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## Effects of multisensory yoga on behavior in a male child with Apert and Asperger syndrome

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### Abstract

This case focused on a 7-year-old boy with Apert and Asperger's syndrome who attended 8, 45 min multisensory yoga sessions, twice a week, during 4-week camp. Results from the pre- and post-tests on Treatment and Research Institute for Autism Social Skills Assessment showed improvements in the total score changes from 19 to 7 for disruptive behaviors. Sparks Target Behavior Checklist scores changed from eight to one showing progression in ability to stay on task. Yoga Pose Rating Scale displayed the transformation in total scores from 80 = emerging to 115 = consistency in pose performance. The field notes revealed the positive development in expressive emotions, social engagement, and decline in looking around. Outside class parent and school behavioral specialist reported the improved ability to self-regulate stress using lion's breath and super brain. These findings indicate an improvement in behaviors that influenced the physical performance, emotional expression, and social interaction after yoga training for this child.

**Keywords:** Apert syndrome, Asperger syndrome, behavior, multisensory yoga, social skills

### INTRODUCTION

Apert syndrome is a rare genetic disorder characterized by physical abnormalities in the skull, acromegaly, difficulty with speech, and low intelligence quotient. Apert research predominately explores the surgical procedures, indicating a lack of studies on effective therapies.[1] Asperger's syndrome, representing 75% of children diagnosed with autism spectrum disorder (ASD), is characterized by low muscle tone, restricted social skills, unusual mannerisms, and interests. Yet, only 5% of funds in the USA are dedicated to ASD research.[2] Yoga research for children with ASD has demonstrated improvements in stillness, following directions, emotional expression, and social interaction.[3,4,5,6,7,8,9,10] There were no studies found on Apert syndrome and yoga.

### CASE REPORT

A 7-year-old male (pseudonym Tom) presented with Apert and Asperger's Syndrome exhibiting the characteristics of difficulty following directions, lack of emotions, irritability, shyness, and poor coordination. In addition, his unusual mannerisms of looking around frequently impaired his engagement with yoga program. Looking around was characterized by his gazing off in the distance or up at ceiling. Tom attended 8, 45 min multisensory enriched yoga, twice a week, during a 4-week camp for children with ASD. The study was approved by Institutional Review Board of local university, and parental consent was obtained during the camp enrolment. Throughout the entire day camp, Tom was partnered with a college counselor to assist with any needs. Thirty-one poses were performed in a small group of five males. Multisensory enrichment aspect included singing of familiar children's songs, counting, rhythmic gesture chanting, and a personalized yoga bin containing yoga colored picture binder, cut outs of hands and feet, feather, pinwheel, small flashlight, bean bag animal, and a large towel. Each multisensory feature was goal oriented based on his diagnosis. For example, the binder contained illustrations and instructions of each pose in sequential order to compliment all learning styles; a pinwheel and feather were used during the breathing exercises to promote calmness and focus; repetitive rhythmic chants and clapping were added to increase vocalization and engagement; singing the familiar children's songs aided time on task and improving language; towel placed over the body in ragdoll to promote tranquility; a miniature flashlight was used during call-repeat mantra to emphasize "light within" to focus on self-awareness. Yoga pose samples are presented in [Table 1](#).

The pre- and post-test measures of behavior, social skills, and physical pose performance were obtained from Sparks Target Behavior Checklist (STBC; measured 59 on task and interactive behaviors using a dichotomous scale: Yes = 1 and no = 0),[\[11\]](#) Treatment and Research Institute for ASD Social Skills Assessment (TRIAD; measured 18 problematic behaviors on a Likert scale from 0 = never to 4 = consistent),[\[12\]](#) Yoga Pose Rating Scale (YPRS; rated 31 poses on Likert scale: 1 = rarely to 5 = mastery),[\[8\]](#) and field notes (FN; rated four multidimensional quality of life domains). All four forms were completed by trained yoga instructor based on a video recording of yoga. Finally, Tom's parent and school behavior specialist were asked to comment on any changes noted at the end of sessions.

Results of YPRS showed the overall total score change from 80 = emerging (partial body engagement) to 115 = consistently (whole body engagement) indicating he held poses more accurately for a longer period of time. TRIAD depicted improvement in the total score from 19 to 7, indicating less disruptive behaviors specifically in shyness and unusual mannerism of looking around. STBC illustrated the elimination of seven out of eight behaviors in the area of staying on task; all that remained was the behavior of looking around. The results of FN indicated that Tom initially was disengaged, shy, rejected help, frequently looked around, and was unexpressive emotionally. He was able to transition to seeking help appropriately, expressing emotions such as laughter and smiling, spending less time looking around, and taking on a leadership role for last yoga session. By a report from behavior school specialist and parent, he also improved his timely utilization of lion's breath and super brain as a means to self-regulate during stressful situations outside the yoga.

## DISCUSSION

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This case demonstrated the positive impact of multisensory enriched yoga on behaviors that influenced the physical performance, emotional expression, and social interaction for this young male. Changes in behaviors were observed during Tom's physical yoga pose performance scores most notably in cat/cow, down dog, reverse warrior, seated forward fold, and call-and-repeat mantra. According to FN, his balance and coordination of upper and lower extremities in poses improved along with his imitation of animal behaviors and sounds. He also utilized the cut outs of hands and feet, towel, and camp counselor partner to lengthen the time in pose and form proper body alignment [\[Figure 1\]](#). Our findings are similar to Radhakrishna[\[8\]](#) and Radhakrishna *et al.*[\[9\]](#) who not only utilized a partner model during yoga, but also noted an improvement in imitation of poses and vocalization of sounds.

Researchers on the role of yoga in children with ASD have shown a transfer of positive emotional coping behaviors from yoga to school and home.[3,4,6,8] For example, Ehleringer discovered children with ASD were able to generalize their ability to self-regulate emotions from yoga to other life areas.[3] Specific to benefits of the super brain, Koterba's found a positive impact on increased focus, decreased self-stimulation, and improved social skills.[7] Tom was able to utilize lions breath and super brain [Figure 2] to calm himself down in stressful situations outside of yoga as reported by school behavior specialist and parent.

One of the most paramount developments was Tom's transformation in social behaviors from shy and withdrawn to a confident leader. For example, Tom went from being irritable and rejecting assistance to asking his camp counselor appropriately for help to stabilize himself in poses. During the last yoga class, Tom accepted the instructor's offer to lead and demonstrate poses in front of the other children [Figure 3]. Another researcher Kenny observed the improvements in connecting with partners during yoga and emphasizing the need for instructors to create opportunities for children with ASD to lead or demonstrate poses for the class.[5] Moreover, Radhakrishna *et al.* noted that children moved closer to the instructor and showed a more positive mood.[9]

While his looking around remained his unusual behavior, it lessened from occurring frequently to very rarely interfering with yoga engagement. This could have resulted from multisensory components of yoga. For example, he would consistently use his binder as a resource to replicate poses and select props from bin [Figure 4]. In addition, he would start the class with a vibrant imitation of vocal vowel sounds during chanting as they were combined with rhythmic gestures, and transition to a tranquil state under a towel, while laying down in ragdoll. Radhakrishna also noted a change in children throughout yoga to indicate their preference for Shavasana.[8]

## CONCLUSION

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It appears that this multisensory enriched yoga did have a positive impact on this young boy's behaviors related to physical, social, and emotional well-being on and off the mat. Based on our positive findings, further research with a larger sample size and additional yoga sessions is warranted to investigate the long-term effects of multisensory yoga on behaviors that contribute to social and emotional well-being in school and community settings.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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### Conflicts of interest

There are no conflicts of interest.

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## Figures and Tables

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**Table 1****Sample yoga poses**

Yoga poses	Instructions	Benefits	Equipment and Cues*
Chanting and breath series			
Pinwheel breath work	The participants were asked: "Grab the pinwheel out of your bin, inhale through the nose and on the exhale blow on the pinwheel" (repeat 3 times)	Promotes calmness, and stilling the mind; adding the pinwheel promotes engagement and focus	18" pinwheel
Lions breath	From a kneeling position, participants were instructed: "Inhale through the nose raising up high on your knees with your hands raised like lions paws, and then exhale and roar like a lion while sticking your tongue out. Lower back down to your knees and place their hands back on the ground" (repeat 3 times)	Reduces stress, mild depression, and anxiety	"ROAR like a LION!"
Balance series			
Tree	The participants were verbally cued to chant the familiar child song. Then "stand with feet shoulder width apart and place your foot on your calf, or inner thigh." Repeat 1 time on other side beginning with the song	Calms the mind, cultivates poise, and focus	Sing prior to pose while clapping your hands "if you are happy, and you know it, be a tree; again on the other side" (repeat song)
Airplane	The participants were guided: "Bend at the hips and bring one leg back perpendicular to the floor. Place your arms straight out to the side horizontally." Repeat 1 time on other side	Improves balance, develops concentration, and strengthens legs, chest, and arms	Sing while holding pose: "Fly like airplane, fly like airplane, fly like an airplane in the sky; again on the other side (repeat song)
Flexibility series			
Table top pose	The participants are asked: "Get your beanbag toy out of the bin. Lay down on your back. Place the toy on your stomach to aid with balance. Then, inhale, while rising up on your hands with hips in the air. Then, exhale and slowly lower bodies back to mat (repeat 3 times)	Stretches pelvis, chest, and shoulders; aligns spine, strengthens bones; increases coordination and balance	Animal beanbag toy is place on the stomach

\*Each participant had a plastic bin with equipment and picture book of poses

[Open in a separate window](#)

**Figure 1**



Towel prop for proper alignment

**Figure 2**



[Open in a separate window](#)

Super brain with partner

**Figure 3**



Leading frog pose for group

**Figure 4**



Table top pose with beanbag animal

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