



# Yogintervention: The effects of Yoga on Attention and Cognition in Children and Adolescents with Autism and ADHD

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## Background

- The Centers for Disease Control and Prevention (CDC) estimates that about 1 out of every 88 children are diagnosed with ASD (CDC, 2013). According to the CDC 11% of children between the ages of 4-17 are diagnosed with ADHD in the United States.
- Core features of ASD include difficulties with social, emotional, and communication skills (CDC, 2013). Individuals with ADHD present with impulsivity, inattention, and hyperactivity (Leitner, 2014). Traditionally increased attention, reduced hyperactivity, and reduced core features of behaviors in children with ASD and/or ADHD are targeted with a variety of interventions.
- Yoga has many benefits and is classified as a mind-body intervention by the National Center for Complementary and Alternative Medicine and can be used as a complementary approach in occupational therapy to enhance engagement in occupation (Koenig et al., 2012).
- The purpose of this review is to analyze the positive changes in cognitive and language skills across core features, attention, and hyperactivity behaviors that are seen in children and adolescents with a diagnosis of ASD/ADHD Disorder after participating in yoga therapy.
- The specific research question is: Do children and adolescents who participate in yoga therapy with a diagnosis of autism spectrum disorder and/or attention deficit disorder show improved language and cognitive skills across a variety of tasks?

## Literature Search

- The following databases/search techniques were used to retrieve articles: CINAHL, PubMed, Google Scholar, ERIC
- The search terms/keywords used were: Yoga therapy and Autism, Yoga and Autism, Children with Autism and Yoga, Exercise and Autism, Yoga therapy and ADHD, Yoga and ADHD, Children with ADHD and Yoga, Exercise and ADHD, Mindfulness (Mind/Body therapy) and Autism, Mindfulness (Mind/Body therapy) and ADHD
- Additional search criteria included:
  - Articles in English
  - Published 2000 or later
  - Children (under 16 years of age)
  - Autism or ADHD
  - Meditation & Autism
  - Meditation & ADHD
- Articles were excluded based on the following criteria: Physical exercise programs that did not include Yoga, Mindfulness, or Meditation

## Results

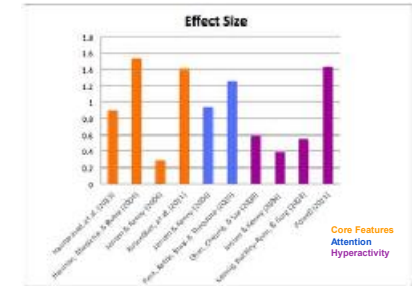
The following tables are presented to represent the results of the meta-analysis of a yoga-based intervention. Table 1.a signifies the effects of each study and whether therapy treatment was the sole treatment, no other treatments were present, or add-on treatment, to other therapies such as pharmacological or ABA therapy. Table 1.b represents the effect size of each study.

Effects	Sole		Add On	
	Autism	ADHD	Autism	ADHD
Core Features	Rosenblatt, et al. (2011)		Radhkrishna (2010)	Hariprasad, et al. (2013) Harrison, Manocha, & Rubia (2004) Jensen & Kenny (2004)
Attention		Peck, Kehle, Bray, & Theodore (2005)		Jensen & Kenny (2004)
Hyperactivity	Koenig, K. P., Buckley-Reen, A., & Garg, S.	Chan, Cheung, & Sze (2008) Powell (2011)		Jensen & Kenny (2004)

\*Studies that looked at Autism  
\*Studies that looked at ADHD

Effects	Article	Effect Size (in Cohen's d)
Core Features	Hariprasad, et al. (2013)	.895
	Harrison, Manocha, & Rubia (2004)	1.54
	Jensen & Kenny (2004)	-.29
	Radhkrishna (2010)	1.41
	Rosenblatt, et al. (2011)	1.41
Attention	Jensen & Kenny (2004)	.94
	Peck, Kehle, Bray, & Theodore (2005)	1.26
Hyperactivity	Chan, Cheung, & Sze (2008)	.59
	Jensen & Kenny (2004)	-.39
	Koenig, Buckley-Reen, & Garg (2004)	.55
	Powell (2011)	1.43

## Data Analysis



As shown in the bar graph above, Harrison, Manocha, & Rubia (2004) and Powell (2011) had the largest effect on children and adolescents with ADHD, indicating yoga-therapy was very beneficial for improving core features and hyperactivity within those studies.

## Clinical Recommendations

- In children and adolescents with a diagnosis of Autism and/or ADHD, participation in yoga therapy demonstrates improved language and cognitive skills across a variety of tasks. Evidence in the findings suggests that yoga therapy results in increased attention, reduced hyperactivity, and decreased occurrences of core features of the diagnoses. Qualitative findings of increased attention and reduced hyperactivity, as well as observed reports of social functioning, make yoga therapy a promising intervention for children and adolescents with autism spectrum disorder and/or Attention Hyperactivity Deficit Disorder. However, treatment should be used with caution because of the limitations that accompany the current studies. Despite the need for further research, all of the studies demonstrated how yoga provides multiple benefits for children and adolescents with Autism Spectrum Disorder and/or Attention Deficit Hyperactivity Disorder.
- Limitations include:
  - Small sample sizes
  - Convenience samples/selection bias
  - Poor psychometric properties of the measurement tools used
  - Limited amount of RCTs conducted
  - In consistent asana practice (sequence of movements) used in yoga sessions
  - Lack of follow-ups after intervention
  - Need for a standardized yoga practice to replicate and compare results

## Patient Characteristics

Autism	Gender		Age (years)
	Males	Females	
Koenig, Buckley-Reen, & Garg (2004)	23	23	5-12
Radhkrishna (2010)	5	1	8-14
Rosenblatt, et al. (2011)	22	2	3.6-16.5
Total Average	16.66666667	8.66666667	3.6 (youngest)-16.5 (oldest)

ADHD	Gender		Age (years)
	Males	Females	
Chan, Cheung, & Sze (2008)	30	30	6.83-10.58
Hariprasad, et al. (2013)	8	1	5-12
Harrison, Manocha, & Rubia (2004)	41	7	4-12
Peck, Kehle, Bray, & Theodore (2005)	3	7	6-10
Powell (2011)	5	X	11-16
Jensen & Kenny (2004)	16	X	8-13
Total Average	17.16666667	11.25	4 (youngest)-16 (oldest)

## Dosage

Autism	Minutes	Sessions	Weeks
Koenig, Buckley-Reen, & Garg (2004)	17.5	80	16
Radhkrishna (2010)	60	80	80
Rosenblatt, et al. (2011)	45	8	8
Average	40.33333333	56	34.66666667
SD	21.95419526	41.5692194	39.4630629

ADHD	Minutes	Sessions	Weeks
Chan, Cheung, & Sze (2008)	30	40	20
Hariprasad, et al. (2013)	60	6	1
Harrison, Manocha, & Rubia (2004)	90	12	6
Peck, Kehle, Bray, & Theodore (2005)	30	6	3
Powell (2011)	60	12	6
Jensen & Kenny (2004)	60	20	20
Average	55	16	9.33333333
SD	22.58317958	12.83744523	8.477420991