

## **EFFECT OF YOGA ON MENTAL HEALTH IN CHILDREN**

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## Abstract

Mental health in children has many dimensions such as having healthy interactions with peers and teachers, and being able to focus attention on specific activities (e.g., studying) while remaining calm. Another aspect of increasing importance is the sense of self-esteem, which is often associated with a child's body image and eating behaviors. Yoga is an ancient Indian way of life which includes practicing certain postures, breathing techniques, and meditation. Several studies have shown that yoga practiced for varying durations (from 10 days to 6 months) can favorably influence hand steadiness as an indicator of concentration [1], and the hand grip strength, the degree of optical illusion, and finger dexterity [2]. Yoga practice also improved the performance of children in a spatial memory task [3] and in a cancellation task requiring selective attention [4]. It is of importance to note that yoga practice improves these functions and also reduces physiological signs of mental stress (e.g., a reduced skin resistance value, reduced heart and breath rates with rhythmic breathing) in children [5]. Apart from children with normal health, 20 sessions of yoga led to improvement in boys with diagnosed ADHD, based on five aspects of the Conner's Parents Rating Scales (i.e., Emotional lability, and Restless/Impulsive behaviors, among others) [6]. Yoga practice has also been shown to have a positive effect on self-concept and eating behaviors [7,8]. In the first study [7], 16 weeks of a healthy lifestyle helped obese adolescent girls to lose weight and significantly influenced their emotional/external/and restrained eating. The second study [8] assessed the effect of yoga practice on youth at risk of developing Type 2 diabetes mellitus. Apart from a weight loss (2 kg after twelve weeks), some of the children showed improved self-esteem. Finally, 12 yoga sessions helped inner-city children in Bronx, New York to have an improved sense of wellbeing and fewer negative behaviors in response to stress [9]. Hence yoga practice has diverse and useful applications in improving the mental health in children, which are detailed in this chapter.

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## YOGA FOR CHILDREN

There is an increasing interest in the use of yoga to calm the mind, and increase overall health and wellbeing [1]. Mental health in children has many dimensions such as having healthy interactions with peers and teachers, and being able to show appropriate emotional responses while exerting control if necessary. Children can have mental, emotional and behavioral problems which are real, painful and costly [2]. Mental health disorders in children are caused by biological factors, the environment, or a combination of the two. Biological factors may include genetics, chemical imbalances in the body, and trauma. Environmental factors such as exposure to violence or abuse, acute or chronic stress, and conditions which increase feelings of insecurity in a child (e.g., loss of a parent) can contribute to mental disorders. Of course it does not follow that children who have had such experiences would develop mental disorders or that all children who have developed mental disorders have had disturbing experiences.

Yoga is an ancient Indian way of life which includes the practice of certain postures (*asanas*), regulated breathing (*pranayamas*), and meditation [3]. Yoga practice was shown to be beneficial for the physical and mental health of children. Given the fact that the brain is most susceptible to both external and internal influences early in life, especially during the brain growth spurt period (from the last 3 months before birth till the first 2 years of life), it is desirable to begin yoga practice as early as possible. However it is essential to mention here that there have been no studies which have shown that beginning to practice yoga early is really beneficial for children, though anecdotal reports from parents/ caretakers and teachers, suggest that children who learn yoga early

on are physically healthier and mentally better adjusted. Some yoga enthusiasts have passively placed the limbs of infants in yoga postures, taking care to be gentle and not to use force. They observed (but there is no published report) that children attained certain milestones (e.g., standing, crawling, walking, and even talking) sooner than those who were not given the yoga postures passively. In the absence of a systematic study this remains an interesting but unproven report. Published research has shown that children as young as seven years of age can improve in attention, concentration and co-ordination after learning yoga. One of the precautions suggested, again based on unpublished observations is that pre-pubertal children should not be asked to practice inverted yoga postures as this is considered likely to result in precocious puberty. Also, those yoga breathing practices (*pranayamas*), which involve practicing physiological ‘locks’ (*bandhas*) of the internal cavities (e.g., intrathoracic cavity), are also not advised to be practiced in children.

The benefits of yoga practice in children are evident from a study with a quasi-experimental design, in which thirty-one children (with ages between seven and twelve years) practiced yoga for seven weeks and the effects on their physical health were assessed [4]. Each sixty minute yoga session included ten minutes of warm up and breathing exercises, forty minutes of yoga postures, and ten minutes of cool down exercises. There were significant improvements in their flexibility, muscle strength and cardiopulmonary fitness. Since physical fitness and mental wellbeing are closely related, these results suggest that these children may have also had mental health benefits though the study was not intended to examine them. This study included both breathing exercises and physical postures. This is indeed considered the best approach. According to

descriptions of the functioning of the body according to ancient yoga texts there are five levels of existence (The *Taittreya Upanishad*). These are (i) physical, (ii) a level of subtle energy (*prana* or *chi*), (iii) the instinctual mental level, (iv) the intellectual mental level, and (v) the fifth and ideal level, a state of optimal homeostasis and balance (Telles, 2010). Ideally a yoga practice session should include physical postures (*asanas*), breathing techniques (certain *kriyas* and *pranayama* practices), meditation, as well as knowledge of the philosophy of yoga. In children also, the ideal program should include all these practices.

Yoga practice has been shown to improve several aspects of mental health in normal children. Before discussing the use of yoga in the management of mental health disorders, the benefits of practicing yoga in promoting positive mental health will be discussed.

In an early study school children aged between nine and thirteen years, performed better on a hand steadiness test, suggestive of better attention and concentration, after yoga [5]. There were two groups of forty-five children each who were assessed using a standard test for static motor performance using a steadiness tester, at the beginning and end of a ten-day period during which one group practiced yoga while the other group continued with their regular routine. The yoga group showed a significant reduction in errors compared to the control group.

In a separate study on one hundred and thirty-five school children with ages between nine and thirteen years, those who practiced yoga for ten days showed a significant improvement in spatial memory [6]. Spatial memory is principally a function of the right cerebral hemisphere and hence the results suggest that yoga practice

facilitates right hemispheric functioning. This was considered especially important as the educational system nowadays places a disproportionate emphasis on left brain skills such as logic and analysis, required to study science and mathematics. A separate study further examined the degree to which yoga practice could influence performance in a spatial memory task when compared to time spent on fine arts, which are considered right hemispheric functions [7]. There were two groups of children with ages between eleven and sixteen years, with thirty children in each group. One group attended a yoga camp, the other a fine arts camp which included drama, painting and pottery. There was also a no-intervention control group. All three groups were assessed at the beginning and end of a ten day period, during which one group practiced yoga, while another group had fine arts activities. The yoga showed a significant increase in spatial memory scores. Memory is not the only mental faculty which improved with yoga practice, in children. Strategic planning based on a Tower of London task, improved in ten girls with ages between ten and thirteen years after yoga, compared to an equal number of girls who had a physical training program [8]. The Tower of London task assesses the ability to plan by evaluating the number of moves required to complete a designated task. The yoga group showed a significant reduction in planning and execution time, as well as in the number of moves. More recently a high frequency yoga breathing, where the breath rate ranged between 1.0 and 2.0 Hz, called *kapalabhati* was shown to improve the ability to perform a cancellation task, which requires both focused and selective attention [9].

These examples show that yoga practice can promote certain higher mental functions in children with normal health. It was also seen that girls in a community home, who were under legal custody as they had no responsible guardian to care for them

benefited by yoga practice [10]. Among these girls, a group who practiced yoga for six months had better visual perception (based on the critical flicker frequency test and a geometric optical illusion test) and better motor dexterity, than a group who were given physical training for the same period.

Apart from the examples mentioned above, yoga practice has also been shown to help children with diagnosed mental health problems. This includes anxiety, eating disorders, attention deficit hyperactivity disorder, and post-traumatic-stress disorder, in children exposed to extreme violence or natural calamities.

Childhood anxiety manifests in various ways, such as separation anxiety, phobias, somatic manifestations, which include undesirable habits and tics, nightmares, and in some cases extreme physical discomfort (as in panic disorder).

An hour of relaxation therapy was found beneficial in forty hospitalized children and adolescents [11]. Of course, while relaxation is an inherent part of yoga, yoga includes other components as well and hence is not the same as relaxation therapy. A randomized trial of yoga for adolescents aged between eleven and eighteen years with irritable bowel syndrome showed that yoga is effective in reducing anxiety as well [12]. The yoga intervention consisted of a one hour instructional session, demonstration and practice. This was followed by four weeks of daily practice at home guided by video. Those adolescents who were assigned to the yoga group reported lower levels of functional disability due to irritable bowel syndrome, as well as lower anxiety and less use of emotion-focused avoidance, which is an unhealthy coping strategy.

These results suggest that yoga practice can increase the likelihood of positive behavior patterns and reduce negative behaviors. These findings were further

substantiated by a study conducted on fourth and fifth grade inner-city students in Bronx, New York [13]. There were thirty-nine children who practiced yoga and thirty-two who did not. Both groups were assessed at the beginning and end of a twelve-week period. Both yoga and non-yoga groups had similar pre-intervention levels of emotional wellbeing. After twelve weeks of yoga, children in the yoga group had better post-intervention negative behaviors scores in response to stress. The results suggested a role for yoga as a preventive intervention as well as a means to improve children's perceived wellbeing.

When discussing stress coping strategies, it is essential that children develop positive and healthy coping strategies, rather than unhealthy strategies. Healthy strategies include communication with friends, relatives, teachers, or counselors, as well as deriving strength from philosophical and spiritual beliefs. Unhealthy strategies could include substance abuse, use of alcohol, sniffing volatile substances, and in younger children, eating disorders. When exposed to stress, children may over eat or eat less than usual. Nowadays this situation has been further worsened as children are over aware of their body image, and how they appear to their peers. This is probably related to the fact that a poor body image is associated with low self-esteem and children who are over weight are more often bullied and left out of group activities.

In connection with this yoga has been useful in helping youth at risk for developing type 2 diabetes to lose weight [14]. A twelve week prospective *Ashtanga* yoga program had twenty participants. Fourteen of them, aged eight to fifteen years completed the program. The average weight loss in twelve weeks was two kilograms.

Four out of five children who had low self-esteem to begin with improved, while two had decreased self-esteem.

Another twelve-week program was evaluated in a separate study [15]. This program was called 'Be a Fit Kid' and included running, yoga, jumping and strength exercises. There was also a nutrition component, which focused on a diet rich in vegetables, fruits, unsaturated fats and whole grains, and was low in saturated fat and sugar. Following the twelve-week intervention significant improvements were observed in body composition, fitness, nutrition knowledge, dietary habits, and in those who participated seventy-five percent of the time there were significant reductions in total cholesterol and triglyceride levels. Hence inclusion of yoga in a fitness program was helpful in improving the physical fitness of children.

The psychological impact of yoga practice was shown in another study which examined the possibility of reducing body dissatisfaction in fifth grade girls [16]. There were seventy-five yoga group participants and sixty-nine in a control group. The yoga sessions consisted of interactive discourses, yoga practice and relaxation. There was a significant decrease in body dissatisfaction and bulimia following yoga as well as an increase on the social scale of a multidimensional self concept scale. Hence yoga practice appears to be useful in the management of eating disorders bringing about both physical and mental benefits.

Another disorder which has shown improvement with yoga practice is attention deficit hyperactivity disorder (ADHD). ADHD is one of the most common mental disorders that develops in children. It is a disabling condition if untreated, as children with ADHD have impaired functioning in multiple settings including their home,

school and in their relationship with peers. Symptoms of ADHD include impulsiveness, hyperactivity and inattention. If ADHD is suspected, the diagnosis should be made by a professional with training in ADHD, which could include child psychiatrists, psychologists, developmental and behavioral pediatricians, behavioral neurologists and clinical social workers. The medical treatment for ADHD is now considered best supplemented with behavior therapy.

Yoga may be considered a form of therapy intended to modify behavior. Boys diagnosed with ADHD by specialist pediatricians who were stabilized on medication were the participants in one trial of yoga for ADHD. The boys were randomly assigned to two groups, a yoga group (n=11) or a control group (n= 8). Assessments included the Conner's Parent and Teacher Rating Scales, the Test of Variables of Attention, and an actigraph which could detect and quantify movement. The result showed some benefits with yoga practice but could not be considered conclusive. The yoga group (but not the control group) showed significant improvement in five subscales of the Conner's Rating Scales, these were oppositional, and the global index for emotional lability, the global index total, global index restless/impulsive and the ADHD index. However significant improvements were also found for the control group, but not the yoga group on three subscales, which were: hyperactivity, anxious/shy and social problems. The improvements seen in the yoga group were increased in those who engaged in more home practice.

Another study also investigated the usefulness of yoga for children with a clinical diagnosis of ADHD [17]. There were nineteen children with a clinical diagnosis of ADHD. The nineteen children were randomized as two groups, a yoga group and a

group given conventional motor training. The yoga group performed better than the control group in an attention task and in ratings of ADHD symptoms.

While ADHD is a diagnosed condition which requires treatment, many children nowadays are more active than would be expected. This has a number of repercussions, such as the inability to be attentive and perform well in school, apparent misbehavior, and in some children, sleep disorders, including restlessness. While polysomnograph recordings on adult experienced meditators have shown an increase in slow wave sleep, with fewer arousals and overall lower sympathetic tone, compared to those who did not meditate [18,19], there have been no studies so far on the effect of yoga on children. However, it is reasonable to speculate that yoga practice may have similar effects on the sleep structure in children, which would have an impact on their functioning during the day.

The last mental health disorder mentioned in this article, which has been managed by yoga, is post-traumatic-stress disorder. Children may be exposed to different types of traumatic events and violence. While natural disasters such as floods or hurricanes have less chances of being personalized, direct confrontation with an assailant or being a victim of sexual abuse or torture is obviously more personalized and hence more traumatic. One hundred and thirty-six high school students in Kosovo were given a six week intervention for post-traumatic-stress disorder in post-war Kosovo [20]. The six-week program included meditation, biofeedback, drawings, autogenic training, guided imagery, genograms, movements and breathing techniques. Three separate programs were held approximately two months apart. Post-traumatic-stress scores significantly decreased after participation in the programs. The scores remained low in the two groups

that took part in the follow-up study when compared to pre test measures. This is an example of post-traumatic-stress disorder following exposure to violence. In a separate study, spiritual hypnosis assisted therapy, which could be considered as allied to yoga therapy was evaluated after the terrorist attack in Bali, in 2002 [21]. There were two hundred and twenty-six children between the ages of six and twelve years among whom fifty-three percent were females. All of them had experienced the terrorist bomb blasts in Bali in 2002 and were subsequently diagnosed with PTSD. Forty-eight of them received spiritual hypnosis assisted therapy, while one hundred and seventy-eight did not. Spiritual hypnosis assisted therapy produced a 77.1 percent improvement at a two year follow-up compared to 24 percent in the control group.

These studies suggest that yoga and allied interventions are useful in the management of post-traumatic-stress disorder in children. In summary the present article shows that yoga improves physical and mental wellbeing in children. Specific faculties improve, such as spatial memory in a delayed recall task, performance in a strategic planning task and in a task for selective and sustained attention. There was also better performance in tasks for perception and motor skills.

Yoga also has beneficial effects in the management of anxiety, eating disorders, attention deficit hyperactivity disorder, and post-traumatic-stress disorder. Some of these studies were reasonably well designed, though further research is required to understand the mechanisms underlying the benefits seen with yoga practice. Other studies can be considered exploratory, and form the basis for future more rigorous studies.

There are several challenges in researching the effects of yoga in children. Some of the difficulties are related to carrying out assessments in children. Many studies use

the easiest to measure objective tests (a standard example is the EUROFIT battery of tests). However many aspects of cognitive and emotional functioning require the use of complex psychological questionnaires. Depending on their age and comprehension, children may find it difficult to respond accurately to the questions asked. Other children may be hesitant to give responses which they would feel could possibly influence the way they are judged by their peers and teachers. Apart from methodological issues related to assessing the children's response to yoga, there are certain issues related to teaching yoga to children. There are three main differences between yoga and physical activity. One of them is the fact that yoga practice is characterized by directing the attention to all sensations arising in the body and maintaining awareness without being distracted. This is often practically difficult. Practically, children are often asked to sit still for brief periods to begin with and be aware of some sensation in their body which is easy to perceive, such as the movements associated with respiration. This also becomes a part of the training in learning to observe brief periods of silence.

The second difference is asking the children to remember to co-ordinate the phases of respiration with different body movements. For example they are asked to breathe in as they bend backwards and exhale with forward bending. These instructions about accompanying specific movements with phases of respiration are the second distinguishing feature between yoga and physical activity.

The third distinguishing feature between yoga and physical exercise is that during the practice of yoga the instructor continually reminds the children to relax. This also is often challenging as children would prefer to be actively engaged in physical activity. Nonetheless training in relaxation is both important and feasible to do with children.

While teaching yoga to children, poses a set of challenges, there are different difficulties associated with carrying out research on the effects of yoga in children. One of the difficulties is making the test interesting for the child so that the child would feel like performing the test. In many cases long or involved questionnaires cause a child to be disinterested and careless in responding. The other difficulty is ensuring that the child understands what is required to be done or what exactly a question means, and the kind of response expected.

Given this situation in which the results may be modified by the fact that children may either not understand or not perform the tests with complete interest and understanding would be particularly relevant for younger children. Apart from this when attempting to understand the effects of yoga practice it is interesting to understand how the practices impact the behavior of children, particularly their interaction with their peers and teachers at school, and their siblings at parents at home. Questionnaires may often give misleading results. In these cases observing the actual behavior of the children in a school setting using a structured observational method may be far more useful than attempting to answer these questionnaires through questionnaires even if they are proven to be reliable and valid for children of a particular age group. Hence a combination of research methods would to be the best way to understand the impact of yoga on the physical, mental, emotional, and social health and behavior of children.

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