



## RESEARCH REPORT

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### RESEARCH SUMMARY

# Maladaptive behaviors in individuals with Angelman syndrome

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## WHAT WAS THE RESEARCH ABOUT?

Maladaptive or challenging behaviors, such as hyperactivity and aggression, are common in Angelman syndrome (AS). These behaviors limit the affected individual's ability to participate successfully in social interactions and are also a significant cause of parent stress. Past research on maladaptive behaviors in AS has yielded inconsistent results. This study examined how maladaptive behaviors in AS varied based on developmental level, chronological age, sex, or subtype (i.e., deletion, uniparental disomy [UPD]/ imprinting defect [ImpD], or *UBE3A* mutation).

## WHAT DID THE RESEARCH TEAM DO?

The research team asked caregivers of 301 individuals with AS to complete a questionnaire about their child's behavior as well as a measure called the Aberrant Behavior Checklist-Community (ABC-C), which measures

maladaptive or challenging behaviors in individuals with intellectual disability. Caregivers were also asked to complete the Parenting Stress Index (PSI) and the Family Quality of Life (FQoL) questionnaire. The PSI assesses parent stress related to child characteristics as well as stressors related to parenting and family. The FQoL, which was designed for use in families of children with disabilities, examines satisfaction with life in multiple domains.

Child developmental functioning was also assessed using either the Bayley Scales of Infant and Toddler Development (Bayley-III) or the Mullen Scales of Early Learning (MSEL). The Bayley-III measures a child's cognition, communication, and motor skills and is standardized for children up to 42 months of age. The MSEL measures a child's visual reception, communication, and motor skills and is

## Parent Report

Maladaptive/  
challenging behavior

Parenting  
stress

Quality of  
life (QOL)

Study  
questionnaire

Aberrant  
Behavior  
Checklist (ABC)

Parenting  
Stress Index  
(PSI)

Family QOL  
Scale (FQOL)

## Direct Assessment

## Cognition

Bayley Scales of Infant  
and Toddler  
Development (Bayley-III)

OR

Mullen Scales of Early  
Learning (MSEL)

standardized for children up to 68 months of age. Both of these assessments are commonly used beyond their respective normative age ranges in studies of individuals with disabilities, including those with AS.

With all of the information they gathered via caregiver report and direct assessment with individuals with AS, the researchers assessed how maladaptive behaviors differed in severity based on subtype, developmental level, age, and sex. This study adds to our understanding about what types of maladaptive behaviors occur in AS, how these behaviors change as individuals get older, and how these behaviors differ based on subtype or sex. This information is helpful for establishing baseline norms for maladaptive behavior and identifying targets for new treatments or behavioral interventions.

## STUDY PARTICIPANTS

301

participants (4 months - 40 years)

70%

Deletion

30%

Non-deletion

144

Males

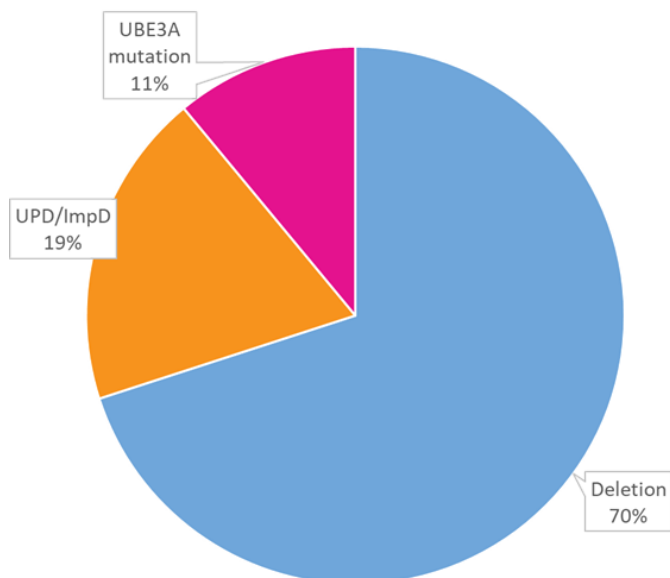
157

Females

## WHO WAS IN THE STUDY?

301 caregivers and their children with a molecular diagnosis of AS were included in the study. The individuals with AS ranged from 4 months to 40 years of age at the baseline visit (average age = 6.0 years). There was a similar number of male and female participants in the sample (144 males, 157 females). On average, children had approximately three study visits.

AS subtype



## WHAT DID THE RESEARCH TEAM LEARN?

### *Specific maladaptive behaviors*

The most frequent caregiver-reported maladaptive behaviors were mouthing behaviors (70-92%), easy excitability (70-90%), short attention span (73-89%), and fascination with water (70-79%). Aggressive behavior and hand flapping were also endorsed by 84% and 80% of caregivers of individuals

with UPD/ImpD, respectively. Temper tantrums and anxiety were the least frequently endorsed behaviors (17-52%). There were significant differences between subtypes in the prevalence of mouthing behaviors, easy excitability, frequent laughter, aggressive behavior, biting, pinching, anxiety, and temper tantrums.

**Aberrant Behavior Checklist (ABC)**

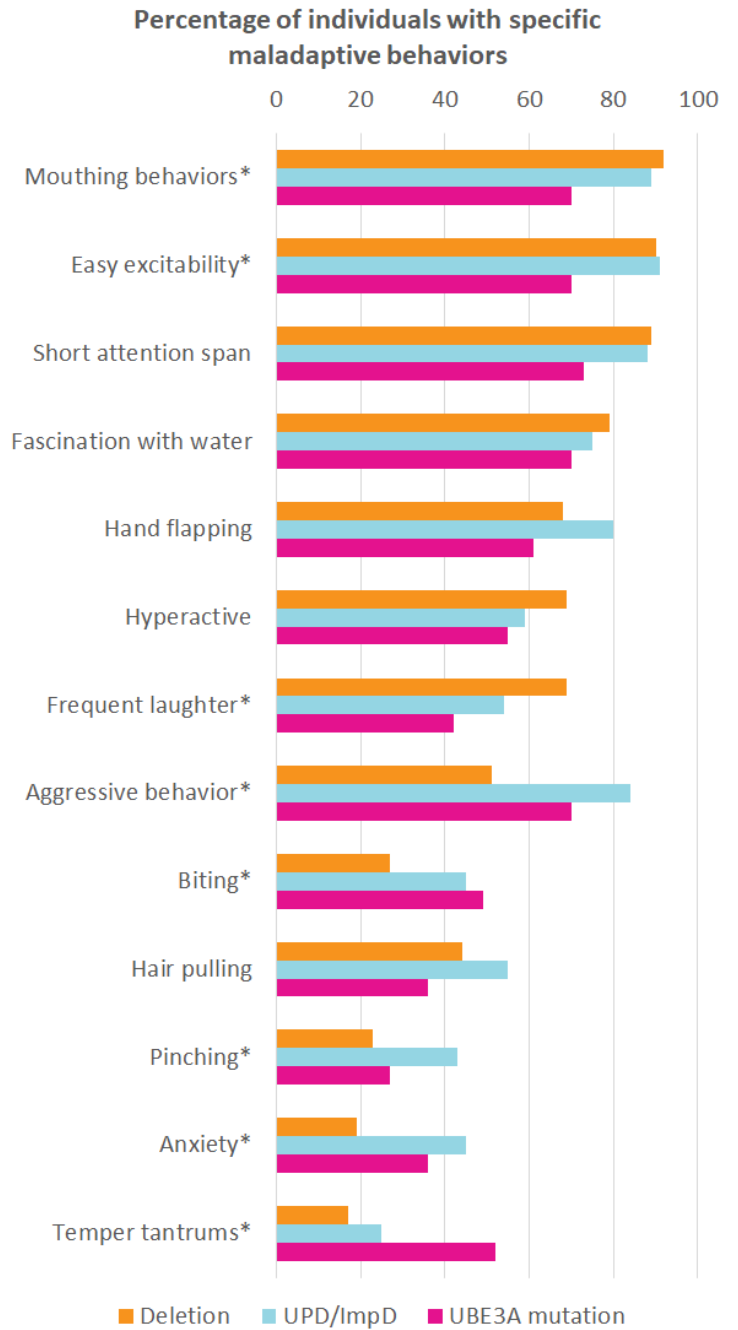
At baseline, individuals with AS had low scores in the ABC domains of irritability, lethargy, and stereotypy, and moderately elevated hyperactivity scores. Individuals with a deletion subtype had *lower irritability scores* compared to those with UPD/ImpD and *UBE3A mutations* but *higher lethargy and stereotypy scores* compared to those with UPD/ImpD.

**Individuals with higher levels of cognitive skills tended to also have increased irritability and hyperactivity.** Irritability and hyperactivity were associated with **higher levels of parent stress** but had *minimal associations with family quality of life.*

**Irritability and hyperactivity increased over time in all subtype groups**, with the greatest increase in irritability observed in individuals with the *UBE3A* mutation and the smallest increase in individuals with a deletion subtype. There were no differences between the subtype groups in terms of the rate of change in hyperactivity over time. Lethargy scores were low over time, increasing only slightly with age for individuals with deletion subtypes or *UBE3A* mutations. Finally, stereotypy scores were also fairly low over time for all subtype groups and only increasing over time for those with a *UBE3A* mutation.

- More likely to be reported over time
- Hand flapping
  - Aggressive behavior
  - Pinching
  - Anxiety
  - Fascination with water (deletion + UPD/ImpD)
  - Frequent laughter (deletion only)

- Less likely to be reported over time
- Mouthing behaviors
  - Biting
  - Hair pulling (UPD/ImpD only)



\*Significant differences between subtypes in prevalence of behavior

**“We speculate that the increase in irritability in cognitively higher functioning individuals is related to their increased self-awareness and subsequently increased frustration in expressing themselves and interacting with their social environment.”**

## WHAT DOES THIS MEAN FOR FAMILIES?

This study provides evidence that individuals with AS have difficulties with hyperactivity, short attention span, irritability, and aggression, and that these behavioral features affect parental stress and family quality of life. Treatments or therapies that address these behaviors may reduce parental stress and improve family quality of life. Some maladaptive behaviors may result from frustration over an inability to communicate. Therefore, access to appropriate augmentative and alternative communication (i.e., AAC) systems is critical for individuals with AS.

**Full article by Dr. Sadhwani and colleagues:**

[Read here](#)

*Sadhwani A, Willen JM, LaVallee N, Stepanians M, Miller H, Peters SU, Barbieri-Welge RL, Horowitz LT, Noll LM, Hundley RJ, Bird LM, Tan WH. Maladaptive behaviors in individuals with Angelman syndrome. Am J Med Genet A. 2019 Jun;179(6):983-992. doi: 10.1002/ajmg.a.61140. Epub 2019 Apr 3. PMID: 30942555; PMCID: PMC8407596.*