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Pepperdine University
Graduate School of Education and Psychology

AUTISM SPECTRUM DISORDER AND USING YOGA AS AN INTERVENTION: A
CRITICAL REVIEW OF THE LITERATURE

A clinical dissertation submitted in partial satisfaction
of the requirements for the degree of
Doctor of Psychology

by

Jessica Garcia, MA

July, 2015

Miguel Gallardo, Psy.D. – Dissertation Chairperson

This clinical dissertation, written by

Jessica Garcia

under the guidance of a Faculty Committee and approved by its members, has been submitted to and accepted by the Graduate Faculty in partial fulfillment of the requirements for the degree of

DOCTOR OF PSYCHOLOGY

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DEDICATION

To my loving parents, supportive family members, and friends who have been there for me every
step of the way.

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ABSTRACT

The present study is a critical analysis of literature regarding the utilization of yoga with children with Autism Spectrum Disorders (ASD). This dissertation will provide an overview and critically analyze the existing relevant literature on the utilization of yoga as an intervention for treating mental health conditions. Special attention will also be paid to the implementation of yoga in schools and classroom settings. Based on the existing literature, strengths as well as limitations will be discussed, and suggestions will be made for future research in this area. This dissertation will conclude with recommendations based on the existing literature, as well as this author's professional experiences in order to improve clinical work with this population.

Chapter I. Introductory Literature Review

What Is Autism Spectrum Disorder (ASD)?

Over the last several decades clinicians have studied the many etiologies of, and interventions for, Autism Spectrum Disorders (ASD) in order to better understand and manage the diagnosis. Only more recently has the diagnosis gained increasing awareness. For example, over five decades ago, children who exhibited autistic-like symptoms were diagnosed under the schizophrenic reaction, childhood type label, in the *Diagnostic and Statistics Manual of Mental Disorders (DSM)* (Matson & Sturmeiy). It was not until the *DSM-III*, in 1980, that the inclusion of autism as a separate diagnostic category was made. Furthermore, the *DSM-IV* included five types of ASD.

Currently, the *DSM-V* categorizes ASD into three separate levels of severity based on social communication impairments and restricted repetitive patterns of behavior (American Psychiatric Association, 2013). Level 1 identifies children with ASD "requiring support," with deficits in social communication that cause noticeable impairments, such as difficulty initiating social interactions; and inflexibility of behavior that causes significant interference with functioning in one or more contexts, such as difficulty switching between activities. Level 2 identifies children with ASD requiring substantial support with deficits in verbal and nonverbal social communication skills apparent even with supports in place; and restricted/repetitive behaviors that appear frequently enough to be obvious to the casual observer and interfere with functioning in a variety of contexts. Finally, Level 3 identifies children with ASD requiring very substantial support with severe deficits in verbal and nonverbal social communication skills that cause severe impairments in functioning; and inflexibility of behavior, or other restricted/repetitive behaviors that markedly interfere with functioning in all spheres (APA).

The diagnosis of autism has evolved through the five releases of the *DSM*, and it is only natural to expect that the understanding of it, as well as the research behind it, has also progressed. Understanding the diagnosis is perhaps the first step to coping with the challenges of ASD. It is important for parents and other professionals to have access to sufficient literature regarding research related to the diagnosis, and its challenges, in order to expand treatment options as well.

Overview of ASD Symptoms

Autism spectrum disorders represent a continuum of neurodevelopmental disorders characterized by impairments in social interaction, communication, and restricted or repetitive interests and behaviors (APA, 2000). In order to gain a better understanding of the disorder, it is important to first consider how the symptoms of ASD present in children. Saint-Georges et al. (2010) conducted a review of 18 of 41 previous studies of family home movies of infants who were later diagnosed with ASD, which yielded 317 movies for analysis. The following were the major findings: (a) there appears to be a lack of social engagement between 6 to 12 months of age; (b) communication skills were impaired as early as 12-14 months in the following areas: a reduced response to one's name, use of fewer phrases, and reduced vocabulary comprehension for the child's age; (c) children made fewer attempts at language and gesture production than expected for their developmental level; (d) reduced intersubjective skills found in clinical settings at 18 months, were found as early as 14 months; (e) disengagement of visual attention between 6-12 months, with affective impairment and irritability at around 12 months; and (f) detection of ASD becomes easier when a child is 2 years or older (Saint-Georges et al., 2010). These findings illustrate the presence of early verbal and non-verbal communication deficits in children with ASD.

These deficits may potentially interfere with parents or clinicians understanding the needs of the child, possibly contributing to parental frustration.

Mahan and Matson (2011) conducted a study utilizing the *Behavioral Assessment System for Children, Second Edition* (BASC-2), which is often used to aid diagnosis in order to compare scores of typically developing children and adolescents to those diagnosed with ASD. Primary caregivers of 38 children diagnosed with ASD (ages 6-16) and 42 typically developing children (ages 6-13) participated in this study. The *BASC-2 Parent Rating Scales* child and adolescent forms were utilized as part of this study. The child form consists of 160 items and is used for children ages 6-11 years old, while the adolescent form consists of 150 items and is used for children 12-21 years old. The informant completing this measure is asked to rate the frequency of particular behaviors, from N (never), S (sometimes), and A (almost always).

Mahan and Matson (2011) found that children and adolescents with ASD had significantly greater difficulties in adaptive skills (e.g., functional communication, social skills, adaptability, activities of daily living, and leadership) when compared to typically developing children and adolescents. These findings coincide with the fact that communication and social skills are two core symptoms of ASD (APA, 2000). The atypicality, withdrawal, and attention problems subscales were also found to be significantly higher for children and adolescents with ASD than for their typically developing peers. Specific items included in the atypicality subscale relate to repetitive behaviors, being out of touch with reality, and odd behaviors, which are each symptoms of ASD (APA, 2000; Mahan & Matson, 2011). The fact that withdrawal was elevated in children with ASD also coincides with symptoms of social impairments often observed in people with ASD, such as not typically engaging in making friends (APA, 2000).

Children and adolescents with ASD also scored higher on the attention problems, hyperactivity, conduct problems, depression, and somatization subscales (Mahan & Matson, 2011). The elevation in somatization subscales may be due to the fact that many children with ASD often have co-occurring medical conditions (e.g., sleep disorders) and because communication barriers may decrease the likelihood that a parent is aware of when their child with ASD is not feeling well (Mahan & Matson, 2011).

A study conducted by Wright et al. (2008) illustrates the lack of communication, language, and attention skills in children with ASD. Utilizing a case-control approach, Wright et al. compared 33 young people with high-functioning ASD, between 7-16 years, with age, sex, and IQ (above 70) to 33 non-ASD children on emotion recognition of faces in pictorial context. Measures included the Ekman and Friesen faces, emotion context task (emotion recognition of faces in pictorial context), occupation context task (non-emotion recognition of occupation in pictorial context), and The Autism Quotient (Wright et al., 2008). Part one of this study examined emotion recognition on faces presented in isolation, while part two investigated whether viewing emotions on faces with contextual information would improve emotion recognition (Wright et al., 2008). The following were the authors major findings: (a) the ability to recognize emotions in faces on emotion and non-emotion context tasks was positively correlated with increasing age and IQ level; (b) neither a diagnosis of ASD or a measure of severity (Autism Quotient Score) impacted these abilities; (c) the ASD group exhibited poorer recognition of happy and angry facial expressions when compared to the non-ASD group (who were accurate 90% of the time or greater); and (d) in performing the facial recognition tasks, the ASD children “mimicked” the facial expressions before labeling it, which the non-ASD group did not do. As previously mentioned, these types of deficits may potentially interfere with

socialization or with parents, peers, or clinicians understanding the needs of the child, in turn contributing to parental frustration. Thus, it is important to also look at the manner in which families tend to cope with ASD symptoms.

Discussion of How Families Cope with Symptoms of Children With Autism Spectrum

Disorder

A healthy parent-child relationship plays a key role in managing the symptoms of a child with ASD. Although there is limited research regarding parenting itself, there are several studies that illustrate common factors associated with parent behavior and coping styles of families with a child with an ASD. Lambrechts, Van Leeuwen, Boonen, Maes, and Noens (2011) conducted a study aimed at the following: (a) examining the factor structure and internal consistency of two scales used to measure parenting behavior, the Parental Behaviour Scale-short version (PBS) and a new scale to measure more specific parenting behaviors among parents of children with ASD, and (b) comparing general and more specific parenting behavior among parents of children with and without ASD. Lambrechts et al. concluded that it was feasible to utilize the parenting constructs (i.e. five subscales: Positive Parenting, Discipline, Harsh Punishment, Material Rewarding, and Rules) of the PBS-short version to investigate parenting behavior of parents with and without children with ASD. Authors then developed a new scale for parenting behavior among parents of children with ASD and the factor analysis of this scale yielded two main factors: Stimulating the Development and Adapting the Environment (i.e., includes behavioral characteristics that parents of children with an ASD need to implement such as, stimulation of joint attention and structuring the environment and activities). Parents then completed both of these measures. Authors found that parents with a child with ASD had somewhat higher scores on a subscale assessing for harsh punishment. However, this result was nuanced because the effect was small and the mean scores for this subscale were also quite low

for both groups (Wright et al., 2008). Therefore, overall this study concluded that general parenting behavior is quite similar between parents with a child with ASD and parents with a child without ASD, with the exception of a significant difference found in parents with a child with ASD partaking in more specific parenting behavior (i.e., more explicitly stimulating their child's development, such as stimulation of joint attention and structuring the environment and activities specifically for a child with ASD).

In a separate study, Sivberg (2002) explored the strain on families when there is a child with ASD. Sixty-six parents from thirty-seven families with a child with autism and sixty-six parents from thirty-seven families with no child with ASD matched in terms of demographics and family system characteristics, were asked to complete the following measures: (a) Sense of Coherence Test, (b) Purpose in Life Test, (c) Family's Rotations Scale, and (d) Ways of Coping Questionnaire (Sivberg). The study found that as the level of family strain increased, the ability of the family to cope with stress related to treating autism decreased, which was found to be particularly true in households with a child with ASD. In addition, when compared to parents with no child with autism, parents with an autistic child scored higher on the specific coping behaviors of distancing and escape as a way to manage their distress. Overall, this study illustrates two key points: (a) there is a high level of strain placed on family systems that include a child with ASD, and (b) it is vital for parents to implement coping strategies into their daily lives in order to better deal with managing the challenges of running a household with a child with ASD.

A similar study conducted by Higgins, Bailey, and Pearce (2005) examined the following: (a) critically examining the perceptions and experiences of families with a child diagnosed with ASD, (b) assessing the behavior and characteristics of children with ASD, and

(c) assessing the impact of ASD on families. Results indicated that primary caregiver's of a child with ASD reported lower: marital happiness, family adaptability, and family cohesion than caregivers of children without an ASD. More specifically, the authors findings indicate that primary caregiver's of a child with ASD reported: (a) low ratings (i.e., measure utilized a likert scale with 1 indicating almost never and 5 indicating almost always) by families regarding flexibility and warmth and connection; (b) low overall marital happiness ratings; and (c) at risk ratings (i.e., falling outside healthy family functioning) of family cohesion and family adaptability in families with a child with ASD. It is also important to note that the authors hypothesis that coping style would influence adjustment (i.e., marital happiness, family adaptability, and family cohesion) was not supported.

Given that families with a child with ASD are often confronted with managing difficult behaviors, it is beneficial to explore several options that are currently available to manage conduct.

Common Approaches For Managing The Behavior of A Child With Autism Spectrum

Disorder

One of the most difficult symptoms for parents of a child with ASD to manage is the inattention to individuals or objects, which often leaves parents feeling they are unable to connect with their child (Wright et al., 2008). Brigham, Jarzynka, Yoder, and Tapp (2009) specifically examined the relationship between parent attentional cues (e.g., child eye contact to parent) and sustained attention to objects in young children with autism. In this study, 25 parents with a preschool age child who spoke fewer than 10 words and met the criteria for ASD or Pervasive Developmental Disorder-Not Otherwise Specified, participated in a 20-minute, videotaped free play session together. The major findings from this study were: (a) a positive relationship between parent maintain cues (i.e., coordinated attention between object and child)

and child object attention (e.g., playing with object or gazing at it) exists, (b) a negative relationship between parent redirect/introduce cues (i.e., coordinated attention of child and object by parent, while attempting to redirect child to another object) and child object attention was found in the majority of all dyads (Brigham et al., 2009). Therefore, as parent maintain cues increased, so did the child's object attention, which indicated that the parents attention to their child and an object can help a child stay more interested in the object. On the other hand, authors found that as parent redirect/introduce cues increased, a child's object attention decreased, which demonstrates that when a parent tries to change their child's focus of attention, attention is lost. In addition, parents that used more maintain cues than redirect/introduce cues, along with a combination of behaviors in their attentional cues (i.e., more than a single behavior), were able to sustain an ASD child's attention to objects more than those who did not (Brigham et al.). Overall, author's findings suggest the following: (a) a parent who focuses more on a present object or activity can better maintain their child's attention, and (b) a parent who utilizes more behaviors that can gain their child's attention may be better able to sustain their child's attention. These findings may benefit treatment planning for parents who are having difficulty sustaining the attention of their child when engaged in an activity together.

Siller and Sigman (2002) conducted a similar study with 25 children with autism, 18 children with developmental delays, and 18 children of typical development. The following measures were administered to participants during two individual sessions: (a) Early Social Communication Scale, (b) Cattell Infant Intelligence, (c) Stanford Binet Intelligence Scale, (d) Reynell Developmental Language Scales, and (d) Childhood Evaluation of Language Fundamentals Revised (Siller & Sigman, 2002). In addition, an episode of a caregiver-child interaction was videotaped and coded using The Observer, NOLDUS.

The aim of the study was to uncover the extent to which the caregiver's verbal and nonverbal behaviors were synchronized with the child's focus of attention and his/her ongoing activity (Siller & Sigman, 2002). Two major findings were evidenced by authors: (a) caregivers of children with autism synchronized their behaviors to their child's attention and activities as much as caregivers of typically and developmentally delayed children with similar language capabilities; and (b) caregivers of children with autism who showed higher levels of synchronization during initial play interactions had children who developed superior communication skills over a period of 1, 10, and 16 years compared with children of caregivers who showed lower levels of initial synchronization.

Siller and Sigman (2002) noted parents of children with autism reach an equivalent level of synchronization as parents of typically developing children. This illustrates that parents of children who have autism adapt their interactive behavior to the language level of their child. Specifically, authors found that a child with autism is able to learn by modeling when parents point, show, or offer an object to their child that is already a focus of attention. In terms of language gains, the strongest predictor of future gains was caregiver utterances that are synchronized with the child's focus of attention and undemanding in quality (i.e., matches the object child is presently attending to and activity child is engaged in). These findings may benefit treatment planning for parents who are having difficulty synchronizing verbal and nonverbal behaviors with the child's focus of attention and for parents who have lost faith in their level of synchronization with their child.

Now that a description of, and key factors associated with ASD have been addressed, the focus will turn to a brief overview of yoga.

Brief Overview of Yoga

Yoga arrived in the United States around the late 1800s and became more widespread in the 1960s as part of the growing interest in Eastern culture (American Yoga Association, 2006). Currently, it has gained increasing popularity and become a part of mainstream culture in the US. According to the American Yoga Association (AYA, 2006), the word Yoga means “to join or yoke together,” (p. 2) and it brings the body and mind together into one harmonious experience. Yoga is built on three main structures that date back 5,000 years: exercise, breathing, and meditation. Breathing techniques are based on the concept that breath is the source of life in the body. One of the main goals of yoga practice is an increase in breath control in order to promote a healthy body and mind. The premise of yoga is that it uses the practice of exercise and breathing to prepare the body and mind for meditation, which in turn results in a quiet mind and allows silence and healing from daily stressors (AYA, 2006). There are over a hundred different schools of Yoga, with Hatha Yoga (i.e., physical movements and postures along with breathing techniques) being one that is commonly associated with yoga practice (AYA, 2006).

Yoga predates written history. In fact, stone carvings depicting figures in Yoga positions have been found in archeological sites in the Indus Valley dating back approximately 5,000 years. There is some controversy regarding whether yoga is a spiritual practice or religion. However, according to the AYA (2006), although Hinduism and other world religions have incorporated some of the practices of Yoga, it is not a religion. The AYA also describes the tradition of Yoga has always been passed on individually from teacher to student through oral teaching and demonstration and the formal techniques of Yoga are based on the collective experiences of various individuals over thousands of years.

Patanjali, a scholar who wrote Yoga Sutras (Yoga Aphorisms) as early as the 1st or 2nd century B.C. or as late as the 5th century A.D., was one of the first to write about Yoga (AYA, 2006). Patanjali's eight limbs of Yoga system are as follows: 1) yama, meaning 'restraint' (e.g., refraining from violence, lying, stealing, casual sex, and hoarding); 2) niyama, meaning 'observance' (e.g., purity, contentment, tolerance, study, and remembrance); 3) asana (i.e., physical exercises); 4) pranayama (i.e., breathing techniques); 5) pratyahara (i.e., preparation for meditation); 6) dharana (i.e., concentration, being able to hold the mind on one object for a specified time); 7) dhyana (i.e., meditation, the ability to focus on one thing (or nothing) indefinitely); and 8) samadhi (i.e., absorption, or realization of the essential nature of the self) (AYA, 2006). Currently, modern Western Yoga classes generally focus on limbs 3 through 5.

Purpose of Literature Review

There is an abundance of research revealing that yoga promotes both physical and mental health. The International Association of Yoga Therapists (IAYT) defines yoga as the process of empowering individuals to progress toward improved health and well-being through utilizing the philosophy and practice of yoga (Joshi & De Sousa, 2012). As previously mentioned, clinicians have studied the many etiologies of, and interventions for, ASD in order to better understand and manage the diagnosis. It is only until recently that ASD has gained increased awareness. There are many challenges faced by parents as well as other important figures in the lives of children with autism ranging from not being able to understand the child's needs, to manageability of problematic behaviors (Sicile-Kira, 2004). These emotional obstacles and challenges may cause stress, which can in turn impact how well parents are able to interact with their child. Furthermore, parents and children with ASD may go through several stages of emotion that are difficult to cope with, such as denial, guilt, anger, blame, isolation, and depression (Sicile-Kira,

2004). Therefore, options for treatments are vital in order to provide quality care to families. Recent literature has also illustrated an increase of stress in lives of children. Therefore, interventions could potentially be more beneficial if children, as well as important figures involved in their life, such as parents, teachers, and peers could somehow be involved in the intervention. Yoga is a feasible option as an intervention, due to the use of it across ages, cultures, and settings. Yoga as an intervention has been shown to lead to symptom improvement for people with many psychiatric disorders. Per current literature, the use of yoga as an intervention for children with ASD has only recently been examined. Thus, the purpose of the present literature review is to explore and critically analyze the existing literature regarding Autism Spectrum Disorder and using Yoga as an intervention, in order to provide the potential clinical value of yoga.

Chapter II. Review and Analysis Procedures

Introduction

This chapter presents all aspects of the research methodology, which includes the following: review procedures for identification and collection of relevant literature, as well as review and analysis of literature such as strengths and weaknesses, synthesizing general findings, and making clinical recommendations based on the current literature.

Review of Procedures

Identification of relevant literature. For purposes of this analysis, the primary search tools that will be utilized include the following: PsycINFO electronic database, Science Direct electronic database, Sage Publications electronic database, and University library catalogue holdings (e.g., Pepperdine University). These sources will be utilized in order to maximize the collection of relevant literature. This review will utilize quantitative and qualitative journal articles, and relevant books.

The following key words will be utilized in the search process in order to maximize the collection of relevant literature: Yoga defined, Autism Spectrum Disorder defined, Autism Spectrum Disorder, Benefits of yoga, Mental health and yoga, Obsessive-Compulsive Disorder and Yoga, Anxiety and Yoga, Yoga and Attention, Yoga and Autism Spectrum Disorder, Yoga and school. Although the practice of yoga for overall health and fitness has been in place for several decades, there is currently a progressive trend toward utilization of yoga as a complementary therapy for children and adolescents with ASD. Thus, the literature will primarily focus on literature published between 2002 to 2015. For areas where the literature was scarce, literature published before 2002 may have been cited. As this dissertation is specific to the utilization of yoga with children with ASD, the literature involving the benefits of yoga for

treating psychiatric disorders that share symptoms in common with children with Autism Spectrum Disorder, such as Obsessive-Compulsive Disorder, Attention Deficit-Hyperactivity Disorder, and anxiety will be included. Therefore, literature regarding the utilization of yoga as an intervention for psychiatric disorders other than ASD, OCD, ADHD, and anxiety will be excluded.

Collection of relevant literature. Literature relevant to this analysis will be gathered in the following ways: articles from electronic databases will be downloaded or printed and books or book chapters will be borrowed from Pepperdine libraries.

Analysis Procedures

Basic analysis techniques. The collection of literature will be read thoroughly, organized in multiple categories relevant to this analysis and placed in electronic folders. The electronic folders will be categorized as follows: Yoga, ASD, Yoga and ASD, Yoga and OCD, Yoga and Anxiety, Yoga and Attention, and Yoga and school. A spreadsheet of the literature will be created to highlight each category, and key ideas from different pieces of literature will be written to develop ideas. Each of these steps will help to integrate and formulate a critique of the literature.

Strengths and weaknesses of current literature. This section will focus on analyzing the strengths and weaknesses found in certain individual pieces of literature, as well as in the literature as a whole. For example, a pilot study essentially examines the feasibility of a particular approach and does not necessarily generalize beyond the inclusion and exclusion criteria of the pilot design, which is a key disadvantage. However, due to the limited literature regarding the utilization of yoga with the ASD population, these studies will be addressed in order to supplement findings. Additionally, in terms of empirical studies, issues related to design

study and methodology will be addressed, as well validity of the study findings and ability to generalize findings to the ASD population. Furthermore, qualitative studies and literature reviews are analyzed with regard to their comprehensiveness concerning the benefits of yoga for treating symptoms of ASD and psychiatric disorders with commonalities.

Synthesis of general findings. This section will outline major themes present in the literature that pertain to the benefits of utilizing yoga as an intervention for children with ASD. The author will focus on identifying key findings that illustrate the overall physical and mental health benefits of yoga as a useful tool to provide for children to remain centered and regain focus. It will highlight significant similarities as well as differences found in the literature.

Clinical recommendations based on literature. Recommendations for the application of yoga in home, school, and clinical settings based on current interventions and relevant findings from literature will be provided. The author will also address important considerations for the potential use of yoga as a complementary therapy, including being mindful of the type of yoga used, as well as a yoga instructor's training. Additionally, areas of the research that require further study will also be discussed.

Chapter III. Review and Analysis of Literature

Introduction

The goal of this chapter is to provide a comprehensive review of and analyze the existing literature regarding the use of yoga as an intervention for children with Autism Spectrum Disorder. First, a brief introduction will review yoga as an intervention for treating psychiatric disorders that share commonalities with ASD. Then the chapter will focus on the implementation of yoga in school settings. Finally, the chapter will review yoga as an intervention for children with ASD.

Yoga as an Intervention for Treating Psychiatric Disorders

A strong body of evidence suggests that yoga has been shown to benefit overall well-being. A literature review conducted by Zipkin (1985) found that yoga: (a) relaxes disruptive children and stimulates under-reactive children; (b) reduces and relieves stress; (c) dissipates excess energy; (d) relieves lethargy; (e) lengthens attention span; (f) improves general health; (g) develops concentration and greater mental clarity; (h) cultivates interpersonal relationships; and (i) benefits children with psychomotor deficits.

Obsessive-compulsive disorder. Obsessive-Compulsive Disorder (OCD) and ASD are associated with repetitive behaviors, anxiety, and social impairment (APA, 2013). The use of yoga as an intervention for OCD has been examined by several investigators. Shannahoff-Khalsa (2003) conducted a study utilizing a specific Kundalini yoga protocol that included breathing techniques proven useful for a wide range of anxiety disorders, as well as individual techniques aimed at increasing ability: to manage fear, calm an angry mind, meet mental challenges, and reframe negative thoughts into positive thoughts. Following a one year Kundalini Yoga (KY) treatment, adult patients diagnosed with OCD reported an overall 70% reduction on Yale-Brown

Obsessive Compulsive Scale (Y-BOCS) scores and symptom reduction for most symptoms of both obsessions and compulsions, along with an overall reduction of psychiatric symptoms (Shannahoff-Khalsa, 2003). Additionally, authors reported that 4 of 5 patients (who were previously using pharmaceutical treatment for symptoms of OCD) had been off medication between 9-19 months after completion of one year KY treatment, which suggest that yoga may have assisted patients manage symptoms.

Although significant symptom reductions were found following KY treatment, Shannahoff-Khalsa (2003) did not specify which particular portion of the 16-step KY protocol provided specific symptom reduction. Another limitation of this study was that it was a small and uncontrolled study. However, there were statistically significant findings, which suggest yoga may benefit individuals with OCD who have difficulty adhering to their medication regimen, or who prefer non-pharmaceutical treatments. Similarly to individuals with OCD, children with ASD may be on medication regimens that include antidepressants for anxiety and/or antipsychotics to treat severe behavioral problems. Thus, a treatment such as yoga could potentially help alleviate some of the symptoms of ASD.

The practice of mindfulness and yoga share commonalities, including the process of meditation and attention to breathing. Hanstede, Gidron, and Nyklicek (2008) studied the effects of a mindfulness intervention on OCD. Eight men and women between ages 19 and 41 participated in a mindfulness intervention that included eight 1-hour meetings aimed at teaching meditative breathing and being mindful. The intervention also incorporated a 4-step sequence for managing difficult emotions (i.e., “noticing, putting no energy, observing flow, returning to one's breathing”) and “body scan” and applying the 4-step sequence to obsessions and compulsions (Hanstede et al., 2008; p. 777). Additionally, authors found significant decreases in symptoms of

OCD for patients who participated in the mindfulness intervention when compared to a control group. Authors also found a significant increase in mindfulness and “letting go of bothering thoughts and feelings” and thought action fusion (TAF; belief that thinking about an event will increase the likelihood of the event occurring) was found in the intervention group (p. 776). Furthermore, authors indicated 60% of participants responded favorably to the mindfulness intervention.

There were several limitations to this study, including small sample size, improper randomization, and inclusion of patients without a clinical OCD diagnosis. Future researchers may want to consider utilizing a larger sample size and patients with an OCD diagnosis in order to provide more conclusive findings. Due to participants’ positive feedback regarding participation following the mindfulness intervention, recruitment efforts may prove fruitful for future researchers.

Anxiety. In addition to alleviating symptoms of OCD, yoga has also been shown to reduce anxiety. Anxiety is a psychological and physical state that every individual experiences. According to the National Institute of Mental Health (NIMH), anxiety disorders are one of the most common psychiatric disorders in the United States. A certain degree of anxiety could typically be motivating (Joshi & De Sousa, 2012). Specifically, authors describe the fear of negative consequences that lead to feeling anxious, often drives individuals to complete tasks, thus contributing to personal growth. However, anxiety can be pathological when persistent and no longer serves to signal danger (Joshi & De Sousa, 2012).

As previously mentioned, the practice of yoga focuses on breath control in order to promote healthy body and mind, which is why yoga is typically associated as a relaxation technique and commonly used to treat anxiety. In a review of the literature conducted by Sharma

and Haider (2013), the authors aimed at determining the efficacy of yoga (with or without pharmacological therapy) as an alternative or complementary treatment for anxiety disorders. Sharma and Haider (2013) found that 19 of 27 studies illustrated a significant decrease in state and/or trait anxiety, illustrating a 70% reduction in symptoms of anxiety overall. Additionally, authors found the majority of studies indicating significant decreases in anxiety were found for in-class yoga training with an instructor when compared to at home independent practice, which suggests that a more structured environment is conducive to positive change. Sharma and Haider (2013) also highlighted studies illustrating that using yoga and meditation significantly decreases anxiety for subjects with anxiety, stress, and depression. However, both studies found that yoga without meditation was not as efficacious. Furthermore, Sharma and Haider found literature that supports that the practice of yoga may be effective in reducing anxiety across ages. As cited in Sharma and Haider (2013), patients separated into two separate groups (ages 20 to 30 years and ages 65 to 75 years) reported significant decreases in state and trait anxiety, with no significant difference found between groups.

There were several limitations to Sharma and Haider's literature review. For starters, many utilized self-reports, which may produce errors such as inaccurate recall. Additionally, there were variations in diagnosis of anxiety (e.g., ranging from secondary or primary conditions to being healthy, which may yield results that may not be comparable between studies. The aforementioned may create challenges in determining whether decreases in anxiety are secondary to decreases in patients with comorbidities of anxiety (e.g., hypertension). However, an overall decrease in anxiety across ages was found in the majority of the literature regarding use of yoga to treat symptoms of anxiety.

In yet another review utilizing yoga as an intervention for anxiety, the authors found an improvement in anxiety, depression, anger, fatigue and confusion in psychiatric in-patients after one yoga session (Joshi & De Sousa, 2012). Additionally, Joshi & De Sousa's review found lower mental disturbances, anxiety, anger and fatigue in long-term yoga practitioners in comparison to non-experienced participants. Authors also found significant short term reduction in state anxiety in non-clinical samples when compared to effects of swimming, fencing, and body conditioning. Authors also highlighted studies illustrating that yoga has also been shown to significantly reduce anxiety of patients suffering from medical or psychiatric conditions (depression, anxiety) when compared to controls, and to reduce stress in response to natural disasters. Furthermore, authors found studies have shown a 27% increase in gamma amino butyric acid (GABA), a neurotransmitter that slows down the activity of nerve cells in the brain and is often used in treatment for anxiety, with levels increasing after one yoga session for avid yoga practitioners. This suggests physiological changes take place following as little as one yoga session.

Yoga may also contribute to improved attention and quality of sleep in patients with anxiety. In terms of the electrophysiology of yoga techniques, as cited in Joshi & De Sousa's review, participants who practice Sudarshana Kriya Yoga (SKY) regularly have an increase in beta activity (i.e., higher frequency range in EEG activity, which is associated with being alert and attentive to one object). Furthermore, authors highlighted sleep studies that have indicated improvement in the following areas (in individuals who practice yoga): quality of sleep, slow wave sleep, and Rapid Eye Movement (REM) sleep.

In terms of yoga as an intervention specifically for childhood and adolescent anxiety disorders, a review of three child and adolescent studies found that yoga participants (not

controls) reported decreased anxiety, increased positive affect, and observed decrease in fidgeting and anxious behavior (Joshi & De Sousa, 2012). The aforementioned review has several methodological limitations such as small sample size, utilization of self-reports, and use of non-clinical samples. However, it reaffirms the benefits of utilizing yoga techniques to assist in anxiety management.

Harrison, Manocha, and Rubia (2004) also found that symptoms of anxiety for children with Attention-Deficit-Hyperactivity Disorder (ADHD) decreased after participation in Sahaja Yoga Meditation (SYM). Specifically, authors noted children reported feeling calmer, less panicky, and more relaxed during and after the SYM program. This study had a small sample size, with no comparison group and future research is necessary. Overall, the study reaffirmed that providing a calm and structured environment is optimal for children with attention problems.

It is common for individuals and family members diagnosed with cancer to experience anxiety due to the disease, the uncertainty of the disease, and treatment. Thysgeson, Hook, Clapsaddle, Robbins, and Moquist (2010) conducted a study utilizing a yoga intervention for parents and their children (and/or adolescents) who were hospitalized on an inpatient unit with a diagnosis of cancer or blood disorder. Although children did not report a change in anxiety or sense of well-being following the yoga intervention, themes from open-ended questions illustrated that children found yoga to be “fun” and “relaxing,” and children reported it “helped them calm” and “feel good” (Thysgeson et al., 2010, p. 280). Adolescent responses yielded similar themes to children participants, with the additional theme of yoga as a self-care strategy (i.e., helpful in managing stress and calming worries, and strengthening muscles). Authors noted both adolescents and parents reported a decrease in anxiety with an improved sense of well-being. Parents described their experience as “very relaxing” overall (Thysgeson et al., 2010, p.

280). Additional parent themes from opened-ended questions included the following benefits: “exercise and movement; stress relief; calm and centered; self-care; bonding with their child; and easy and better than expected” (p. 280).

Although the above-mentioned study lasted 9 months, it was a small study and participants engaged in a single yoga session. Additionally, a brief anxiety measurement was utilized as a substitute for sense of well-being. The aforementioned study was also conducted in one hospital and one yoga session was offered. Conducting studies in various settings and utilizing several yoga sessions over the course of treatment, would allow for more detailed findings. Overall, the significant decrease in anxiety and increase in sense of well-being following the yoga session, illustrate the potential benefits for future research in this area. In addition, 73% of parents consented to the yoga intervention and all participants reported enjoying yoga, which illustrates the feasibility of utilizing yoga for populations dealing with anxiety.

These various research findings indicate yoga may help reduce obsessions and compulsions, improve mood, and reduce anxiety, which helps illustrate the potential benefit yoga may have in children with ASD who experience similar challenges.

Attention-deficit-hyperactivity disorder. The focus will now turn to the use of yoga as a treatment intervention for ADHD, as this diagnosis affects children in the same three areas that children with ASD are affected (i.e., communication, social interactions, and behavior) (APA, 2013). Sahaja Yoga Meditation in conjunction with medication as a family treatment for children with ADHD and their parents has been found to have the following affects: (a) reduction of core ADHD symptoms (i.e., hyperactivity, impulsivity, and attention deficit), with children reporting they felt calmer and more relaxed; (b) increased self-confidence (per child self-report and parent-

rated questionnaires); and (c) improvement in homework completion (Harrison et al., 2004).

Children also reported an improvement in sleep quality and ability to concentrate. As previously mentioned, yoga has also been found to help families' better cope with the symptoms of children with ADHD (Sivberg, 2002).

Harrison et al. also found that the quality of the child-parent relationship improved after participation in SYM, along with a significant reduction in relational conflict. Similarly, Zylowska et al., (2008) conducted a feasibility pilot study of an 8 week mindfulness training program for adults and adolescents with ADHD where 78% of participants reported a reduction in total ADHD symptoms, and 30% reported at least a 30% reduction. These findings suggest that yoga may be particularly valuable for parents of children with ASD who are seeking ways to soothe their children, bring a greater sense of calm to the family, and facilitate their child's ability to concentrate and focus on learning experiences. Although the above mentioned studies had several limitations, including small sample size, use of self-reports, and lack of control group, they both highlight potential benefits for helping children and parents cope with varying symptoms related to ADHD.

Peck, Kehl, Bray, and Theodore (2005), conducted a study that required elementary school children to engage in a 30 minute yoga fitness video designed for children twice a week for 3 weeks. Authors found that time on tasks (measured as the percentage of intervals observed that the students were orienting toward the teacher or task), along with completing required classroom assignments remained relatively unchanged throughout the three phases of the study. Observations by the school psychologist and/or intern reported that due to student compliance and engagement, behavioral interventions were not required throughout the course of the study. This suggests that children enjoyed engaging in yoga. Additionally, self reports indicated the

practice of yoga facilitated by video was easily implemented and teachers recognized the ease of intermittently utilizing yoga in a classroom or office setting in order to regain student focus (Peck et al., 2005).

There were several limitations to the aforementioned study, including use of small sample with no control group, use of self-reports, possible bias due to the investigator being the observer to participants, and inclusion of patients without a diagnosis of ADHD. However, this study coincides with previously mentioned studies that highlight positive responses from both students and teachers regarding yoga, which illustrates the feasibility of integrating yoga principles into school settings.

In yet another study, Jensen & Kenny (2004) investigated the effects of a yoga practice program on the behavior and attention of boys ages 8 to 13 years old diagnosed with ADHD. Based on results of the Conners' Parent Rating Scales (CPRS), authors found significant improvements were identified in terms of their child's oppositional behavior, emotional lability, restless/impulsive behavior, ADHD index, hyperactivity, anxious/shy, and social problems for boys who participated in yoga. Jensen and Kenny (2004) explain that from a parental perspective, the improvement in the ADHD index, indicates their child's behavior became "more controllable," in conjunction with an increased improvement in "ability to remain engaged" in activities (p. 211). Authors also found that both yoga and control groups (who participated in cooperative activities, such as games involving turn taking) significantly improved in the following CPRS scales: Perfectionism, DSM-IV hyperactive/impulsive, and DSM-IV total. Authors reported control groups significantly improved in the following CPRS scales: anxious/shy and hyperactivity (both with a trend toward yoga group), and social problems.

Authors reported no significant differences were observed by teachers for the yoga or control group.

Jensen & Kenny also found that boys who attended more yoga sessions showed a greater reduction in primary ADHD symptoms, and those who engaged in additional home practice received improved ratings on the CPRS. Additionally, authors found that the boys performance on a continuous performance test that measures attention, and ability to sustain a consistent level of performance over a given period of time, improved following engagement in yoga. Furthermore, anecdotal evidence from parents and participants suggests positive improvement in the behavior of boys in the yoga group. For example, one mother noted the effectiveness in prompting her son to utilize “staircase breathing” (i.e., “breathing practice involving deeply inhaling and exhaling in spurts through both nares”) when his behavior escalated into “hyperactivity, restlessness, and loss of control” (Jensen & Kenny, 2004, p. 214). Another mother reported that following the yoga intervention her son's memory improved, along with his ability to follow more than one command. Additionally, one of the boys who participated reported he used relaxation techniques learned in the yoga intervention in order to help him sleep (Jensen & Kenny, 2004).

There were several limitations in the above mentioned study, including a small heterogeneous sample (e.g., first group predominantly inattentive, while second group was combined type ADHD on DSM-IV), lack of power in order to discern small to moderate differences between yoga and control groups, and variability in number of sessions attended (ranging from 5-20 sessions). Additionally, for a number of participants, pre and posttests were completed by different teachers. However, authors did illustrate that the practice of yoga may provide symptom relief for children with ADHD, which warrants future research in this area.

Prakash (2010), conducted a study which compared the performances of meditators, with more than 10 years experience, versus nonmeditators in Vihangam Yoga, a type of yoga that primarily focuses on a concentrative meditation technique where an individual focuses attention on a particular point, on different parameters of attention. Authors found that meditators performed better on all four domains of attention (i.e., attention span, attentional shift, ability to inhibit distracters, and information processing speed) when compared to controls. One limitation of the study included self-selection bias, which longitudinal study would be the only practical solution for. Additionally, participants in the meditation group had an extensive history of yoga practice, which creates a challenge when comparing the study with others. However, findings of this study correlate with previously mentioned studies that suggest the benefits of yoga increase in conjunction with increased engagement in yoga practice.

The literature that this author has addressed thus far has shown fruitful results for utilizing yoga as an intervention for psychiatric disorders that share symptoms in common with children diagnosed with ASD. Specifically, this author has highlighted several studies that found yoga may help reduce anxiety, increase attention and relaxation, increase self-esteem, improve mood, and improve parent-child relationships. It is likely that much of the literature supporting the use of yoga with children plays a role in the progressive trend toward the implementation of yoga-based activities in schools.

The Implementation of Yoga in School Settings

Children and adolescents are faced with many stressors, ranging from academic performance to familial problems, which have the potential of developing into mental health concerns. Being that children spend the majority of time in a school setting, the importance of

identifying potential interventions to address mental health of youth is essential. Therefore, the author will address the potential benefits of recent use of yoga interventions in school settings.

Powell, Gilchrist, & Stapley (2008), conducted a study to examine a self-discovery program that consisted of 12 sessions delivered weekly to facilitate self-discovery (i.e., senses, feelings, psychological and physical well-being) through massage, yoga, and relaxation. The studies participants consisted of 54 (control group) and 53 (intervention group) 8-11 years old with emotional and behavioral difficulties at risk of exclusion from school. Authors discovered that following the program, children in the intervention group increased use of self-talk, increased attention span, and enhanced listening skills. Authors also found that following the intervention, children's use of positive touch and breathing techniques increased, while fidgeting behavior decreased. Overall, children were also observed to appear more relaxed in the classroom. There are several limitations to this study, including use of self-reports and small findings; therefore, future studies should focus on utilizing additional measures and a longer duration of intervention in order to provide more conclusive findings. Furthermore, although this study did not solely examine the effects of yoga, it illustrates the benefits of yoga and similar meditative techniques, indicating potential benefits of alternative and complementary therapies for children in school settings.

In another study, Khalsa, Hickey-Schultz, Cohen, Steiner, & Cope (2012) evaluated potential mental health benefits of yoga for adolescents in secondary school. For 11 weeks, authors randomly assigned students to either regular physical education classes or 2 to 3 yoga sessions per week. Authors found that students who participated in yoga frequently made comments indicative of having had a relaxing and positive experience with yoga. Specifically, Khalsa et al., (2012) noted students in the yoga class frequently made comments such as the

following: “enjoyed being able to let go of everything, zone out and relax;” “felt like the class was a relaxing prep for the rest of the day;” “an opportunity to de-stress at the end of the day;” and “I could reflect on my day in a positive way” (p. 87). Authors also reported student self-reports (BASC-2) indicated a decrease in fatigue/inertia (BASC-2) for students in the yoga group, while the control group reported an increase in these symptoms. Additionally, student self-reports showed improvements in the anger and attitude toward school scales for participants in the yoga group.

There were several limitations to the aforementioned study, including only a few statistically significant findings; and lack of blinding with subjects, which could create bias. Additionally, the study primarily focused on comparing yoga education versus regular physical education classes in order to identify potential mental health benefits of yoga as an intervention. This study does however provide an extensive amount of positive anecdotal evidence regarding children's experience with yoga, which illustrates potential benefits for future research in this area.

In yet another study, Ehud, An, & Avshalom (2010) assessed the impact of a yoga intervention for a group of Israeli school children residing in the region affected by the Second Lebanon war. Authors found that children enjoyed the yoga intervention. Specifically, self-reports indicate that post intervention 57% of children found yoga interesting, 64% described it as fun, and 90% expressed interest in continuing the classes during school hours. Authors also found improvements in children's attention span, restlessness, and inattentiveness following participation in the yoga program.

Furthermore, authors indicated teachers reported several statistically significant improvements in children's concentration, mood, and ability to function under pressure

following participation in yoga during school hours. This study had several limitations, including use of self-reports and no control group. This study does however highlight positive improvements in attention, behavior, and mood, along with child reports of enjoyment in yoga, which illustrates the potential for future research in this area.

Smith, Connington, McQuillin, and Bierman (2014) conducted a two part study utilizing the deployment focused treatment development model (DFM), which is a multi-phase model aimed at overcoming obstacles to implementing evidence-based interventions. The authors describe that the first part of their study is consistent with the first phase of DFM, which “involves manual development with input from stakeholders” (Smith et al., 2014, p. 140). Thus, part one is a descriptive study that focuses on teachers' reactions to a school wide implementation of a yoga program in an urban elementary school, in order to assess the acceptability and feasibility of such a program. Authors utilized a semi-structured interview approach with ninety-six percent of teachers in an urban elementary school. Authors reported the following significant findings: 61% reported an improvement in students behavior as a result of yoga, 17% reported feeling uncertain as to whether yoga impacted their students, and 1 teacher reported a negative effect. Authors also found that 52% of teachers reported yoga helped individual students. Additionally, authors reported that 76% of classrooms reported using prompts to use yoga throughout the school day, with 86% saying they had used prompts within 24 hours. Authors also found that fifty-two percent of teachers reported using yoga during transitions, while a third of teachers indicated using prompts to promote calm. Authors noted an additional 28% of teachers reported using yoga to regain student's focus, while two teachers reported use of prompts to improve test performance. Smith et al. (2014) also reported 60% of teachers shared weekly yoga was not sufficient, while 32% reported it was (1 teacher was

undecided). Furthermore, the authors found that 39% of teachers reported their perception of yoga changed for the better following the yoga implementation at school.

There were several limitations in the aforementioned study. For starters, there was a wide variability in yoga-related activities (e.g., breathing, postures and mindfulness activities, such as body scanning) supported by the teachers and it is unclear how involved teachers were in implementing yoga into their particular classroom. Additionally, results were mixed and numerous teachers reported being unsure of the benefits of yoga. For example, the authors reported that it was unclear why one teacher identified the use of yoga as negative. Therefore, future researchers who utilize qualitative data are advised to focus on gathering more detailed accounts, including follow up questions. Future researchers may also benefit from gathering information regarding perception of the benefits of yoga in the classroom, as well as how teachers beliefs play a role in implementation of yoga in school settings.

Part 2 of Smith et al. (2014) was a pilot study conducted in two public, high-poverty elementary schools with after school programs. Part 2 of the study aimed at assessing the feasibility and acceptability of a yoga intervention at school and acceptability and feasibility of controlled research regarding the utilization of yoga in an afterschool program (Smith et al., 2014). Authors gathered information regarding attendance, behavioral support system level (for implementation of school programs), a measure of academic performance scores for students, and academic grades from report cards. For 8 months, students engaged in either yoga twice weekly for approximately 40 minutes per class, while comparison groups attended a class called healthy eats (HE) twice weekly for 45 minutes. Authors did not find any statistically significant change on academic grades from student report cards following yoga or HE participation.

Additionally, only 58% of students completed a full year of yoga (e.g., 7 or more months) and overall 65% of students attended the yoga class; due to this researcher's were not able to measure effects of the intervention.

Authors indicated that results of this pilot study are mixed and should be interpreted with caution. Although this study has numerous limitations, the authors were able to identify crucial considerations for future research. For starters, authors identified the importance of teacher involvement when implementing a yoga intervention during school hours and the necessity for researchers to ensure proper utilization of yoga intervention (e.g., proper documentation) is being implemented. Additionally, ensuring that children are present and engage in the yoga intervention in order to accurately analyze results following the program is vital. Authors also noted that when considering future school-based yoga studies, assessing whether the intervention may have impacted grades is important. Furthermore, parents complained about their child being placed in HE, but there were no complaints for those placed in yoga, which further illustrates the feasibility of yoga implementation in school settings.

A review regarding benefits of mindfulness practices (including yoga) conducted by Greenberg & Harris (2012), found that urban youth who participated in a 12-week yoga program reported decreases in involuntary stress responses as well as lower scores on subscales of intrusive thoughts and emotional arousal. In a similar review of the literature that included 12 peer-reviewed published studies, in which yoga and a meditative component (i.e., breathing practices or meditation) were taught to youth in school settings, children with severe educational problems who participated in a yoga intervention reported improvements in both attention and concentration (Serwacki & Cook-Cottone, 2012). Authors also found that following yoga, typically developing children experienced a decrease in body dissatisfaction, anxiety, and

negative behavior; and an increase in perceived self-concept and emotional balance.

Additionally, authors found that following yoga children with emotional, behavioral, and learning problems were rated as exhibiting greater self- and social confidence, as well as improved communication and participation in the classroom. Furthermore, following a mindfulness intervention, inner city children reported reductions in cognitive disturbances, such as rumination and intrusive thoughts, as well as a decrease in emotional and physical arousal and impulsivity (Serwacki & Cook-Cottone, 2012).

This author has addressed various benefits of utilizing yoga as an intervention for psychiatric disorders sharing commonalities with ASD and the recent trend toward implementation of yoga in school settings. The focus will now turn to the specific benefits of yoga with children with ASD.

Yoga as an Intervention for Children with ASD

Imitation skills. Findings suggest that practicing yoga improves imitation skills in children with ASD, which may potentially provide a foundation for enhancing overall well-being. As previously mentioned, one of the most challenging symptoms for parents of a child with ASD to cope with is the inattention to individuals or objects, which often leaves parents feeling they are unable to connect with their child (Wright et al., 2008). As previously mentioned, children with ASD exhibited difficulties in both recognizing and labeling facial expressions when compared to non-ASD groups, and imitation skills that can be observed in typical infants as early as infancy are typically lacking in children with ASD (APA, 2013; Radhakrishna, 2010; Wright et al., 2008). Treatment methods for ASD based on behavioral or cognitive developmental models, such as discrete trial training (DTT) and applied behavior analysis (ABA), focus on teaching imitation skills; the premise being that imitation skills are

essential to new learning and are considered pre-requisite abilities for learning other skills (e.g., motor imitation, such as walking, running, and walking on toes) are building blocks for more complex tasks (Radhakrishna, 2010).

Deficits in imitation skills can also affect socialization, and a core component of human social behavior is the ability to understand another person's action and imitate that action (Kenny, 2002). Radhakrishna investigated the use of Integrated Approach to Yoga Therapy (IAYT) as a treatment method for children (in India) with ASD, aimed at increasing imitative skills. The author found improvements in imitation of gross motor movements, oral facial movements, and performing breathing exercises post assessment. The author also found significant changes in imitation skills related to all five parameters (e.g., gross motor actions, vocalization, two phase complex movements, oral facial movements, and adult breathing) following IAYT. Additionally, following IAYT the author found improvements in communication, functional object use, language, play, and joint attention. Furthermore, following the 8-week treatment program, the majority of the children were able to emulate the 18 different postures utilized during the yoga portion of sessions (Radhakrishna, 2010). The author noted the fact that yoga utilizes visual aids, modeling, and imitation of instructor and peer poses as well as prompting by instructor to identify areas of strength and improvement, may be related to the observed improvements in imitation skill and shared attention behaviors in children with ASD.

In a separate study conducted by Radhakrishna, Nagarathna, and Nagendra (2010), IAYT was utilized 5 times per week over a 2 year academic period at a school for children with ASD. Two special educators assessed subjects pre, mid, and post sessions on ASD's 9 core targeted behaviors: eye to eye gaze, sitting tolerance, body posture, body awareness, depth perception and

balance, imitation skills, self-stimulatory behavior, receptive skills related to spatial relationships, and self injurious behaviors. Authors separated 12 children aged 8 to 14 into two groups of six. The first six (matched control group) continued to receive ABA therapy they were accustomed to, while the second group of six received IAYT in addition to ABA (Radhakrishna et al., 2010). During this study, children also received one-on-one assistance from their parents. Authors found “after first 12 sessions, no observable changes in eye to eye gaze, sitting tolerance, or imitation skills occurred (Radhakrishna et al., 2010, p. 122). The following were significant midsession changes noted by the authors: increased eye contact, improved body posture and ability to remain seated for longer period of time, as well as observations made by teachers that children’s alertness after yoga sessions increased. Authors also indicated that therapist and parents reported the following significant changes: increased communication, language, play and joint attention, eye contact, sharing, initiating, and reciprocating. Additionally, authors found that the slow pace of yoga helped children’s imitative and cognitive performance. Parents also reported positive progress at home, while therapists observed a higher level of interpersonal skills during session (Radhakrishna et al., 2010). Furthermore, Ehleringer (2010) made observations that her students frequency of outbursts in classroom decreased and amount of time spent on task increased. It is apparent throughout the literature that yoga provides various opportunities to build upon imitation skills through modeling and observation, which in turn may also play a role in developing further opportunities for socialization and communication.

Social Interaction. The presence of markedly abnormal or impaired development in social interaction and lack of social and emotional reciprocity is one of the key indicators of ASD (APA, 2013). Yoga is thought to rebalance the body biologically, improving capacity for

contact with others, increased attention span, better handling of emotional reactions, and greater tolerance for frustration, all of which promotes social interaction and encourages interaction and trust within groups (Kenny, 2002). Kenny also describes that competitive physical activities may often lead to frustration in children, and children with ASD who may already have social concerns, may benefit from a less competitive activity, such as yoga that draws upon working both independently and as a group. Porter (2013) found that following yoga, her student was observed to cry less frequently and was not as easily frustrated, which illustrates that yoga has the potential to help with emotion regulation, and in turn promote more positive social interactions. Porter also reported her student wanted to show his peers and other teachers what he had learned, which further indicates that yoga provides opportunities to increase interaction with others. Furthermore, during her work as a manager for a program for high school students with ASD with high sensory and behavioral needs, Ehleringer (2010) observed that students had a desire to socialize and connect with others, but appeared uncertain of how to do so. Therefore, Ehleringer began to teach students yoga to assist them in integrating outside information and building an inner connection with themselves, which she observed to benefit students following several sessions. The author reported students enjoyed yoga, illustrated by their “calmer demeanors and happy smiles” (Ehleringer, 2010, p. 132).

Kenny (2002) also highlights that because yoga is a fairly safe and noncompetitive activity, individuals may potentially gain a sense of physical self-confidence as they are learning new postures and being praised throughout. Kenny describes that children with ASD, who may experience feeling different than others, may feel a sense of relief during yoga as opposed to other physical activities. Specifically, removing the added stressor of competition may provide further opportunity to engage in physical activity and interactions with others. Ehleringer (2010)

also cited several studies showing that one of the four typical components of yoga, yoga mantras (music and chanting), promotes eye contact, and a typical yoga session ends with “namaste” (a customary greeting or departure in yoga) and intentional eye contact, which provides further opportunity for social- interaction. Furthermore, Serwacki & Cook-Cottone (2012) indicated that children with ASD (with intellectual disabilities) who participated in a yoga program reported improved ratings on social adaptation scores.

In children with ASD, yoga may help improve symptoms of irritability. Rosenblatt et al. (2011), found a trend toward improvement (in latency-aged group children) for the irritability scale of the BASC-2 after participating in a therapy program that combined yoga, dance, and music therapy. Furthermore, authors found significant post-treatment changes for all children participants for the Aberrant Behavior Checklist (ABC) irritability scale and the BASC-2 atypicality score, with greater changes shown by latency-aged participants, when the ABC irritability scale and BASC-2 were combined. The apparent greater impact of this combined yoga, dance, and music therapy treatment on latency-aged participants may indicate that patients with ASD may have greater receptivity to the program's emphasis on sound and movement during this developmental period (Rosenblatt et al.). This study illustrated that yoga has the potential to decrease irritability for children with ASD, which may provide opportunities for more positive interactions between a child with ASD and others, and also benefit overall well-being.

Communication. Another characteristic typical of individuals with ASD is a qualitative impairment in communication (APA, 2013). As previously noted, communication skills in children with ASD have been found to be impaired as early as 12-14 months, and children and adolescents with ASD have significantly greater difficulties in terms of functional

communication (Mahan & Matson, 2011; Saint-Georges et al., 2010). Yoga offers a variety of opportunities for improving social-communication skills and direct language learning through turn taking, motor and verbal imitation, and communicating intent. As previously mentioned yoga also offers opportunities for asking for help with postures and receiving praise and attention from others, which provides children further opportunities to develop communication skills.

Kenny (2002) found consistent results in terms of improvement in communication with children diagnosed with ASD following Integrated Movement Therapy (IMT; an individual and group yoga based therapy approach, combining speech-language pathology, behavioral and mental health counseling). Specifically, Kenny reported observations of improvement in nonverbal communication (e.g., motor imitation of picture cards and therapist), verbal identification of poses, as well as increased social interaction (e.g., initiating play) following six sessions of IMT. The author noted the aforementioned play a large role in the development of functional communication and increasing both expressive and receptive language skills. Kenny also noted observations that the variety of named poses (categorized in terms of animals/objects) and body positioning in yoga practice, provided opportunities for learning more complex language skills.

Additionally, Ehleringer (2010) cited several studies showing that yoga mantras (music and chanting), encourages the development of language. Kenny observed children utilizing nonverbal skills, such as eye contact and facial expressions throughout IMT. Porter (2013) also reported an increase in her student's use of nonverbal skills, with significant improvement in eye contact during the hour following yoga. Additionally, Kenny found an increase in self-esteem and social communication skills in children in IMT. Furthermore, Rosenblatt et al. (2011) found that following an 8-week therapy program that combined yoga, dance, and music therapy, symptoms of withdrawal decreased in children with ASD (primarily between ages 5-12 years old).

Anxiety/Inhibition. As previously mentioned, yoga has been shown to have an effect on sympathetic over activity. For example, observed qualities of anxiety, such as a racing heart, palpitations, tremors, sweating, increased blood pressure, dry mouth, avoidance behavior, restlessness, and increased responsiveness have been shown to decrease and progressively disappear for individuals who practice yoga (Joshi & De Sousa, 2012).

Through observation of his children with ASD, Russell (2011) found that practicing mindfulness decreased his children's overall anxiety symptoms and frequency of tantrums. Russell (2011) also reported personally feeling as though he can, "pay better attention to (his) thoughts and take back some control of the process" in terms of his day to day tasks (p. 213). Based on her clinical experience (i.e. Master's in Education and Registered Yoga Teacher), Ehleringer (2010) noted observations that yoga helps create a personal connection due to the use of vibration and vocalization, which may be calming and help regain focus. Ehleringer reported that parents also noted improvement in their child's attention, focus, and ability to remain calm. Pranayama (breathing exercises), which are integrated into yoga, have been shown to benefit children with ASD. Specifically, Ehleringer describes that pranayama aims at creating awareness of the breath to calm one's body. The author notes that teaching proper breathing techniques may help decrease a child's levels of anxiety throughout the day; the premise being that improper breathing typically creates anxiety. Reviews of studies of children diagnosed with ASD that participated in a yoga program also found reduced stress and lowered pulse rate following yoga (Serwacki & Cook-Cottone, 2012). Additionally, Kenny indicated that specific asana (i.e., body positions in yoga) and pranayama practices encourage sensory integration, body awareness, and coordination and balance. Kenny (2002) describes that breathing exercises stimulate the parasympathetic nervous system (the calming part of the nervous system) through integration of

the right and left sides of the brain. Kenny discovered that children who participated in IMT were able to slow and calm their breath with direct instruction, and control undesired thoughts. Kenny also found an increase in children's ability to transition from high to low activity following IMT.

Another typical component of yoga is deep relaxation. During savasana (relaxation pose) the aim is to learn to independently gain a sense of calm (Ehleringer, 2010). This coincides with a separate study indicating that following yoga the teacher valued her time with student more, because he was “calm and happy, and present” (Porter, 2013, p. 29).

Research has also shown significant functional deficits in the prefrontal cortex (area of the brain responsible for working memory, which is associated with inhibition) of children with ASD, which along with working memory enables behavior to be guided by ideas and concepts, rather than instinctual or reflexive responses (Kenny, 2002). Neuroimaging studies have shown that meditation activates the prefrontal cortex, the thalamus, and the inhibitory thalamic reticular nucleus and as a result, functional differentiation of the parietal lobe (Joshi & De Sousa, 2012). Being in an aroused state from sensory overload or lack of predictability, may elicit exaggerated repetitive motor mannerisms, such as hand flapping (Kenny, 2002). Thus, Kenny describes that providing students with a peaceful setting, predictability, and options for self-soothing may benefit the overall well-being of a child with ASD. Kenny highlighted that a typical setting where yoga is practiced supports a calm atmosphere and less opportunity for over stimulating a child with ASD. Specifically, yoga rooms are often quiet and peaceful with dim lighting and no toys or activities in the room, which limits distractions.

Although children with ASD do not necessarily have physical limitations as part of their diagnosis, it is common for them to struggle with proprioception (internal body awareness) and

the sense of their bodies in space and yoga is shown to build strength in this area (Ehleringer, 2010). Yoga utilizes verbal cues that help children associate with their bodies. Kenny describes that the vestibular system (area of the brain responsible for balance) and proprioceptive skills are crucial for developing physical and social competence. Kenny also observed that practicing balancing poses along with pranayama and the use of drishti (i.e., gaze), increased students ability to focus and maintain concentration. Essentially, these aspects of yoga stimulate the vestibular system and the systems of the brain that control eye movements, both of which are areas of the brain involved in regulating focus and concentration (Kenny, 2002). Kenny reported that teachers, parents, and therapists made observations that children showed increased balance and coordination, as well as improved ability to follow motor patterns following IMT. Kenny also made observations that students were able to slow and calm their breath with direct instruction and use control of breath to control unwanted movement of their body. Pranayama was one specific yoga technique Kenny reported helps improve control over one's body. Furthermore, Kenny observed that during shavasana (corpse pose) students learned they have the opportunity to take time to rest in response to somatic sensations during yoga, without time away from yoga practice being used as punitive. It is also common for children with ASD to have low muscle tone and limited core strength and Ehleringer (2010) describes that the majority of yoga postures use the child's body weight to provide input to the joints and muscles, which help with children with ASD who have sensory processing difficulties. Ehleringer also received parent feedback indicating that following engagement in yoga, one of the most noticeable changes observed in their child following yoga, was improved flexibility, strength, and awareness of breath.

The potential of reduction in anxiety and increased inhibition for individuals who practice yoga, suggests that children with ASD who experience such symptoms may in fact be able to calm themselves and likely enjoy participating in the yoga practices.

Structure. Children diagnosed with ASD also tend to have restricted repetitive and stereotyped patterns of behavior manifesting in inflexible adherence to specific, non-functional routines or rituals (APA, 2013). Kenny (2002) noted observations that yoga provides structure and continuity through the use of mats to create personal physical space and a schedule of the same type of postures throughout and within sessions, thus providing a routine. Kenny (2002) also noted that during yoga, all 24 students followed directions and complied with rules with minimal prompts. As children with ASD typically have difficulties with transitions and change, providing a routine and structure may allow for accomplishing tasks. The structure yoga provides might in turn help increase attendance, participation, and enjoyment.

Engagement. As previously noted, an important aspect of any treatment includes an individual's engagement in the intervention of choice. Kenny (2002) found that children who participated in IMT wanted to attend and enjoyed yoga class, illustrated by comments by parents and students that they “love coming to yoga class” (p. 75). Kenny also made observations that students initially resisted shavasana, but that following a few sessions many began to ask for permission to engage in shavasana pose to begin yoga session, illustrating students are aware they may be tired or frustrated, and that partaking in this pose may provide some relief. Additionally, in a previously mentioned single case study conducted by Shannaoff-Khalsa (2003), a young woman expressed that yoga helped motivate her to continue in treatment for OCD, as well as remain hopeful her symptoms would decrease if she remained committed to her treatment.

Previously mentioned studies for the use of yoga for treatment of various psychiatric diagnoses also established self-reported high measures of participant satisfaction following yoga-based activities (Hanstede, Gidron, & Nyklicek, 2008; Khalsa et al., 2012; Peck et al., 2005; Zylowska et al., 2008). Radhakrishna (2010) described that early shared attention behaviors (e.g., looking at peers, making eye contact with therapist, and not resisting therapist) and increased facial expression (e.g., pleasure), vocalizations, and gazing at peers, may suggest some understanding that participating in an activity with others could be enjoyable.

In a personal account illustrating the effects of utilizing mindfulness techniques with his identical twins with ASD, Russell (2011) found that his twins occasionally began independently meditating, which suggests that his children enjoyed participating in yoga. Additionally, Elheringer (2010) reported that parents enjoyed sharing stories about their children utilizing breathing (outside of session) to calm themselves.

School setting/physical education. Physical education is part of every child's schedule when attending school in the United States, because of the many health benefits of exercise. It is not uncommon for children with ASD to miss out on physical education (PE) at school due to lack of varied spontaneous make believe play and inability to develop peer relationships appropriate to developmental level (APA, 2013; Kenny, 2002). These deficits often result in limited opportunities for physical stimulation and social interaction for children with ASD. Children spend the majority of their time in a school setting; therefore, providing a child with the opportunity to participate in an activity such as yoga, may potentially create an atmosphere that promotes positive interactions and engagement in school settings. More specifically, Kenny describes that because children are coming together for a common goal and develop relationships based on that goal, yoga provides children with opportunities to learn to work within a group,

attend to others accomplishments, and identify areas for cultivating in themselves and peers.

Studies of implementation of yoga in school settings have also been found to improve both behavioral and academic performance. Koenig, Buckley-Reen & Garg (2012) aimed to examine the effectiveness of a manualized occupational therapy intervention, Get Ready to Learn (GRTL), with elementary school students with ASD and challenging and maladaptive behaviors. The GRTL program, developed by Ann Buckley-Reene, is a daily classroom-based preparatory yoga curriculum that uses specific developmentally targeted breathing exercise, yoga postures, chanting, and relaxation techniques to enhance the functional and academic performance of students with a variety of disabilities. Authors reported that teacher ratings of students who participated in the yoga intervention indicated a decrease in students' irritability, lethargy, social withdrawal, hyperactivity, and noncompliance compared with teachers' ratings of students in the control group (i.e., children who engaged in their daily morning routines). Furthermore, authors note teacher's reported high satisfaction with the implementation of GRTL.

Yoga is a practice that has been utilized for thousands of years and is currently being used to relieve various ailments. This review has illustrated that yoga is not only a safe and effective method, but one that can be used in various settings as a primary or complementary treatment option. The research reviewed has not only highlighted the potential benefits of yoga for various populations, but has also shown that children who have participated in yoga related activities tend to enjoy yoga, and engagement is the key to improvement in treatment. An added benefit is that there is no specific medication known to be effective for ASD and incomplete benefits from medication with this population is common, thus alternative and complementary treatments are needed to optimize therapeutic effects.

Additionally, therapy tends to be outcome driven for treatment with children with ASD, rather than placing emphasis on overall well-being and reaching one's full potential. Yoga is inherently a discipline that encourages complete personal development, focusing on physical, emotional, intellectual, and social growth (Kenny, 2002). As illustrated throughout the literature, yoga tends to focus on personal growth, and the value of providing opportunities in treatment to enhance overall well-being and one's individual potential, is crucial.

Chapter IV. Discussion

Introduction

The following chapter will provide a summary and overview of the previous chapter, as well as, note general themes found within the literature regarding utilizing yoga as an intervention for children with Autism Spectrum Disorders and related psychiatric diagnoses. Additionally, general limitations will be discussed and suggestions for future research will be provided. The chapter will close with a brief set of recommendations for clinicians, teachers, and parents to take into consideration regarding the use of yoga with children with an ASD.

Synthesis of General Findings

The previous literature review provided information from the current existing database of published psychological research regarding the use of yoga as an intervention for children with ASD and with psychiatric diagnoses that share commonalities with ASD. Following a thorough analysis of relevant literature, general themes were found and the following provides a brief overview.

Yoga. Throughout the review of the literature, it was found that various types of yoga and yoga related activities, such as mindfulness interventions were utilized. This is only logical considering that there are over a hundred different schools of yoga. Yoga is also well-established in the literature to be effective for numerous physical and mental health disorders and yoga is practiced by various populations; thus, it is not uncommon to offer programs with special techniques or modified versions of yoga. Throughout the literature it was found that various techniques were applied when utilizing yoga as an intervention for children. For example, Kenny (2002) documented feedback regarding the use of IMT, an individual and group yoga based

therapy approach, combining speech-language pathology, and behavioral and mental health counseling. Additionally, Rosenblatt et al. (2011) researched a therapy program that combined yoga, dance, and music therapy.

As previously mentioned the practice of mindfulness and yoga share commonalities, including the process of meditation and attention to breathing, and are often combined. Therefore, the author also included literature, which highlighted studies that utilized mindfulness or incorporated yoga and mindfulness (Greenberg & Harris, 2012; Hanstede, Gidron, & Nyklicek, 2008; Russell, 2011; Serwacki & Cook-Cottone, 2012; Zylowska et al., 2008). This author's experience engaging in a yoga class has also illustrated that yoga often opens the opportunity for becoming more mindful. For example, through continued practice this author's ability to recognize when muscles are tight during practice has improved, and drawing her attention to this as the teacher guides the practice, has decreased feelings of frustration and distractibility. This author has also practiced yoga in the home setting, utilizing free you tube videos, and observed it is common for the instructor to guide students in bringing awareness into the present moment. For example, this author initially found it challenging to engage in yoga, experiencing feelings of boredom or thoughts outside of the yoga practice, but after continuing to engage this author was able to practice bringing awareness back to her breath. Yoga has now become one of this author's favorite activities to look forward too, feeling grateful to have the time to dedicate to self-care.

The literature addressed the utilization of yoga practice across ages. However, although the use of yoga with children has been widely used and researched, there is some controversy regarding its safety. According to AYA (2006), yoga is not recommended for children under 16 years of age, because children's central nervous system and glandular system are still growing,

and AYA's stance is that the effect of yoga exercises on these systems may interfere with natural growth. However, AYA specifically noted that asanas may pose a risk, and thus, it was suggested that children can use meditation and breathing exercises, but recommended children do not hold their breath. In addition, the American Academy of Pediatrics (AAP) has not yet taken a position regarding the use of yoga with children. Furthermore, the majority of the literature indicates that as with any other physical exercise, it is important to be cautious when utilizing yoga with children.

The literature addressed the importance of tailoring yoga based activities based upon age and diagnosis. The current literature review primarily addresses the utilization of yoga with children and autism. Based on developmental considerations, Kaley-Isley, Peterson, Fischer, & Peterson (2010) suggest the following: use of nature names for poses, use of short and simple directions, holding of posed for a maximum of 3 breaths, and creating a playful, calm environment for both preschool and school age children; and remaining mindful of body image and clothing issues (e.g., tight jeans or revealing shirts) when working with adolescents. The practice of yoga typically provides structure, continuity, routine, limited stimulation (e.g., dim lighting), limited distractions (e.g., no toys or objects in room), all of which should be practiced when using yoga as an intervention with children with ASD. In addition, as in any activity, awareness of each individual's particular diagnoses (e.g., asthma and need for inhaler) should be taken into consideration in order to ensure safety.

Yoga and Religion. Yoga is often associated with religion and spirituality. The controversy regarding whether yoga is a spiritual or religious practice was addressed in the literature (Smith et al., 2014). Recent news has also brought this controversy to light. In a well-known court case regarding the use of yoga in the Encinitas Unified School District, a group of

parents sued the school district due to claims that the instruction of yoga on school property and as part of the curriculum was too religious. In recent local news (April 3 2015), the California Court Appeal ruled the school district's yoga program does not violate religious freedoms and should continue. The court ruled that "while yoga may be practiced for religious reasons, it cannot be said to be inherently religious or overly sectarian" (Garske & Stickne, 2015, p. 2).

As previously mentioned, the AYA (2006) also indicated that although Hinduism and other world religions have incorporated some of the practices of yoga, it is not a religion. Furthermore, the majority of individuals who practice yoga intensively for years continue to follow the religious traditions they have grown up with, which this author has found to be true in her own practice and through knowledge of others shared experience as well. However, the controversy still exists and it is important for researchers to address these concerns with parents, clinicians, and teachers prior to utilizing yoga or yoga techniques with children. Clinicians should also ask their clients about their own unique experience in regard to their cultural and religious identity.

Socialization and Communication. The importance of promoting socialization and communication with children with ASD is another relevant concern that was identified in the literature. Throughout the literature it was evident that specific areas of deficit for children (e.g., behavioral concerns, such as crying) with ASD may improve following yoga practice, and in turn result in improvement in both socialization and communication. For example, Porter (2013) and Rosenblatt et al. (2011) found that following yoga negative feelings, such as irritability might decrease, while the ability to regulate emotions may increase. The ability to control one's frustration may promote more positive social interactions and may also benefit overall well-being.

Through observation, this author has also noted the positive affect of utilizing yoga techniques in clinical practice with children. For example, this author observed that when yoga techniques were utilized prior to a therapy session with a 10-year-old patient, the child communicated more throughout the session. This particular patient also shared with family what they had learned, which the family was grateful for, sharing they felt “more involved” with patient. The author’s clinical experience with yoga coincides with accounts made by Porter (2013) who reported her student wanted to show others what he had learned, which further indicates that yoga provides opportunities to increase interaction with others.

As previously mentioned, findings suggest that practicing yoga improves imitation skills in children with ASD, which may help with ability to focus to an object or person (Wright et al., 2008). As Wright et al. indicated, the inability to focus often leaves parents feeling they are unable to connect with their child with ASD. Throughout the literature the increased opportunity for nonverbal communication in yoga such as eye contact, was shown to promote social interaction (Ehleringer, 2010; Kenny, 2002; Porter, 2013). The literature also addressed that the increased opportunity for modeling others, postures and receiving praise and attention from others also provides children opportunities to develop communication skills, self-confidence, and language skills (Ehleringer, 2010; Kenny, 2002). Furthermore, Rosenblatt et al. (2011) found that symptoms of withdrawal decreased in children with ASD following yoga, which further illustrates that yoga can be a social activity. This author also noticed her own ability to feel more connected with others through meeting and communicating with the yoga teacher and students, saying namaste prior to and after yoga, and learning through observation.

Setting. Throughout the literature, the utilization of yoga in various settings was shown to have positive results. Anecdotal evidence suggested that clinicians, children, parents, and

teachers were found to utilize yoga throughout the day (Jensen & Kenny, 2004; Kenny, 2002; Peck et al., 2005; Russell, 2011). It was also made evident throughout the literature that there is a recent trend toward the implementation of yoga-based activities in school settings. Multiple studies illustrated various benefits of using yoga in a classroom environment, including that yoga techniques can be easily applied throughout the school day (Ehud et al., 2010; Khalsa et al., 2012; Koenig et al., 2012; Peck et al., 2005; Porter, 2013; Powell et al., 2008; Smith et al., 2014).

It is important to create interventions that apply to a child's day-to-day life most realistically. Being that children spend the majority of time in a school setting, implementing yoga during school hours provides researchers with the opportunity to gain a better understanding of the benefits of yoga with children. The literature also found that applying yoga practice in multiple settings provided additional benefits. For example, two studies found increased benefits when children engaged in home practice and when number of yoga sessions increased as well (Jensen & Kenny, 2004; Russell, 2011). Kenny (2002) also found that the length of time and degree to which students fully rested during yoga was observed to increase when using eye pillows, blankets, and music. The majority of studies indicated significant decreases in anxiety for in-class yoga training with an instructor when compared to at home independent practice, which suggests that a more structured environment is conducive to positive change (Sharma & Haider, 2013). Kenny (2002) also reported that parents, teachers, and therapists observed that once students successfully learned techniques in session, they were able to generalize them and use them outside of the yoga setting. Additionally, Elheringer (2010) observed that the skills her students learned in yoga practice generalized more quickly than other curricula she and staff previously attempted. Furthermore, Elheringer and her staff observed that following several sessions, they no longer needed to prompt deep breathing and students were

able to recognize when they were anxious and would begin deep breathing independently, demonstrating their ability to self-regulate. Elheringer (2010) reported that parents enjoyed sharing stories about their children utilizing breathing (outside of session) to calm themselves. Although yoga can be easily applied in various and multiple settings, the key is to provide a peaceful setting with limited distractions overall, in order to create a more conducive environment for children with ASD.

Yoga was ranked as the third most likely helpful CAM approach (Tsao et al., 2005). Furthermore, according to the National Health Interview Survey (NHIS), in 2007 yoga was rated the sixth most popular complementary or alternative health activity following nonvitamin, mineral, natural products, deep breathing exercises, meditation, chiropractic or osteopathic manipulation, and massage. Due to the multiple positive benefits of yoga illustrated throughout the literature, along with the apparent positive feedback regarding yoga as a CAM approach, this author believes that the utilization of yoga as an intervention is a viable option that can be easily applied with children with ASD, or as a pastime with multiple potential physical and mental health benefits.

Engagement. One of the crucial aspects for an intervention is treatment engagement. The vast majority of the literature provided results indicating high measures of participant satisfaction following yoga-based activities (Hanstede et al., 2008; Kenny, 2002; Khalsa et al., 2012; Koenig et al., 2012; Peck et al., 2005; Thygeson et al., 2010; Zylowska et al., 2008). Several personal accounts were also highlighted throughout the literature that supported that yoga is well-liked by various populations, including teachers, parents, children, and clinicians (Porter, 2013; Russell, 2011; Thygeson et al., 2010). Yoga tends to provide positive benefits and is enjoyable for teachers, parents, and children, which suggests the potential for higher rates of engagement.

Treatment motivation is another crucial element the literature addressed. For example, Shannaoff-Khalsa (2003) found that yoga helped motivate a participant to continue treatment for OCD. Motivating individuals with ASD is essential, but often challenging due to various vulnerabilities associated with the diagnosis. For example, a child with ASD who has limited communication skills may have difficulties communicating needs during play and then become frustrated that their efforts are not being acknowledged, thus causing frustration and leading to lack of motivation to engage in the activity in the future. The majority of treatment interventions focus on providing a planned, structured, and positive experience, because providing opportunities for success may help increase motivation and engagement and can potentially help children with ASD partake in the community more often. It is not uncommon that when children have a negative experience with something, they tend to avoid it in the future. Children with ASD have several deficits that increase the likelihood of avoidance of activities, thus, providing this population with opportunities to recognize their own accomplishments and feel successful and confident may help motivate them. As previously noted, yoga is noncompetitive activity, which may also play a role in providing opportunities for motivation and success. In addition, Kenny (2002) reported teachers, parents, and therapists observed an increase in students self-mastery, confidence and positive self-image following yoga. Developing self-esteem allows for opportunities to build upon other skills.

Furthermore, a recent study found that children with ASD often engage in play that provides strong sensory feedback, cause-and effect results, and repetitive motions, all of which are elements that yoga practice provides (Ericson, 2013). Additionally, children with ASD often choose activities with motions and particularly enjoyed play that engages the vestibular and proprioception senses.

The literature addressed by this author yielded positive feedback from children regarding engaging in yoga. Additionally, the literature also addressed that children with ASD who have sensory processing difficulties often find some relief following yoga (Ehleringer, 2010). As previously mentioned, it is typical for children with ASD to struggle with proprioception (internal body awareness) and the sense of their bodies in space. The literature addressed that yoga builds strength in this area and several aspects of yoga were shown to stimulate the vestibular system and the systems of the brain that control eye movements, both of which are areas of the brain involved in regulating focus and concentration (Ehleringer, 2010; Kenny, 2002). Kenny also observed reduced sensory defensiveness in children following yoga. The literature provided sufficient evidence highlighting that yoga is typically liked by parents, clinicians, children, and teachers. Findings also illustrated several reasons why children with an ASD may be drawn to yoga as an activity. These findings may help parents whose children with ASD have trouble communicating preferred activities.

Limitations

One significant limitation throughout this process was the lack of available published peer-reviewed journal articles. A majority of the literature aimed primarily at utilizing yoga with the ASD population was found in the form of pilot studies and single case studies. Single case studies are subject to issues of methodological rigor, researcher subjectivity, and external validity. Pilot studies essentially provide feasibility, as opposed to finding a meaningful effect. Therefore, future researchers are recommended to utilize more standardized procedures when studying the effects of yoga with the ASD population.

Another limitation included small study size (Ehud et al., 2010; Hanstede et al., 2008; Harrison et al., 2004; Jensen & Kenny, 2004; Joshi & De Sousa, 2012; Peck et al., 2005; Shannahoff-

Khalsa, 2003; and Sharma and Haider, 2013; Thygeson et al., 2010; Zylowska et al., 2008).

Future researchers should focus on providing large sample sizes in order to increase the likelihood of generalizing to the wider, more diverse population. Various studies also had short interventions; therefore, increasing the duration of future yoga interventions may also increase the likelihood of more significant findings. The duration of yoga sessions and variability in yoga based activities also varied across the literature. Based upon developmental considerations, Kaley-Isley, Peterson, Fischer, & Peterson (2010) made the following suggestions regarding total duration for yoga based activities with children: Preschool age (3–6 years) 15–20 minutes; school age (7–12 years), 30–45 minutes; and adolescents (13–18 years) 45–90 minutes. However, it remains unclear how the amount of yoga affects changes in outcomes. Therefore, future research on dose effect will be critical to furthering the understanding of the effects of yoga.

The vast majority of the literature also utilized self-reports, which may result in data that may not be fully accurate. Utilizing self-reports may create limitations, such as response bias. Therefore, future researchers who utilize self-report measures are advised to integrate additional measures in order to provide more definitive results. In order to ensure more accurate data, it is also important to be mindful of surveying each person individually rather than having someone fill in data for their child or student based on their perception. Variations in diagnosis and use of non clinical samples is another limitation in various studies (Hanstede et al., 2008; Joshi & De Sousa, 2012; Peck et al., 2005); therefore, future research should aim at ensuring clinical samples and a control group in order to provide more conclusive findings.

Bias due to the investigator being the observer was an additional limitation (Peck et al., 2005) along with lack of blinding with subjects, which could create bias (Khalsa et al., 2012).

Furthermore, one study included pre and post measures that were completed by different teachers, which may create inaccurate results (Jensen & Kenny, 2004). It is crucial for more literature to be conducted in the form of journal articles or book chapters, which are more easily accessible and readable to clinicians. Future researchers should also focus on addressing the long-term effect of yoga especially when working with children, because of developmental complexities. Furthermore, there was significantly more literature regarding the utilization of yoga with psychiatric disorders sharing commonalities with ASD as opposed to specific use with the ASD population, which is why the author also provided this information. The feasibility of using yoga as an intervention for children with ASD has been addressed and warrants future research with this population.

Future Directions for Research

Based on the current literature review and on the author's knowledge of issues within the ASD and yoga community, it is imperative that further research be conducted on this population in order to better serve their mental health needs. It is imperative that issues concerning psychoeducation and preventative education be further explored, as this population tends to respond well to multidisciplinary treatment methods and early intervention. Evidence strongly suggests the etiology of ASD is largely genetic, along with environmental factors that play a role. However, specific factors are unknown, which is why CAM interventions are being widely used by families of children with ASD. As previously mentioned, yoga was ranked as the third most likely helpful CAM approach and sixth most popular complementary or alternative health activity (Tsao et al., 2005; The National Institute of Mental Health, 2015). Therefore, future research in this area is warranted. Research should try to focus on ways to change the view of mental health counseling from curing to overall enhancing potential for personal growth (Kenny,

2002). In terms of treatment modalities, it is crucial for quantitative and qualitative research to be conducted on this population in order to better understand more thoroughly how utilizing yoga as an intervention is effective. It would be helpful to conduct experiments that include a control group in order to better see the effect of each specific treatment. Longitudinal studies would also be helpful to study how treatment impacts individuals over time. Future research should also be mindful of using larger and more randomized samples in order to better generalize findings to the larger population. Furthermore, in order to generalize the results to the broader population of children with ASD and related psychiatric disorders, it is suggested that future researchers remain mindful of demographic variability and focus on utilizing purposive sampling procedures.

In conclusion, there are still many areas that need to be studied in order to better understand the use of yoga as an intervention for children with ASD. The suggestions listed in this section are a starting point and are based on gaps found in the existing literature; however, there are numerous other areas that may be clinically relevant to study as well.

Clinical Implications and Guidelines

The following are recommendations for the application of yoga in home, school, and clinical settings based on current interventions and relevant findings from the literature. The author will also address important considerations for the potential use of yoga as a complementary therapy, including being mindful of modifying yoga practice for children with ASD, as well as considering yoga instructor's training. It is the author's hope that this literature review will provide valuable information and insight for various individuals involved with this population.

1. Increased emphasis on psychoeducation, prevention, and early intervention (i.e., parenting skills courses, general mental health outreach presentations and seminars) is

crucial. Rather than focus on illness and pathology, prevention and early intervention may help alleviate a portion of the stigma attached to children with ASD. Focusing on strengths and interventions geared at overall well-being (such as CAM approaches do) is also vital.

2. Yoga for Children with Autism Spectrum Disorders is ideal for parents and caregivers who want to use simple yoga techniques to help children with ASD overcome some of the symptoms of the disorder. Clinicians should assess for social and family support and engage parents in treatment.
3. Clinicians should also address importance of self-care for parents or siblings of children with ASD. It is well established in the literature that modeling plays a significant role in a child's development. What children observe parents and significant adults in their lives doing has a much greater impact than what they are told to do. Furthermore, children look up to a variety of role models to help them shape how they behave in school, when interacting with others, and when making challenging decisions. Therefore, it is recommended parents dedicate time for self-care, in order to model the importance of such time for one's mental and physical well-being.
4. Providing a lesson plan, structure, minimal stimulation and aspects that engage children, such as a warm up game and using animal poses or animal noises, is recommended when utilizing yoga.
5. It is important to tailor yoga based activities when working with children, as well as when working with children with ASD. There are several resources, such as books and articles that provide various suggestions for doing so. One example is a reference cited throughout this review, Ehleringer (2010). The following is an example of a book: Betts,

D. & Betts, S.W. (2006). *Yoga for Children with Autism Spectrum Disorders: A Step-by-Step Guide for Parents and Caregivers*. London; Philadelphia : Jessica Kingsley. ISBN: 978-1-84310-817-7.

6. Focus on self-esteem building by offering specific feedback, such as “That was a great example of mountain pose,” instead of more general feedback, such as “good job.”
Allowing children to recognize and label strengths before, during, or after a yoga session is also recommended.
7. Mental health professionals and individuals working with families of children with ASD should be aware of cultural and religious identity when considering yoga as a possible intervention. Mental health professionals should act as cultural brokers and assist clients with psychoeducation and community resources as well (e.g., trained yoga instructor).
8. Mental health professionals should educate themselves about ASD symptoms and common experiences of children and families of children with ASD; yet be mindful of not generalizing this information to the entire population.
9. Mental health professionals have various duties, but the most important thing is to benefit the patient; therefore, being mindful of respecting patient beliefs, values, and wishes is key.
10. Future researchers should allow sufficient time to address questions and concerns when gathering qualitative information relevant to the utilization of yoga as an intervention with children with ASD.

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APPENDIX A

GPS IRB Approval Notice

PEPPERDINE UNIVERSITY

Graduate & Professional Schools Institutional Review Board

July 21, 2015

Jessica Garcia

Protocol #: P0715D03

Project Title: Autism Spectrum Disorders and Yoga Intervention

Re: Research Study Not Subject to IRB Review

Dear Ms. Garcia:

Thank you for submitting your application, *Autism Spectrum Disorders and Yoga Intervention*, to Pepperdine University's Graduate and Professional Schools Institutional Review Board (GPS IRB). After thorough review of your documents you have submitted, the GPS IRB has determined that your research is **not** subject to review because as you stated in your application your dissertation *research* study is a "critical review of the literature" and does not involve interaction with human subjects. If your dissertation research study is modified and thus involves interactions with human subjects it is at that time you will be required to submit an IRB application.

Should you have additional questions, please contact the Kevin Collins Manager of Institutional Review Board (IRB) at 310-568-2305 or via email at kevin.collins@pepperdine.edu or Dr. Bryant-Davis, Faculty Chair of GPS IRB at gpsirb@pepperdine.edu. On behalf of the GPS IRB, I wish you continued success in this scholarly pursuit.

Sincerely,



Thema Bryant-Davis, Ph.D.
Chair, Graduate and Professional Schools IRB

cc: Dr. Lee Kats, Vice Provost for Research and Strategic Initiatives
Mr. Brett Leach, Regulatory Affairs Specialist
Dr. Miguel Gallardo, Faculty Advisor