

# Children with Autism Spectrum Disorder in Dentistry

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# Autism-Spectrum-Disorder

- I. What is a Autism-Spectrum-Disorder:  
Prevalence, symptoms
- I. Etiology
- II. Children with ASD in dentistry

# What is a Autism-Spectrum-Disorder?

## Strengths



## weakness

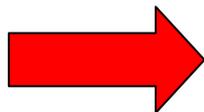


## Word-clouds of autism

Dillenburger, Jordan, McKerr, Devine, & Keenan, 2013, Seiten 1562-3

# Myths and Stereotypes of Autism/ASD

- ASD is incredibly rare, and easy to recognize
- All individuals with autism have savant abilities / special talents
- All people with ASD have intellectual disability
- All people with ASD live in a world of their own
- Everyone with ASD behaves in the same way
- There is a cure for ASD, or people will grow out of the disorder
- People with ASD have to be in special programs “for the autistic”



harmful divergence between the general image of autism and the clinical reality

# Autism-Spectrum-Disorder

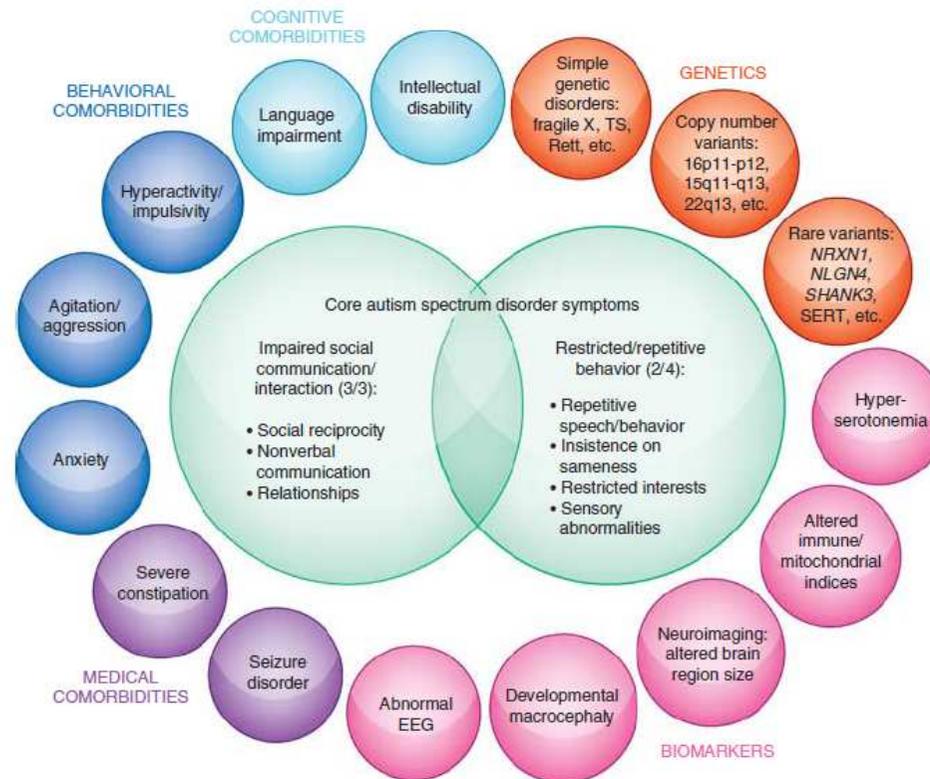
is characterized by

- Persistent deficits in social communication and social interaction across multiple contexts

in combination with

- Restricted, repetitive patterns of behavior, interests, or activities
- Symptoms must be present in the early developmental period (typically recognized in the first two years of life)
- Symptoms cause clinically significant impairment in social, occupational, or other important areas of current functioning

# Autism-Spectrum-Disorder



Veenstra-VanderWeele  
& Blakely, 2012, p. 197

- Start in early childhood
  - Symptoms are present in all situations and
  - persistent throughout the lifespan
- ➔ **High phenotypical heterogeneity**



# High phenotypical heterogeneity

- Measured Cognitive Ability
- Social-Emotional Development
- Communication Ability
- Motor Skills: Both Fine and Gross
- Sensory Processing
- Comorbidities

Silly Brilliant Caring Myste  
Interesting Smart Funny Gi  
Exceptional Zany I Brave Ha  
Intriguing am Talented Cl  
Sensitive Keen am Intellig  
Curious more Gifted G  
Unique than Charisn  
Blessed Amus  
Smart Autism V  
Humorous Aware Bright V  
Inspirational Strong Kind L  
Loving Creative Spirited Hun

# Autism-Spectrum-Disorder

## Social impairment

- Have trouble engaging in everyday social interactions
  - Make little eye contact
  - Tend to look and listen less to people in their environment or fail to respond to other people

# Autism-Spectrum-Disorder

## Social impairment

- Have trouble engaging in everyday social interactions.
  - Deficits in joint attention
  - Rarely seek to share their enjoyment of toys or activities by pointing or showing things to others
  - Respond unusually when others show anger, distress, or affection.

**Fig. 1. Illustrations of two expressions of joint attention development: responding to joint attention (a) and initiating joint attention (IJA; b, c1,2,3).**



a



b



c1



c2



c3

Mundy P , and Newell L Current Directions in Psychological Science 2007;16:269-274

# Autism-Spectrum-Disorder

## Social impairment

- Have trouble engaging in everyday social interactions.
    - Deficits in the ability to attribute mental states (beliefs, intents, desires, pretending, knowledge, etc.) to oneself and others and to understand that others have beliefs, desires, and intentions that are different from one's own.
    - Respond unusually when others show anger, distress, or affection.
- not specific for ASD, also present in many other disorders like: ADHD, depression, conduct disorder.....

Decety & Moriguchi, 2007; Korkmaz, 2011; Thoma et al., 2013

# Autism-Spectrum-Disorder

## Communication issues

- Fail or be slow to respond to their name or other verbal attempts to gain their attention
- Fail or be slow to develop gestures, such as pointing and showing things to others
- Coo and babble in the first year of life, but then stop doing so
- Develop language at a delayed pace
- Speak only in single words or repeat certain phrases over and over, seeming unable to combine words into meaningful sentences
- Repeat words or phrases that they hear (echolalia)
- Use words that seem odd, out of place, or have a special meaning known only to those familiar with the child's way of communicating (stereotyped language)

# Autism-Spectrum-Disorder

## Communication issues

- difficulties with the back and forth of conversations
- Suspicious intonation of speech
- Limited speech comprehension

# DSM-5 Criteria: Social Communication

- Persistent deficits in social communication and social interaction across contexts, not accounted for by general developmental delays, manifested by all of the following:
  - Deficits in social-emotional reciprocity
  - Deficits in nonverbal communicative behaviors
  - Deficits in developing and maintaining relationships appropriate to the developmental level

# Autism-Spectrum-Disorder

## Repetitive and stereotyped behaviors

- **Compulsions and rituals** combined with **inflexibility** that may often be extreme and cause serious difficulties
- **Mannerisms**
- **Self-stimulation:** bizarre attachment to certain objects or parts of objects selected because of particular quality

# Autism-Spectrum-Disorder

## Repetitive and stereotyped behaviors

### Sensory Processing Difficulties

- Visual
  - Auditory
  - Tactile
  - Vestibular
  - Olfactory
  - Gustatory
  - Proprioceptive
- 
- hypo- or hypersensitive

# Autism-Spectrum-Disorder

## Repetitive and stereotyped behaviors

# Sensory Processing Difficulties

### Tactile

#### • Hypo

- Holds others tightly - needs to do so before there is a sensation of having applied any pressure.
- Has a high pain threshold.
- May self-harm.
- Enjoys heavy objects (eg, weighted blankets) on top of them.

#### • Hyper

- Touch can be painful and uncomfortable; people may not like to be touched and this can affect their relationships with others.
- Dislikes having anything on hands or feet.
- Difficulties brushing and washing hair because head is sensitive.
- Only likes certain types of clothing or textures.

# Autism-Spectrum-Disorder

## Repetitive and stereotyped behaviors

# Sensory Processing Difficulties

### Taste

- **Hypo**

- Likes very spicy foods.
- Eats everything - soil, grass, Play-dough.

- **Hyper**

- Avoids most foods children their age enjoy
- Have limited repertoire of accepted foods
- Certain textures cause discomfort; some children will only eat smooth foods like mashed potatoes or ice-cream.

# Autism-Spectrum-Disorder

## Repetitive and stereotyped behaviors

# Sensory Processing Difficulties

### Smell

- **Hypo**
- Some people have no sense of smell and fail to notice extreme odours (this can include their own body odour).
- Some people may lick things to get a better sense of what they are.
- **Hyper**
- Smells can be intense and overpowering. This can cause toileting problems.
- Dislikes people with distinctive perfumes, shampoos, etc.

# **Autism-Spectrum-Disorder**

## **Repetitive and stereotyped behaviors**

# **Sensory Processing Difficulties**

### **Auditory**

- **Hypo**

- May not acknowledge particular sounds.
- Might enjoy crowded, noisy places or bang doors and objects.

- **Hyper**

- Noise can be magnified and sounds become distorted and muddled.
- Particularly sensitive to sound
- Inability to cut out sounds – notably background noise, which often leads to difficulties concentrating.

# Autism-Spectrum-Disorder

## Repetitive and stereotyped behaviors

# Sensory Processing Difficulties

- Sensory processing difficulties much more present in younger children with low functioning ASD

Cuccaro et al., 2003; Carcani-Rathwell et al., 2006; Szatmari et al., 2006; Jones et al., 2009

→ Specifics of sensory not universal in ASD!

# Autism-Spectrum-Disorder

## Repetitive and stereotyped behaviors

# Stereotyped Interests

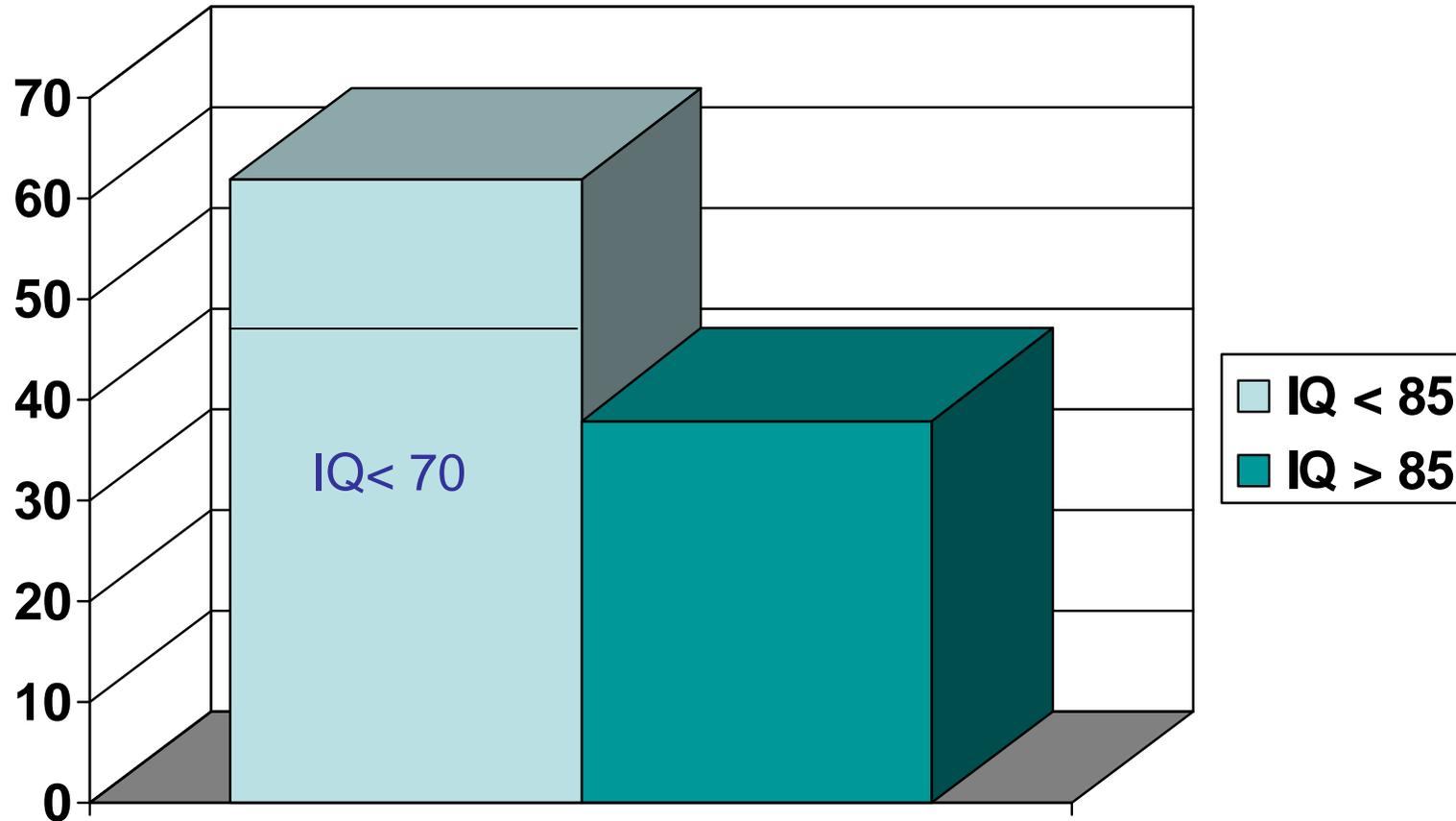
- Stereotyped interests
  - ✓ unusual intensity
  - ✓ Circumscribed
  - ✓ Non-social quality
  - ✓ Stagnation but variation

# Autism-Spectrum-Disorder

## Many comorbidities

- Language disorders
- Cognitive delays
- Neurological disorders
- Anxiety, phobia, depression
- Attention problems, ADHD
- Autoaggression
- Bruxism
- Seizures
- Restricted eating
- .....

# Autism-Spectrum-Disorder Cognitive abilities in ASD



# Genetics in ASD etiology

- Until recently ASD is considered one of the most heritable of neurodevelopmental disorders (~90% heritability)
- Rare genetic variants: gene mutations/CNVs/chromosome abnormalities or genetic syndromes account for ~10-20% of ASD cases
- Each individual rare variant is found not in more than ~1-2% of ASD cases
  - 15q11-13 maternal duplication, 16p11-12 deletion
  - SHANK3, NRXN1, NLGN3&4, PTCHD1
- Common variants: SNPs have been identified through several genome-wide association studies
  - MACROD2, CDH9, PITX1
  - Lack of replication among studies points to high genetic heterogeneity and small effect size of the risk factor alleles

# Environmental Factors

## Possible factors

- parental age
- maternal infections /medications during pregnancy
- Low birth weight
- peri- and neonatal events
- Extreme deprivation
- Environmental pollutant (pesticide- and fine dust)

## Ruled out factors

- vaccines
- Food incompatibility
- Deficit of vitamin- or mineral nutrients
- Fluoride, amalgam, quicksilver
- Gluten/Casein
- “Refrigerator mothers”

„The findings of this review suggest that the etiology of ASD may involve, at least in a subset of children, **complex interactions between genetic factors and certain environmental toxicants** that may act synergistically or in parallel during critical periods of neurodevelopment, in a manner that increases the likelihood of developing ASD“.

# Etiology of ASD

***Abnormalities in the genome and/or  
environmental toxicants***



***Mechanisms underlying the expression of  
these abnormalities during brain  
development***



***structural and functional abnormalities in  
the brain***



***Behavioral expressions of autism***

# Oral health status in children with ASD

- „People with ASD were more likely to be caries-free and had lower DMFT scores than did their unaffected peers“  
Loo et al., 2008
  - **Higher carries prevalence** Marshall et al., 2010; Subramaniam et al., 2011; Jaber 2011
- Majority of studies unequivocally point out poor oral hygiene in children and adults with ASD  
Gandhi & Klein, 2014; Delli et al., 2013

# Oral health status in children with ASD

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  - **Higher carries prevalence** Marshall et al., 2010; Subramaniam et al., 2011; Jaber 2011
- Majority of studies unequivocally point of poor oral hygiene in children and adults with ASD, associated with
- increased severity of ASD symptoms
  - and generalized gingivitis
  - Sensory sensitivities Stein et al., 2013, 2012

# Oral health status in children with ASD

- Oral hygiene may be the most influential caries risk indicator in children with autism and special attention should be given to the presence of visible plaque and gingivitis in patients with ASD.
- The child's behavior has been identified as a major barrier to dental care and children with poor perceived behavior had higher odds of having unmet dental needs.

Gandhi & Klein, 2014

# Children with ASD in dentistry

- Cooperative behavior is reduced due to
  - Deficits in social interaction and communication abilities
    - Reduced ability for joint attention
    - Reduced speech comprehension
  - Limited cognitive abilities
  - Sensory sensitivities, compulsions and rituals
  - Reduced response to social rewards “ (e.g. „well done“)
  - Usual rewards at the end of treatment not effective

# **Boston Study:** factors associated with the behaviour of patients with ASD in a dental setting

- 395 children with ASD (3- 28 years)
- 386 healthy controls
- Factors associated with uncooperative behavior:
  - Younger age, diagnosis of ASD, comorbidities
  - Cognitive impairment, auto aggressive behavior, Pica → bad risk
- No association:
  - caries, oral health status, first treatment, seizures, medication or further treatments

Loo et al., 2009, s.a. Marshall et al., 2007

# Boston Study: factors associated with the behaviour of patients with ASD in a dental setting

- 37 % of the ASD-children received general anaesthesia (GA)
- 4% Sedation

Table 3. Factors associated with dental treatment under GA in the ASD group.

Variables	Adjusted odds ratio* (95% CI)	P-value
Caries severity (log DMFT)	1.63 (1.34–1.98)	<0.001
Behaviour <sup>†</sup>	2.02 (1.51–2.70)	<0.001
Gender		
Male	1.00	
Female	2.18 (1.10–4.31)	0.03
Age (years)	0.97 (0.92–1.02)	0.2

CI, confidence interval.

\*Adjusted for all other factors in the model.

<sup>†</sup>Behaviour (Frankl scale): 1 = definitively positive; 2 = positive; 3 = negative; 4 = definitively negative.

## **Physiological and Behavioral Stress and Anxiety in Children with Autism Spectrum Disorders during Routine Oral Care**

Leah I. Stein,<sup>1</sup> Christianne J. Lane,<sup>2</sup> Marian E. Williams,<sup>3</sup> Michael E. Dawson,<sup>4</sup>  
José C. Polido,<sup>5</sup> and Sharon A. Cermak<sup>1</sup>

- (1) Children with ASD exhibit **significantly more uncooperative behaviors** during routine dental cleanings compared to typically developing children.
- (2) Children with ASD exhibit significantly higher electrodermal arousal (non-specific skin conductance response frequency) compared to TD children, indicating **greater physiological stress during dental cleaning**.
- (3) Physiological stress (as measured by non-specific skin conductance response frequency) is significantly correlated with overt behavioral distress in children with ASD, indicating that as physiological stress increases so does **behavioral distress**.
- (4) Younger age is correlated with uncooperative behavior in typically developing children; in children with ASD, **lower expressive communication ability and physiological distress** are correlated with uncooperative behavior

# Children with ASD in dentistry

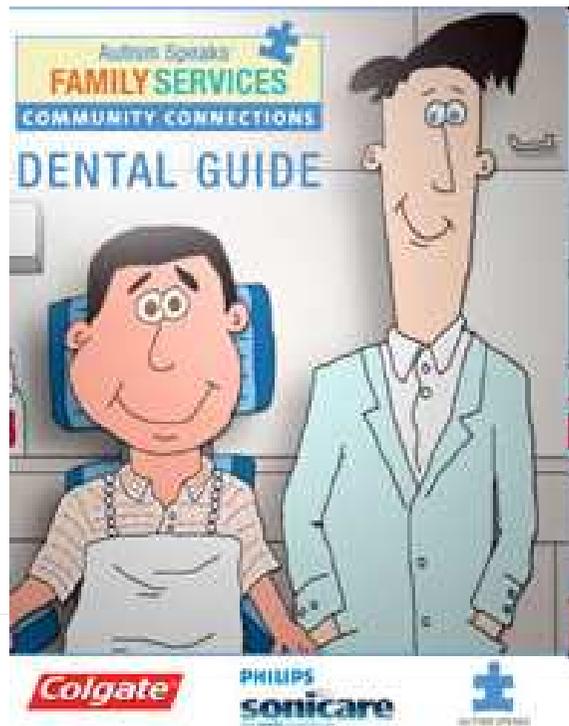
## Pre visit: Parent Consultation

- Recording of complete medical/psychological history and past experience with dental professionals
- Together with parents/therapists: Identification of possibly problematic behaviors
- Instructions for home teaching of skills related to the dental appointment
- Advise to appropriate patient education material

# Children with ASD in dentistry

## Preparation before treatment

- Teaching necessary behaviors
- Familiarization with dental environment and instruments



<http://www.autismspeaks.org/sites/default/files/documents/dentalguide.pdf>



1 Put hands on stomach



2 Feet out straight



3 Open mouth wide



4 Hold mouth open



5 Count teeth



6 Take X-Rays



7 Clean teeth



8 Spit into sink

# Children with ASD in dentistry

## Desensitization

- gradual approach to learning to tolerate dental procedures
- Each visit should involve practicing a specific behavior and should end on a positive note
  - Walking into the exam room
  - Sitting in the exam chair for 5 seconds
  - Sitting in the exam chair for 30 seconds
  - Sitting in the exam chair for 1 minute
  - Sitting in the exam chair for 5 minutes
  - Sitting in the exam chair for 10 minutes
  - Sitting in the exam chair for 15 minutes
  - Sitting in the exam chair and opening mouth
  - Sitting in the exam chair while allowing the dental practitioner to count teeth
  - Sitting in the exam chair while allowing the dental practitioner to brush teeth
- rewards to the child for completing each step successfully

# Children with ASD in dentistry

## Dental appointment

- Communicate with the child at a level that he or she can understand. Use a “**tell, show, do**” approach when explaining treatment and procedures. Speak directly in clear, concrete terms.
- Start the oral examination **slowly**, using only fingers at first. If this is successful, begin using dental instruments.
- Keep dental instruments out of sight and keep light out of the child’s eyes. **Reduce** other **sensory input** such as sounds and odors that may be distracting to the child.
- Avoid interruptions and have as few staff as needed in operatory.

# Children with ASD in dentistry

## Dental appointment

- **Reward** cooperative behavior with positive verbal reinforcement.
- **Observe** unusual body movements and anticipate future movements. Keep area around the dental chair clear.
- **Immobilization** techniques may be used only with parental consent to keep the child from potential injury.
- Use the **same** staff, dental operator, and appointment time each visit if appropriate.
- **Sedation** may be used with appropriate precautions and possible physician consult.
- **General anesthesia** may be required for complex surgical or restorative treatment.