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The Effects of a Healthy Breakfast/Yoga Program on Social Competence and Antisocial Behavior in School-age Children with ADHD

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Abstract

This article presents results of the "Good Day-Good Start Program," an 8-week intervention designed to improve social competence and reduce antisocial behavior among elementary students diagnosed with ADHD. The intervention contained two components, a nutritious breakfast free of processed foods and sugar and yoga exercises and guided visualization designed to teach the students attention and relaxation. After the eight-week intervention, the students' overall social competence mean score increased and the overall antisocial mean score decreased as measured by the School Social Behavior Scale (2nd ed.)

Keywords: Attention; Attention Deficit/Hyperactivity; Nutrition; Yoga

Introduction

The prevalence of diagnosed ADHD in school children was estimated at 7.8% in 2003 [1]. Boys are affected more often than girls, with a ratio of 3:1 male to female [2]. In a classroom of twenty students, there is a good chance there will be at least one child diagnosed with ADHD. More children are referred to mental health clinics for ADHD than for any other psychiatric or behavioral problem. Children with ADHD have poor social and coping skills [3]. Consequently, they often display antisocial behaviors that result in various disciplinary actions such as detention and expulsion.

Du Paul, McGoey, Eckert, and Van Brakle [4] found that children with ADHD exhibited more problem behaviors and were less socially skilled than children without the diagnosis. Research suggests that children with ADHD would benefit from stress management and social skills training. The purpose of this article is to examine the results of a study that utilized a healthy breakfast/yoga intervention, the Good Start-Good Day program, to increase social competence behaviors and decrease antisocial behaviors in five school-age children diagnosed with ADHD. The Good Start-Good Day program found that nutrition in conjunction with yoga practice resulted in significant improvements in the student's social skills: decreased hostility/irritability, antisocial/aggressive behavior, and defiant/disruptive behaviors and demonstrated significant improvement in the student's overall social skills, including improved peer relations, self-management/compliance and academic behavior.

While most medical doctors use psycho-stimulant medications as the first-line therapy for children diagnosed with ADHD, [5] side effects, which include loss of appetite, insomnia, headaches, stomachaches, moodiness, irritability and tics frequently offset many of the positive effects of medication and often preclude long-term medication treatment [6]. Children diagnosed with ADHD whose treatment is limited to stimulant medication remain at high risk for vandalism, petty crime, frequency of alcoholic intoxication, and possession of marijuana [7,8]. One recent study indicated that teachers had little communication with parents or professionals regarding the use of medication by their students and its side effects [9]. There is growing evidence from the scientific and clinical community that natural and holistic forms of therapy are effective alternatives or adjuncts to pharmacological treatment of ADHD [10].

Benefits of Yoga and Children

While medication and behavior therapy used together has proven to be more effective than either intervention used alone [11], even multimodal treatment does not normalize ADHD symptoms for a substantial number of children. For these reasons, it is important to develop and document the effectiveness of interventions for ADHD that can complement medication and behavioral approaches. Research has found that children on medication for ADHD can greatly benefit from a yoga practice; specifically, research shows that a particular yoga posture, forward bends, are effective because they develop concentration [12]. Yoga uses physical postures (asanas), breathing exercises (pranayama) and deep relaxation techniques to calm and strengthen the central nervous system [13]. In a study where yoga was implemented into an elementary school-based occupational therapy program, all participating children showed improvement in relaxation, organization and concentration [14].

There is growing evidence that yoga increases social skills, self-esteem, self-regulation of emotions, and decreases aggressiveness. Improving a child's self-esteem can help them manage their own attention and energy levels. (Frame, Kelly, & Bayley, 2003) [15] Children and adolescents who are diagnosed with ADHD report that some of the main problems they experience because of their ADHD are behavior related, in terms of difficulties following rules and getting along with others. Specific problems included fighting, throwing things, and yelling at teachers [16]. These students frequently used the word, "bad" to describe themselves, and began to incorporate this idea into their identities. For others, ADHD meant "getting into trouble" or feeling "Weird" [16]. A 2006 study found that children with ADHD were found to be as self-aware and as interested in school activities when compared to children without ADHD [17].

Yoga has been shown to increase children's self-esteem. A study of children in grades K-5 who participated in a yoga program found that the children developed a higher degree of self-confidence and self-esteem; were able to relax, self-nurture and regulate emotions, and were better able to communicate and problem solve [18]. Responses from the children in the study reflect these results: "I don't just out of the blue, scream at someone, I stay calm." "I hardly ever get in trouble. I concentrate the same and my self-confidence is high and my attitude is normal." Another study of forty-eight 5th graders in a yoga training program increased emotional balance and decreased fears, feelings of helplessness and aggression [19]. Research has demonstrated that participants in yoga class improved their attitudes towards themselves and behavior towards others, vastly lowering discipline referrals [20]. Most U. S. children diagnosed with ADHD receive psychoactive medication and some receive counseling, but there are few programs that actually teach children how to self-regulate their behavior and emotions. Yoga can help children with ADHD self-regulate their behavior and emotions, thereby increasing their self-confidence and self-esteem.

Yoga and Increased Attention

Researchers have highlighted the difference between selective attention, which is the ability to pick out one message from several that occur simultaneously, and sustained attention, which is the ability to direct and focus on specific stimuli [21]. Research indicates that selective attention is intact in children with ADHD, however sustained attention is often impaired (DeShazo, et.al) [21]. Because the prefrontal cortex, an area of the brain critical to memory, attention focusing and higher-order motor functioning, is less mature in children with ADHD, these functions are impaired in children diagnosed with this disorder. Yoga can help children with ADHD by increasing concentration, focus and relaxation. Tomasko, [22] Peck and Kehle [23] found that elementary school children who engaged in 30 minutes of yogic practices (by following a videotaped yoga session) twice a week for three weeks increased their time on task, while their classmates' time on task remained essentially unchanged. Anantharaman and Kabir [24] reported that memory span and attention measured before and after yoga training changed positively as a result of yoga training.

Since the core issues with ADHD are attention deficit, restlessness and impulsivity, attention training through paying attention while calming the mind and body through yoga poses is an excellent approach. The nutrition and yoga intervention presented in this paper helped students learn sustained attention by developing attention skills focusing on the breath, body and emotions through yoga poses and relaxation, thus offering the student an opportunity for improved academic achievement.

Benefits of Nutrition for Children with ADHD

There is increasing evidence that many children with ADHD and behavioral problems are sensitive to one or more food components that can negatively impact their behavior. In general, diet modification plays a major role in the management of ADHD and should be considered as part of the treatment protocol [25]. Studies of the effect of nutrition on mental functions of children and adolescents with ADHD concluded that nutrition has potent effects on brain function. It was found that protein, iron, iodine, and the consumption of breakfast all impact on a child's learning capability and behavior. Moreover, recent research has identified additional, potent roles of micronutrients, such as essential fatty acids, minerals, and vitamins, in the prevention of learning and behavioral disorders [26]. In one study, over 5000 fifth-grade children completed the Harvard Youth/Adolescent Food Frequency Questionnaire over several weeks. The results found that children

who reported a higher diet quality-increased fruit and vegetable intake, whole grains, omega-3 fatty oils, fish, adequate protein, and lower intake of fats were significantly less likely to fail the school performance tests.

Recent research showed that eliminating artificial food colorings from children's diets reduced hyperactivity and other symptoms of ADHD. One study showed that children's behavior significantly improved when AFC's (artificial food colorings) were removed from their diets [27]. Another study of 153 3-year olds and 144 8-9 year olds who followed an additive-free diet for one week found there was a significant increase in GHA (global hyperactivity aggregate) when the children consumed additives [28,29]. Studies focusing on the effect of sugar on ADHD children have reported mixed results. In 1985, Dr. Mark Wolraich, published the most influential study demonstrating that sugar plays no role in ADHD [30]. However, there are numerous studies that have found sugar to have negative effects on the behavior of children with ADHD. One study of hyperactive children found that, the more sugar they ate, the more destructive, aggressive and restless they became [31]. The effects of sucrose on 8 preschool children found a decrease in performance on structured testing and "inappropriate" behavior during the free play. The differences were especially significant after 45-60 minutes, concluding the rather subtle, yet significant, and time-dependent behavior effect of sucrose ingestion" [32].

A growing body of research points to nutritional deficiencies especially related to micronutrients, essential fatty acids (essential oils) and amino acids (proteins), as a contributing factor of ADHD. Research has found that hyperactive children who ate a meal high in protein did equally well and sometimes better in school than non-hyperactive kids [33]. Sorgi, Hallowell, Hutchins, & Sears, (2007) [34] found that high-doses of EPA/DHA concentrates given to children with ADHD resulted in significant improvements in behavior (inattention, hyperactivity, oppositional/behavior, and conduct disorder) The social worker in this study educated the children's parents on nutrition (healthy meals/snacks handouts were given to parents) and served the children a healthy breakfast, free of sugar and additives twice a week for eight weeks, resulting in significant improvements in the children's social skills and significant reduction of anti-social behaviors.

Social workers are in key positions to develop attention training programs such as yoga where children are focused on their body and breath, and educate teachers and parents regarding the benefits of nutrition and relaxation techniques. The social worker in this study offered children diagnosed with ADHD the opportunity to develop attention skills, increase self-esteem and self-regulation of emotions and behaviors through, yoga, relaxation exercises and eating a nutritious breakfast before starting their school day.

Methods

Sample

Students in an elementary school (approximately 650 pupils) in the Southwest were referred to the Healthy Breakfast/Yoga Program by their classroom teachers. To qualify for the Program, students had to have a documented diagnosis of ADHD. The students who participated in the program had the most referrals to the social worker for behavior problems. The teachers and parents supported the program as they were at a loss to find solutions to deal with the impulsive behavior of those students. After the referrals were made, the school social worker obtained parental permission for student participation. The parents were given handouts on healthy nutrition to use at home and were invited to attend yoga class sessions. The sample included five students; three were age 8-9, one was 7 years old, and one was 6 years old. Three of the students were enrolled in the third grade, one in the second grade, and one in first grade.

The Healthy Breakfast/Yoga Program

The Healthy Breakfast/Yoga Program ran two mornings a week for 8 weeks. After the 8 weeks, the students participated in the filming of a video showing them performing the yoga exercises. Student-participants were provided a nutritious breakfast and attended a 60-minute yoga class. (see note) Children waited their turn to retrieve and return mats clothing, food and plates during the yoga class and breakfast. At the breakfast table children were directed to focus on eating and speak in turn. (Maria, I think it would be best to leave out anything about social skills as it complicates the findings. Layne already said that it's a little difficult to sort out effects of yoga/nutrition, so adding one more thing might complicate this paper. What do you think?) The breakfast menus included the following meals: 1) Whole grain waffles with soy butter and all fruit strawberry jam; all natural organic apple juice; scrambled eggs; 2) Organic cheese melts on whole wheat toast; strawberries; rice milk; 3) All natural organic peanut butter on whole grain toast; bananas; soy milk; 4) Whole grain all natural sugar free cereals with rice milk; fruit; 5) Soy cheese omelet; sprouted grain toast with butter and all natural organic all natural strawberry jam. After breakfast student-participants attended a 60-minute yoga session.

60 Minute Yoga Session

- Children entered the classroom and retrieved their mats, blankets and yoga tie, followed by changing into their yoga clothes (10 minutes).
- Children engaged in a 30-minute yogic practice, consisting of a warm-up, yoga poses, and a cool-down period (they followed a videotaped yoga program for children).

- Following the yoga video, students were guided to relax using a guided visualization CD (10).
- Children put their mats and ties away and walked to the breakfast table (10 minutes).
- Children came together for breakfast (20 minutes).
- Children cleaned up after themselves following breakfast (10).

Procedures

The referring classroom teachers were asked to observe and assess their student-participants using the School Social Behavior Scales, second edition (SSBS-2). There were two assessment periods. The first assessment was one week prior to the start of the Yoga program. The second assessment occurred one week after the end of the 8-week intervention.

Measure

The SSBS-2 is standardized measure consisting of two co-normed scales: Social Competence and Antisocial Behavior. The Social Competence scale includes three subscales related to prosocial behavior: Peer Relations, Self Management/Compliance, and Academic Behavior. The Antisocial Behavior scale includes three subscales: Hostile/Irritable, Antisocial-Aggressive, and Defiant/Disruptive. Reliability of the SSBS-2 has been reported at .94-.96 for internal consistency among the six subscales (cite) and .86-94 for test-retest reliability at 1 week (cite). ata [35].

Data Analysis

We used descriptive statistics to identify the pre- and post-test raw and T mean scores. Due to our small sample size (five students) we employed the Wilcoxon signed-ranks test. The Wilcoxon is designed for two related samples or repeated measures (pre- and post-test) data. The Wilcoxon test assigns a rank to the difference in each pair of data. For example, when the difference between the pre- and post-test scores for a case is greater than zero, a rank of "+" is assigned; when the difference is less than zero a "- "is assigned. Cases in which there is no difference are omitted from consideration. The absolute differences are then ranked from smallest to largest. The problem with using the Wilcoxon on interval data is that we lose power. This means that our ability to correctly reject the null hypothesis more difficult. The end result is that we increase the likelihood of making at Type II error or wrongly accepting a null hypothesis of "No difference."

Results

Table 1presents the raw and T scores mean for the overall social competence and antisocial behavior scales. Our prediction was that the social competence raw mean score would go up and that the antisocial-behavior raw mean score would go down. In fact, the overall social competence mean score went up 12.2 points while the overall antisocial mean score went down 19.4 points. The Wilcoxon signed-ranks test was statistically significant with a p value of .04 Table 1.

	Social Competence Scale (Pre-test)	**Social Competence Scale (Post-test)**	**Antisocial Behavior Scale (Pre-test)**	**Antisocial Behavior Scale (Post-test)**
RawScore Mean and Median	M = 77.40	M = 89.60 (+12.2)	M = 103.20	M = 83.80 (-19.4)
	Md = 84.00	Md = 91	Md = 111	Md = 74
T Score Mean	M = 39.2	M = 43 (+3.8)	M = 66	M = 59.4 (-6.6)
	Md = 41	Md = 44	Md = 69	Md = 56

Table 1: Raw and T Score Means for Overall Social Competence and Antisocial Behavior.

The T scores can be understood in the context of the norms for the general population of students that were used to norm the scales. Fifty is the mean and the standard deviation is 10. Therefore, in our sample the students' overall Social Competence Pre-test T mean score of 39.2 is just over one standard deviation below the "average" for the general student population. The post-test T mean score of 43 is closer to one half of one standard deviation below the "Average," indicating real progress for the students who participated in a relatively brief 8-week (16 days) program.

The second table shows the difference in raw and T score means for the three social competence subscales: Peer Relations, Self-Management/Compliance, and Academic Behavior. The students made progress on each subscale with an average increase of 3.5 points. The Wilcoxon rank difference between the pre- and post-test scores on the social competence subscale - peer relations were statistically significant with a p value of .04. The social competence subscale - academic behavior trended toward statistical significance with a p value of .10. While the difference in the self-management/compliance subscale was not statistically significant (p = .22), the students did make measurable progress Table 2.

Social Competence Subscales	Raw Score Mean and Median	T Score Mean
Peer Relations (14 items) Pre-test	M = 36.60	M = 43.4
	Md = 39	Md = 45
Peer Relations Post-test	M = 42.80 (+6.2 points)	M = 48 (+ 4.6)
	Md = 41	Md = 47
Self-Management/Compliance (10 items) Pre-test	M = 22.80	M = 36.8
	Md = 20	Md = 34
Self-Management/Compliance Post-test	M = 27 (+4.2 points)	M = 40.4(+3.6)
	Md = 26	Md = 40
Academic Behavior (8 items) Pre-test	M = 18	M = 37.2
	Md = 18	Md = 37
Academic Behavior Post-test	M = 19.80 (+1.8 points)	M = 39.4(+2.2)
	Md = 19	Md = 38

Table 2: Raw Score and T Score Means (pre and post) for Social Competence Subscales

The third table displays the difference in raw and T score means for the three antisocial subscales: Hostile/Irritable, Antisocial/Aggressive, Defiant/Disruptive. The students decreased their post-test scores on all three subscales by an average of 5.5 points. The Wilcoxon results were not statistically significant; however, the difference in pre- and post-test scores on the defiant/disruptive subscale approached significance with a p value of .13. The hostile/irritable p value was .21; the antisocial/aggressive p value was .50. Utilizing the pre-test T mean scores, the students were more than one and a half standard deviations above the "average" student on both the hostile/irritable and defiant/disruptive subscales; and just over one standard deviation above the average on the antisocial/aggressive subscale. The post-test T mean scores were less than one standard deviation above the average on all three subscales Table 3.

Antisocial Subscales	Raw Score Mean and Median	T Score Mean
Hostile/Irritable (14 items) Pre-test	M = 47.40	M = 65.8
	Md = 51	Md = 69
Hostile/Irritable Post-test	M = 38.40 (- 9 points)	M = 58.8 (-7)
	Md = 35	Md = 56
Antisocial/Aggressive (10 items) Pre-test	M = 27.60	M = 60.4
	Md = 30	Md = 62
Antisocial/Aggressive Post-test	M = 23.60 (- 4 points)	M = 59 (-1.4)
	Md = 23	Md =58
Defiant/Disruptive (8 items) Pre-test	M = 28.20	M = 66.8
	Md = 28	Md = 67
Defiant/Disruptive Post-test	M = 21.80 (- 6.4 points)	M = 58.6 (-8.2)
	Md = 17	Md = 52

Table 3: Raw Score and T Score Means (pre and post) for the Antisocial Subscales.

In summary, after the 8 week (16 days) healthy breakfast/yoga intervention the students made progress on all six subscales. The most significant changes included their overall score in social competence, the peer relations subscale score, the academic behavior subscale score, and the defiant/disruptive subscale score.

Future Research

Although the results of the present study had a positive result, the sample was small and the power is low which may explain the lack of statistical significance. In addition, in the future the researcher needs to disentangle the effects of breakfast versus yoga practice as the effects on not eating before yoga can impact the student's performance.

Discussion

This study aimed to evaluate the Effects of a Healthy Breakfast/Yoga Program on social competence and antisocial behavior in school-age children with ADHD. Results from the School Social Behavior Scales found that students improved peer relations, self management/compliance and academic behavior. Although there were no specific measures for attention, the fact that students were able to regulate impulsive behavior indicates that skills utilized in the intervention, focusing, paying attention to the breath and body helped with self regulating behavior resulting in a decrease in behavior problems. In addition, students were not stimulated by food additives which may have added to their ability to remain calm and pay attention.

Offering students opportunities to have more control over their lives by developing the tools to manage their personal, school and home environment cannot be underestimated. When students are able to experience a sense of mastery in their lives they are less likely to develop a sense of learned helplessness setting the stage for life long dependency. In addition, the cost to parents and schools dealing with a child diagnosed with ADHD is astronomical when behavior is out of control causing aggression, property damage and administrative costs during and after school to deal with discipline.

Social workers are in a key position to develop programs for students and train other school personnel in yoga. Simple poses can be offered in physical education classes and in the primary classroom with little training. In addition, working with the district school lunch program in providing nutritious breakfasts and lunch can be beneficial not only to children with behavior problems, but all children minimizing the effects of allergies; "Sugar highs" and depletion of the immune system, all affected by poor nutrition. The current program offers healthy solutions to the nationwide problem of student discipline facing schools today while empowering students to gain control over their lives setting the stage for personal and academic success.

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