



**ORIGINAL RESEARCH PAPER**

**Education**

**EFFICACY OF ASHTANGA YOGA ON SOCIAL SKILLS DEVELOPMENT OF CHILDREN WITH HIGH-FUNCTIONING AUTISM**

**KEY WORDS:** High functioning autism, ASD, Social skills, Ashtanga yoga.

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**ABSTRACT**

An experimental study was conducted to explore the effectiveness of 'ashtanga yoga' on social skills development of children with high functioning autism spectrum disorder. The pre-test post-test control group design was employed for the study wherein two convenient groups of children with ASD, one enrolled to the CRDAC, Kozhikode, (experimental group) and the other enrolled to BRC, Perambra (control group) were pre-tested for social skills by administering Social Skill Assessment Scale for Children with Autism (Parent version and Teacher version). The experimental group was exposed to 23 one-hour sessions of yogic training spread over six weeks, followed by post-testing of social skills in both the groups. Covariance analysis showed significant improvement in social skills of children with autism in the experimental group, revealing the effectiveness of ashtanga yoga in promoting social skills of children with high functioning autism. Boys and girls in the experimental group differed significantly with respect to the improvement they made in the social skills, the girls excelled the boys. Age of the children with high functioning autism is a decisive factor influencing the effectiveness of ashtanga yoga in improving their social skills, the younger children improved more in their social skills than that made by the older children.

**INTRODUCTION**

Autism Spectrum Disorder (ASD) is a pervasive developmental disorder which is characterized by social difficulties, communicative limitations, and a restricted range of interests and behaviors. Social skill deficits are central to the diagnostic criteria of ASD, as individuals with this disorder typically have difficulty initiating interactions, sharing enjoyment, maintaining eye contact, reciprocating conversation, taking another's perspective, and inferring interests of others (American Psychiatric Association, 2000). These deficits can significantly affect the ability to establish lasting and meaningful relationships and lead to rejection and isolation (Silveira-Zaldivara, Ozerk & Ozerk, 2021; Holloway, Healy, Dwyer & Lydon, 2014). Impairment in social functioning is a central feature of autism spectrum disorders (ASD) and has been well documented in the literature (Lin, Lim & Lee, 2022; Mikami, Miller & Lerner, 2019; Frye, 2018; Keejar & Teng, 2015; Chasson & Jarosiewicz, 2014). Individuals with ASD have difficulty communicating with others, processing and integrating information from the environment, establishing and sustaining social relationships with others, and participating in new environments. Specific social skills deficits include difficulties with initiating interactions, maintaining reciprocity, sharing enjoyment, taking another person's perspective, and inferring the interests of others (Yizengaw, 2021; Hodges, Fealko & Soares, 2020; Frye, 2018; Chasson & Jarosiewicz, 2014).

Teaching social skills to children with ASD can be one of the most challenging and rewarding tasks that educators and psychologists undertake. Social skills training (SST) is a topic of great importance in the field of autism as social skill deficits are a prominent feature of autism spectrum disorders (ASD). Unfortunately, few children receive SST as an integral part of their treatment and educational programming (Choque et al., 2017). The social skills component of the educational program determines the functional success of every other goal. It is through social abilities that academic knowledge is conveyed in the real world. Even communication skills carry minimal power if social skills are not developed to ensure opportunities to communicate. Decreasing social anxiety through non-pharmacologic techniques has great attraction to both parents and teachers of children with autism (Jiang, Song, Qin, Xiao, Xu & Yuan, 2022). Yoga is a mind-body approach that enjoys popular practice for increasing the sense of wellbeing and control with the potential to decrease

anxiety in social situations. The effectiveness of yoga to promoting social skills by reducing social anxiety of children with autism spectrum disorder requires more scientific study. In this context, the present study was undertaken to know the effectiveness of Ashtanga Yoga on social skills development of children with high functioning ASD.

**Objectives Of The Study**

The specific objectives of the investigation are the following.

1. To find out the effectiveness of 'ashtanga yoga' in developing social skills of children with high functioning autism spectrum disorder.
2. To find out the differential influence of gender on the efficacy of 'ashtanga yoga' in developing social skills of children with high functioning autism spectrum disorder.
3. To find out the differential influence of age on the efficacy of 'ashtanga yoga' in developing social skills of children with high functioning autism spectrum disorder.

**Hypothesis Of The Study**

The following hypotheses were tested for the study:

1. Ashtanga yoga is effective in developing social skills of children with high functioning autism spectrum disorder.
2. Gender does not exert any significant differential influence on the effectiveness of ashtanga yoga in developing social skills of children with high functioning ASD.
3. Age does not exert any significant differential influence on the effectiveness of ashtanga yoga in developing social skills of children with high functioning ASD.

**METHODOLOGY**

The quasi-experimental study adopted a pretest-posttest control group design. The population for the study was the children with High Functioning Autism (HFA) in the age range 8-14, living within the revenue boundaries of the Indian state of Kerala. As the present study focused on children with high functioning autism spectrum disorder, children who have been identified to belong to this category alone have been included in the study. The researchers used convenient sampling method for selecting the children from Centre for Research and Development of Autistic Children (CRDAC), Kozhikode, under Samagra Shiksha Kerala (SSK) Project (Govt. of Kerala) as experimental group (n = 42) and autistic children enrolled to Block Resource Centre, Perambra as control group (n = 37). The participants of the present study

comprised those children who have been diagnosed and certified as cases of autism by approved medical/mental health agencies. The participants were students in the age range 5 to 14, enrolled in different schools under Block Project Officer for their normal education as per IED (Integrated Education for Disabled) system. These children receive periodical training in the CRDAC to cope with their developmental difficulties and optimize their educational outcome. The inclusion criteria comprise: (a) children identified as autistic, (b) IQ above 70, (c) between the ages 6-14 years, (d) studying in grade 1 to 8, and (e) gender identity as either boy or girl. The exclusion criteria included: (a) children with physical disabilities, (b) children suffering from severe ailments, (c) children with sensory defects, and (d) autistic children with IQ below 70.

The social skills of the participants were measured by two parallel versions of the Social Skill Assessment Scale for Children with Autism, one for the parents (SASCA-P) and the other for the teachers (SASCA-T), both developed by Prameela and Arjunan (2014). They are five-point (from Always to Never) Likert-type scales consisting of 40 items each of which describe some specific social behaviour across six selected dimensions of social skills: (i) Cooperation, (ii) Responsibility, (iii) Self-control, (iv) Assertion, (v) Communication, and (vi) Empathy. The validity and reliability estimated for SASCA-P are in the order of 0.77 and 0.86, and those for SASCA-T are in the order of 0.74 and 0.83. The yogic intervention of the study made use of the Basic Training Module of Ashtanga Yoga for Children and Adolescents developed by Santhosh (2010). The package was mainly meant for differentially abled children and adolescents. So, the asanas and pranayama adopted for the package were in consonance with their age and developmental stage. The package comprises following asanas: Prayer, Vajrasana, Sashankasana, Paschimottanasana, Parvatasana, Pavana muktasana, Bhujangasana, Dhanurasana, Naukasana, Makarasana, Savasana, Tadasana, Gomukhasana, Ardhapadmasana, Padmasana, Yoga mudra, Kapalabati, Anuloma viloma, Meditation. The yogic intervention was made by a qualified and experienced trainer in imparting meditation and yoga to differentially abled children. The duration and frequency of each asana was varied according to the requirements of the participants. The experimental intervention was completed in 23 sessions of 1 hour duration, spread over 6 weeks, and adequate suggestions for practice at home under the supervision of the parents.

**Analysis and Interpretation**

The important descriptive statistical indices pertaining to the pre-test and post-test scores of social skills, estimated for the control group and experimental group, are given in Table 1.

**Table 1: Descriptive Statistical Indices Pertaining To Pre-test And Post-test Scores Of Social Skills**

Testing	Groups	N	M	Md	σ	Sk	Ku	SEM
Pre-test	Contl.	37	97.92	100.0	10.81	-0.714	0.729	1.78
	Exptl.	42	97.50	100.5	14.08	-0.465	-0.613	2.17
Post-test	Contl.	37	98.08	101.0	10.33	-0.874	0.686	1.70
	Exptl.	42	112.55	116.0	13.99	-0.391	-0.181	2.16

The results of the descriptive statistical analysis show that the distribution of pre-test and post-test scores of social skills in both the control group and experimental group are normal as the skewness estimated lie between +1 and -1. The highest pre-test score and post-test scores estimated for the control group are 117 and 115, while those estimated for the experimental group are 122 and 142 respectively. The lowest pre-test and post-test scores for the control group are in the order of 66 and 69; while those obtained for experimental group are 66 and 81 respectively.

Analysis of covariance was carried out to find out the effect of ashtanga yoga on the social skills of children with high

functioning autism by comparing the post-test scores of control group and experimental group after partialling out the effect of their pre-test scores. the result of the ANCOVA is given in Table 2.

**Table 2: Covariate Analysis Of Post-test Scores Of Social Skills (Summary Of Tests Of Between Subjects Effects)**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	13517.684a	2	6758.842	207.442	.000	.845
Intercept	508.769	1	508.769	15.615	.000	.170
Pre-test	9400.947	1	9400.947	288.534	.000	.792
Groups	4326.317	1	4326.317	132.783	.000	.636
Error	2476.214	76	32.582			
Total	899826.000	79				
Corrected Total	15993.899	78				

a. R Squared = .845 (Adjusted R Squared = .841)

The F-ratio estimated is significant beyond 99.9% confidence interval (F = 132.783; p<.001), revealing that intervention with ashtanga yoga has caused significant improvement in the social skills of children with high functioning autism spectrum disorder. The value of partial eta square (η<sup>2</sup>) indicate that Ashtanga Yoga exert a large effect on the social skills of children with high functioning ASD.

In order to find out whether ashtanga yoga is equally effective with both boys and girls, the groups were compared with respect to the gain scores of social skills. As a first step, the gain scores of social skills were estimated by subtracting the pre-test scores of each participant from their post-test scores. The gain scores of the gender groups were then compared by applying independent sample t-test, the result of the same is given in Table 3.

**Table 3: Comparison Of Boys And Girls Regarding The Gain Scores Of Social Skills**

Groups	Statistical Indices				t-value	Sig.
	N	M	SD	SEM		
Boys	28	13.43	5.916	1.118	2.105	.05
Girls	14	18.29	8.957	2.394		

The t-value obtained on comparing the gender-based sub-samples in the experimental group with regard to the gain scores of social skills is significant at 95% confidence interval (t = 2.105; p<.05). It exposes that boys and girls differ significantly with respect to the effectiveness of ashtanga yoga. Inspection of the mean estimate shows that ashtanga yoga was more effective in developing the social skills of girls than that of boys.

The differential influence of age on the effectiveness of ashtanga yoga on social skills development of children with high functioning autism was examined by subjecting the gain scores to one way ANOVA. The participants in the experimental group were classified into high, average and low age groups based on the M± principle. Accordingly, the arithmetic mean (M = 10.33) and the standard deviation (σ = 2.71) of the gain scores of social skills were computed and participants were grouped into High age group (participants with age of 13 years and above), Low age group (participants with age of 8 years and below) and Average age group (participants whose age is between 9 and 12). One way ANOVA was subsequently performed to compare high, average and low age groups of the participants in the experimental group with respect to their gain scores of social skills. The result of the analysis of variance is given in Table 4.

**Table 4: Comparison Of The Gain Score Of Social Skills Of Participants In High, Average And Low Age Groups (summary Of Anova)**

SSK	Sum of Squares	df	Mean Square	F	Sig.
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Between Groups	494.956	2	247.478	5.635	.01
Within Groups	1712.949	39	43.922		
Total	2207.905	41			

The F-ratio calculated is significant at 99.9% confidence interval ( $F = 5.635; p < .01$ ), showing that there is an actual difference among autistic children in different age groups with respect to the improvement they made in the social skills when intervened with ashtanga yoga. Scheffe's post-hoc test was subsequently performed to find out the age groups which demonstrate significant difference, the result of the same is presented in Table 5.

**Table 5: Post Hoc Test For The Comparison Of Gain Social Skills Scores Of Hfa Children In Different Age Groups**

(I) AGE	(J) Age	(I-J) Mean Difference	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
LOW	Average	6.871*	2.576	.038	.31	13.43
	High	10.361*	3.220	.010	2.17	18.56
AVERAGE	Low	-6.871*	2.576	.038	-13.43	-.31
	High	3.490	2.692	.439	-3.36	10.34
HIGH	Low	-10.361*	3.220	.010	-18.56	-2.17
	Average	-3.490	2.692	.439	-10.34	3.36

\* The mean difference is significant at the 0.05 level.

The mean difference estimated for different paired groups shows that children in the low age group (below 8 years) differ significantly from children in the average (mean difference = 6.871;  $p < .05$ ) and the high (mean difference = 10.361;  $p < .01$ ) age groups regarding the improvement they made in the social skills when exposed to ashtanga yoga. No true difference, however, was noticed between children in the average and high age groups (mean difference = 3.490;  $p > .05$ ). A closer observation of the Table 5 reveals that ashtanga yoga intervention was more beneficial for children in the low age groups than children in average and high age groups.

**CONCLUSIONS**

The results of the study have brought out that six-week long ashtanga yoga is effective in improving the social skills of children and adolescents with high functioning autism spectrum disorder. The parents and teachers reported reduction in problem behaviour and improvement in motor coordination in participants exposed to yogic intervention. The first hypothesis (ashtanga yoga is effective in developing social skills of children with high functioning autism spectrum disorder) is, therefore, accepted. Comparison of male and female children with HFA with respect to the effectiveness of ashtanga yoga disclosed that intervention with ashtanga yoga is more successful with girls than with boys. The null hypothesis formulated in this context, viz., Hypothesis-2 (gender does not exert any significant differential influence on the effectiveness of ashtanga yoga in developing social skills of children with high functioning ASD) is, therefore rejected. The findings brought out that ashtanga yoga is significantly more effective for younger children than for older children. The third hypotheses (age does not exert any significant differential influence on the effectiveness of ashtanga yoga in developing social skills of children with high functioning ASD) is, subsequently rejected. The study put forth experimental evidence to substantiate that ashtanga yoga is a holistic mind-body intervention to stimulate development of social skills in children and adolescents with high functioning autism. Gender and age of the children are significant decisive factors affecting the effectiveness of ashtanga yoga in nurturing the social skills in children with high functioning autism.

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