

# Incidence of Pre-, Peri- and Post-natal and Developmental Problems in Children with Sensory Processing Disorder and Autism Spectrum Disorder with Sensory Processing Problems

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# PURPOSE

- ① An exploratory examination of the incidence of potential pregnancy, birth and early childhood risk factors in children with SPD and in children with Autism and SPD.
- ① Explore differences between these groups to determine if these factors may contribute to the differential diagnosis of these problems.



# RESEARCH QUESTIONS

- ① What if any types of pre-, peri- and post-natal and developmental factors are common in children with Sensory Processing Disorder (SPD) and in Autism Spectrum Disorder (ASD)?
- ② Are there significant differences between the SPD and ASD groups on any pre-, peri- and post-natal as well as developmental factors?
- ③ What, if any comparisons may be made with available data on typical populations?



# PROCEDURE

- © Retrospective chart review at a large private practice, in northeastern US, specializing in the assessment and treatment of sensory processing disorder.



# DEVELOPMENTAL SENSORY HISTORY

- © All information was extracted from 3 age appropriate versions of a parent report questionnaire, The Developmental Sensory History.

(Koomar & May-Benson, 1996 unpublished; Koomar et al. 1996 unpublished and Koomar & May-Benson, 1996 unpublished).



# INCLUSIONARY CRITERIA

- ⊙ Parental completion of a Sensory Developmental History between 1997 and 2008.
- ⊙ Adopted children were excluded due to lack of information on study variables



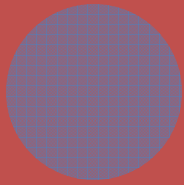
# PARTICIPANTS

- ◎ 2 Groups
  - ◎ 1000 children with SPD, two excluded, 998 children included aged 3-17 years with SPD
  - ◎ 467 Children with SPD and ASD, two excluded, 465 children included aged 1-17 years



# DEMOGRAPHICS

- ◎ Significant differences exist between the SPD and ASD groups on many demographic variables .
- ◎ This study is exploratory , it is possible that demographics may account for some of the differences between groups.



# DEMOGRAPHICS

	SPD %	ASD %	t
Male	73	82.6	-4.147**
Aged 0-3	1.1	26.8	-12.367**
Aged 4-12	98	67.7	13.541**
Aged 13-17	1.1	5.4	-4.951**
ADD/ADHD	17	12	2.314*
Anxiety	3	8	-4.642**
Other Diagnoses	19	23	-2.094*



# MEASURES

- ◎ Parents reported on information from 5 areas
  - ◎ Maternal health during pregnancy
  - ◎ Child's birth
  - ◎ Early childhood illnesses and injuries
  - ◎ Infancy/Early Childhood
  - ◎ Developmental milestones



# PRE-NATAL FACTORS

- ④ 45% of mothers in both groups reported 1 or more problems during pregnancy
- ④ No significant differences between the SPD and ASD groups.



# RESULTS- PRE-NATAL FACTORS

	SPD %	ASD %	t
Maternal stress	18	21	-1.253
Maternal illness	25	24	.656
Maternal use of medications	26	28	-.865



# BIRTH RELATED FACTORS

- ① No significant differences on any individual measure between groups except fetal distress which was higher in the SPD group.
- ① Some problems potentially underreported as parents wrote in problem areas rather than checking off options.

# RESULTS- BIRTH RELATED FACTORS

Delivery Complications	SPD %	ASD %	t	Comparison %
Overall delivery complications	42	38	1.528	
Prolonged labor	8.0	10.1	-1.282	7.6 <sup>1</sup>
Breech	4.7	5.7	-.708	4.7 <sup>2</sup>
Fetal Distress	4.4	1.9	2.296*	6.3 <sup>1</sup>
Low Fetal Heart Rate	3.0	2.6	.371	
High Fetal Blood Pressure	0.9	0.9	-.048	

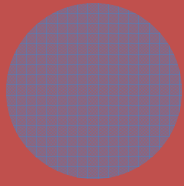
<sup>1</sup>Brimmacombe et al.(2007), Prenatal Complications in Autism

<sup>2</sup>Martin et al. (2007), Births: Final Data for 2005



## RESULTS - BIRTH RELATED FACTORS

Assisted Delivery Methods	SPD %	ASD %	t	Comparison %
Overall Assisted Delivery	36	44	-2.509*	
C-Section	18	22	-1.528	30 <sup>1,2</sup>
Induced Labor	5.4	7.5	-1.553	22 <sup>2</sup> , 26 <sup>1</sup>
Forceps	8.3	7.4	.546	0.9-3.5 <sup>2</sup>
Suction	7.6	10.3	-1.589	3.9-5.9 <sup>2</sup>



## RESULTS - BIRTH RELATED FACTORS

Gestational age and birth weight	SPD %	ASD %	t	Comparison %
Born prematurely <sup>a</sup>	12	16	-1.875	13 <sup>2</sup> , 17 <sup>1</sup>
Very low birth weight <sup>b</sup>	1.5	1.8	-.279	1.5 <sup>2</sup>
Low birth weight <sup>c</sup>	4.8	7.6	-1.822	8.2 <sup>2</sup>
High birth weight <sup>d</sup>	15	18	-1.284	8.1 <sup>2</sup>

<sup>a</sup> before 37 weeks

<sup>b</sup> <3lb 4oz

<sup>c</sup>3lb 5oz – 5lb 8oz

<sup>d</sup>≥8lb 14oz

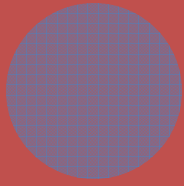
# RESULTS - BIRTH RELATED FACTORS

Illness/Injury	SPD %	ASD %	t	Comparison %
General Birth injury	4.7	6.6	-1.456	
Umbilical Insult	5.1	5.4	-.258	1 <sup>4</sup> , 1.2 <sup>3</sup>
Meconium	3.1	2.4	.721	5.5 <sup>2</sup>
Jaundice	26	30	-1.768	7 <sup>5</sup> , 18 <sup>1</sup>
Intensive Care	11	13	-.444	

<sup>3</sup>Glasson et al.(2004), Perinatal Factors and the Development of Autism

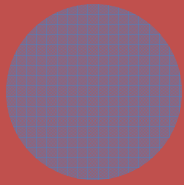
<sup>4</sup>Koonings et al. (1990), Umbilical cord prolapse. A contemporary look

<sup>5</sup>Setia et al., (2002), Neonatal Jaundice in Asian, White and Mixed-Race Infants



## EARLY CHILDHOOD ILLNESS/INJURY

- ⊙ The SPD group reported significantly more illnesses than the ASD group
- ⊙ The ASD group reported significantly more ear infections and allergies than the SPD group, although ear infection percentages were above 60% in both groups.
- ⊙ Both the SPD and ASD group reported more ear tube insertion than comparison data.



## RESULTS - EARLY CHILDHOOD ILLNESS/INJURY

	SPD %	ASD %	t	Comparison %
Significant Illness	32	26	2.508*	
Serious Injury	13	12	.489	
Ear Infections	62	69	-2.556*	91 <sup>6</sup>
Ear Tubes	14	12	1.047	4.2 <sup>6</sup>
Allergies	24	38	-5.593**	
Seizures	5.4	7.9	-1.774	
Asthma	8.0	7.4	.340	13 <sup>7</sup>

<sup>6</sup>Paradise et al., (1997), Otitis media in 2253 Pittsburgh-area infants: prevalence and risk factors during the first two years of life.

<sup>7</sup>Child and Adolescent Health Measurement Initiative, 2003



# EARLY CHILDHOOD DEVELOPMENTAL PROBLEMS

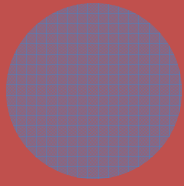
- ◎ The only significant difference was for sleeping problems with the ASD group reporting more problems than the SPD group.
- ◎ At least 45% of each group reported not experiencing the terrible twos.

# RESULTS - EARLY CHILDHOOD DEVELOPMENTAL PROBLEMS

	SPD %	ASD %	t	Comparison %
Sleeping Problems	32	44	-3.799**	
Feeding Problems	32	38	-2.210	25-40 <sup>8</sup>
Colic	20	24	-1.522	5-28 <sup>9</sup>
Prefer certain positions	33	35	-.548	
Dislike lying on back	10	13	-1.711	
Dislike lying on stomach	16	21	-1.714	
Dislike bouncing	13	10	1.470	
Not calmed by swings or cars	19	14	2.207	
Nauseated by swings or cars	6.3	5.4	.562	
Not experience terrible two's	45	50.8	-1.625	

<sup>8</sup>Reau, et al. (1996), Infant and toddler feeding patterns and problems: normative data and a new direction.

<sup>9</sup>Lucassen, et al. (2001), Systematic review of the occurrence of infantile colic in the community.



# DEVELOPMENTAL MILESTONES

- ◎ The ASD group reported more problems in every area than the SPD group, with significant differences on sitting, absent crawling phase, acquisition of language, and hesitancy on stairs.
- ◎ Relative to other reported norms the SPD and ASD groups both reported higher numbers not crawling by 12 months or having an absent crawling phase.

# RESULTS - DEVELOPMENTAL MILESTONES

	SPD %	ASD %	t	Comparison %
Not rolling over by 6m	11	14	-.928	
Not walking by 18m	6.1	7.7	-1.000	
No words by 12m	33	55	-6.574**	
No sentences by 24m	21	56	-10.075**	
Not sitting alone by 10m	2.9	6.5	-2.573*	
Not crawling by 12m	6.0	9.3	-1.292	3 <sup>10</sup>
Brief crawling phase	29	33	-1.084	
Absent crawling phase	8.0	10.0	-2.410*	4.3 <sup>10</sup>
Hesitancy on stairs	28	40	-3.880**	

<sup>10</sup>WHO Multicentre Growth Reference Study Group, (2006), WHO Motor Development Study: Windows of achievement for six gross motor development milestones.



# MULTIPLE PROBLEMS

- ① No single problem was common to all.
- ① The individuals in the SPD group averaged 7 problems across all areas while the ASD with SPD group averaged 8 problems across all areas.
- ① When examining the aggregate data, there were significant differences between the SPD and ASD groups for three categories: gestational age and birth weight; early childhood illnesses and injuries; and developmental milestones, with the ASD group showing higher percentages.

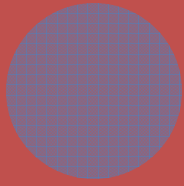
# RESULTS - MULTIPLE PROBLEMS

Problem Area	SPD M (SD)	ASD M (SD)	t
Pregnancy	.68 (.882)	.66 (.910)	.476
Delivery	.37 (.613)	.36 (.597)	.171
Assisted Delivery	.39 (.567)	.43 (.571)	-1.366
Gestational age and birth weight	.25 (.508)	.40 (.620)	-4.768**
Birth-related injuries and illnesses	.50 (.697)	.52 (.728)	-.954
Early childhood illnesses and injuries	1.5 (1.15)	1.7 (1.14)	-2.269*
Infancy and early childhood developmental problems	2.0 (1.61)	2.2 (1.74)	-1.876
Development Milestones	1.2 (1.37)	1.7 (1.40)	-6.091**
Total Problems	7.5 (3.63)	8.1 (3.90)	-2.440*



# CONCLUSIONS

- © Children with SPD and ASD with SPD exhibit similar profiles for pre-, peri-, and post-natal and developmental problems, but frequently the percentages were higher or problems more severe for children with ASD, with the exception of significantly higher incidences of fetal distress and childhood illnesses for the SPD group.



## COMPARISON TO POPULATION SAMPLES

- ⊙ For some problems, where data on a population sample was available for comparison, the SPD and ASD groups had higher percentages of the problem.
- ⊙ However, the incidence may not need to be significantly higher to be meaningful in assisting with differential diagnosis. These population samples included both ends of the bell curve and the existence of some of the problems may be a warning sign of SPD, ASD or other developmental problems when above or in line with incidence in the population at large.



## POSSIBLE SIGNS OF SPD IN A YOUNG CHILD

- ◎ This data is very preliminary but at this time, it appears that a profile to note when making a referral for SPD assessment may include:
  - 1) maternal stress during pregnancy,
  - 2) birth factors: jaundice, fetal distress, cord prolapsed, suction or forceps delivery, high birth weight,
  - 3) significant childhood illnesses- especially severe viral
  - 4) ear tubes,
  - 5) sleeping and feeding problems and colic,
  - 6) delayed or absent crawling phase and
  - 7) not having a “terrible two” phase.



# THANK YOU

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