

**Changes in Red Flags of  
Autism Spectrum Disorders from the  
Second to the Third Year of Life**

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**Introduction**

- ❖ Early red flags distinguish children with ASD from children with developmental delay and typical development in the second year of life.
- ❖ The purpose of this prospective, longitudinal study was to examine how red flags of ASD change from the second to the third year of life.

**13 Red Flags of ASD in the Second  
Year of Life**  
(Wetherby, Woods, Allen, Cleary, Dickinson, & Lord, in press)

*Systematic Observation of Red Flags (SORF)* in ASD (Wetherby & Woods, 2002) identified the following:

<b>Lack of Typical Behaviors:</b>	
➢ Appropriate gaze	
➢ Warm, joyful expressions with gaze	
➢ Sharing enjoyment or interest	
➢ Response to contextual cues	
➢ Response to name	
➢ Coordination of gaze, facial expression, gesture, and sound	
➢ Vocalizations with consonants	
➢ Showing	
➢ Pointing	
➢ Playing with a variety of toys conventionally	

<b>Presence of Atypical Behaviors:</b>	
➢ Unusual prosody	
➢ Repetitive movements or posturing of body, arms, hands, or fingers	
➢ Repetitive movements with objects	

**Method**

- ❖ Participants drawn from a pool of over 5,000 children assessed through the FIRST WORDS Project
- ❖ Participant selection criteria:
  - Performed in the bottom 10th percentile on the Social or Symbolic Composites of the CSBS DP
  - Later diagnosed with ASD
  - Archival videotaped Behavior Samples were available from their 2nd and 3rd years of life
  - Follow-up developmental assessment
- ❖ Behavior Sample videotapes were coded using the SORF
  - Interrater Reliability: Cohen's Kappas > .80

**Participants (n=17)**

- ❖ Chronological Age at Behavior Samples
  - 2nd Year of Life Mean Age: 19.7 months (*SD* 2.6)
  - 3rd Year of Life Mean Age: 29.0 months (*SD* 2.9)
- ❖ Mullen Mean Age: 33.1 months (*SD* 7.1)
  - LCSS: 79.1 (*SD* 29.4)
  - Nonverbal DQ: 81.3 (*SD* 23.4)
  - Verbal DQ: 64.4 (*SD* 36.8)
- ❖ All children were receiving early intervention services between Behavior Samples.

**Research Question 1**

Are the 13 red flags that have previously distinguished children with ASD in the second year of life evident in this sample of children in the second of life?

12 of the 13 red flags from the previous study were evident in the majority of children in this sample in the second year of life.

SORF Items	Original n=18	Present n=17
<b>Reciprocal Social Interaction</b>		
Lack of appropriate gaze	72%	88%
Lack of warm, joyful expressions	83%	82%
Lack of sharing enjoyment or interest	94%	100%
Lack of response to contextual cues	89%	82%
Lack of response to name	100%	100%
Lack of coordination of gaze, facial expression, gesture, and sound	100%	94%

SORF Items	Original n=18	Present n=17
<b>Unconventional Gestures, Sounds and Words</b>		
Lack of pointing	94%	94%
Lack of showing	100%	94%
Unusual prosody	50%	41%
Lack of vocalizations with consonants	83%	88%
<b>Repetitive Behaviors/Restricted Interests</b>		
Repetitive movements with body	50%	53%
Repetitive movements with objects	72%	88%
* Excessive interest in particular toys	28%	53%
Lack of playing with variety of toys	83%	80%

## Research Question 2

Which red flags of ASD are evident in the majority of this sample in the third year of life?

SORF Item	2 <sup>nd</sup> year	3 <sup>rd</sup> year
<b>Reciprocal Social Interaction</b>		
Lack of appropriate gaze	88%	82%
Lack of warm, joyful expressions	82%	71%
Lack of sharing enjoyment or interest	100%	82%
Lack of response to contextual cues	82%	59%
Lack of response to name	100%	100%
Lack of coordination of gaze, facial expression, gesture, and sound	94%	77%

SORF Item	2 <sup>nd</sup> year	3 <sup>rd</sup> year
<b>Unconventional Gestures, Sounds and Words</b>		
Lack of pointing	94%	82%
Lack of showing	94%	88%
Unusual prosody	41%	65%
Lack of vocalizations with consonants	88%	41%
<b>Repetitive Behaviors/Restricted Interests</b>		
Repetitive movements with body	53%	59%
Repetitive movements with objects	88%	59%
* Unusual sensory exploration	29%	53%
Excessive interest in particular toys	53%	24%
Lack of playing with variety of toys	65%	77%

### Research Question 3

Are there changes in the pattern of red flags from the second to the third year of life?

SORF Item	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year
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<b>Reciprocal Social Interaction</b>		
Lack of anticipatory posture	35%	6%
Lack of response to contextual cues	82%	59%
<b>Unconventional Gestures, Sounds and Words</b>		
Use of a person's hand as a tool	6%	29%
Unusual prosody	41%	65%
Immediate echolalia	6%	29%
Lack of vocalizations with consonants	88%	41%

SORF Item	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year
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<b>Repetitive behaviors and restricted interests</b>		
Repetitive movements with objects	88%	59%
Unusual sensory exploration of objects	29%	53%
Excessive interest in particular toys	53%	24%
<b>Emotional Regulation</b>		
Fear or distress about objects	41%	12%
Distress over removing object / ending	41%	18%
Difficulty calming	29%	6%
Abrupt shifts in emotional state	41%	18%
Heightened alertness	35%	12%
Flat or unresponsive	35%	12%

### Mean SORF Scores

SORF	2 <sup>nd</sup> Year (n=17)	3 <sup>rd</sup> Year (n=17)
Age	19.7 mos	29 mos
<b>Total (29)</b>	23.2	18.1
<b>RSI (8)</b>	9.8	7.6
<b>UG (3)</b>	3.5	3.3
<b>US (6)</b>	2.7	2.7
<b>RBRI (5)</b>	4.1	3.7
<b>ER (7)</b>	3.1	.9

### Mean SORF Scores

SORF	3 <sup>rd</sup> Year (n=17) With intervention	3 <sup>rd</sup> Year (n=6) Without intervention
Age	29 mos	28 mos
<b>Total (29)</b>	18.1	26.7
<b>RSI (8)</b>	7.6	10.2
<b>UG (3)</b>	3.3	4.7
<b>US (6)</b>	2.7	3.3
<b>RBRI (5)</b>	3.7	5.7
<b>ER (7)</b>	.9	2.8

### Conclusions

- ❖ Results of this investigation confirm and extend previous findings on early indicators of ASD.
  - Very young children with ASD exhibit both a lack of typical behaviors and the presence of atypical behaviors.
  - Impairments in early social communication AND repetitive behaviors contribute to earlier identification of ASD.
  - These red flags persist from the second to the third year of life in these children.
- ❖ New red flags not present in the second year of life may emerge during the third year of life.
- ❖ Research is needed to further explore how the characteristics of ASD unfold over the first three years of life and how early intervention and cognitive differences may impact on early red flags of ASD.

# Systematic Observation of Red Flags for Autism Spectrum Disorders in Young Children

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## Difficulty with Reciprocal Social Interaction (RSI)

1. Aversion to social touch or proximity
- \*\*2. Lack of appropriate gaze
- \*\*3. Lack of warm, joyful expressions with directed gaze
- \*\*4. Lack of sharing interest or enjoyment
5. Lack of anticipatory posture or movement in response to interaction
- \*\*6. Lack of response to contextual cues
- \*\*7. Lack of response to name when called
- \*\*8. Lack of coordination of gaze, facial expression, gestures, and sounds

## Unconventional Gestures (UG)

1. Using person's hand as a tool without directed gaze
- \*\*2. Lack of pointing
- \*\*3. Lack of showing

## Unconventional Sounds and Words (US)

1. Atypical vocalizations (squeals, growls, and yells)
2. Unusual syllable strings
- †3. Unusual prosody (little variation in pitch, odd intonation, irregular rhythm, unusual voice quality)
4. Immediate echolalia
5. Idiosyncratic or repetitive use of words or phrases
- \*6. Lack of communicative vocalizations with consonants

## Repetitive Behaviors and Restricted Interests (RBRI)

- \*\*1. Repetitive movements or posturing of body, arms, hands, or fingers
- \*\*2. Repetitive movements with objects
- †3. Unusual sensory interest or exploration with objects
- \*4. Excessive interest in or focus on particular toys
- \*\*5. Lack of playing with toys and objects conventionally

## Emotional Regulation (ER)

1. Fear or distress about particular objects
2. Distress over removing particular objects
3. Difficulty calming when distressed
4. Abrupt shifts in emotional or behavioral state
5. Heightened alertness and response to stimuli or situations
6. Flat affect or unresponsive to interactions
7. Challenging behavior (self-injury or aggression)

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\* present in a majority of the sample (n=17) in the second year of life only

\*\* present in a majority of the sample (n=17) in the second AND third year of life

† present in a majority of the sample (n=17) in the third year of life only