



Options for Autism Assessment

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What is the ADOS-2?

- Gold standard diagnostic assessment
- Semi-structured, play based observations and interview
- Based on DSM-5 diagnostic criteria for ASD
- Requires training and experience
- Used as one source of information – **ADOS-2 on its own is not sufficient for diagnosis**

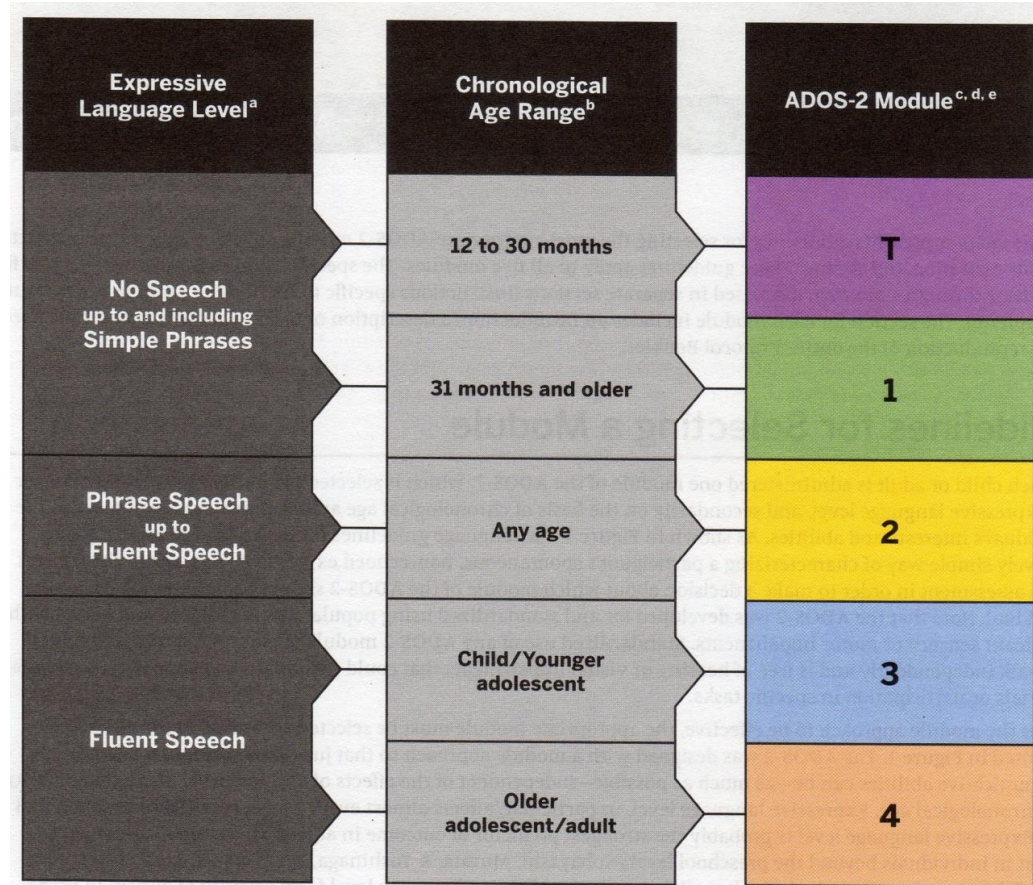
Why was the ADOS-2 developed?

- To provide opportunities to observe social-communication differences and restricted and repetitive behaviors associated with ASD that may be used to determine strengths and support needs for intervention planning
- To standardize these observations across different individuals, clinicians, and sites

ADOS-2 is designed for individuals

- 12 months of age (if walking independently) to adulthood
- With a minimum nonverbal mental age of 12 months (for Toddler module) or 15-18 months (all other modules)
- Without significant sensory impairments (e.g., blindness, deafness) or motor impairments

ADOS-2 Module System



ADOS-2 design

- Takes approx. 40-60 minutes to administer
- Observations are obtained from standardized “social presses”/tasks that are designed to elicit certain behaviors (certain things you are focusing your observations on)
- Individual behaviors are coded
- An algorithm is used to determine diagnostic classification (NOT a diagnosis)

Social Communication Behaviors

- Words, phrases, sentences
- Grammatical markings and errors
- Voice tone
- Echolalia
- Stereotyped speech
- Use of another's body as a tool
- Offering info
- Asking for info
- Reporting of events
- Conversation skills
- Gestures
- Pointing
- Eye contact
- Facial expressions
- Coordination of eye contact, gestures, and vocalization
- Giving
- Showing
- Joint attention
- Requesting
- Shared enjoyment
- Labelling of emotions/empathy
- Communication of emotions
- Insight into relationships
- Social overtures
- Social responses

Restricted and Repetitive Behaviors

- Visual inspection
- Sniffing
- Mouthing/Licking
- Rubbing/touching
- Auditory interest
- Hand flapping
- Finger flicking/wiggling
- Spinning
- Bouncing
- Self-injurious behavior
- Excessive interests
- Repetitive behaviors
- Odd interests
- Sensory aversions
- Compulsions
- Ritualistic behavior
- Lining up toys
- Playing with parts of toys
- Grouping toys
- Spinning wheels of toys
- Providing unnecessary lists
- Needing things to be a certain way
- Insisting on completing the book
- Getting “stuck” on a toy or activity

Other Behaviors

- Overactivity
- Fidgeting
- Underactivity
- Tantrums
- Aggression
- Verbal threats
- Aggressive swearing
- Loud, angry voice
- Throwing things
- Screaming/yelling
- Swiping items off the table
- Hitting
- Biting
- Kicking
- Anxiety
- Mild signs of self-consciousness/anxiety



ADOS-2 as a clinical instrument

- Helps a clinician create a “social world” in which ASD-related behaviors can be observed
 - Structured and unstructured activities are used to elicit behavior/observation
 - Guidelines for “hierarchy” of examiner’s behavior are included
 - Examiner uses their experience and guidelines to know when to act and when not to act

ADOS-2 is a useful tool but...

- The ADOS-2 will not provide you with *every* answer you seek
- Additional components will be necessary to answer various clinical and research questions relevant to ASD such as:
 - Developmental/cognitive testing
 - Measures of comorbid symptoms
 - Medical history
 - Developmental history
 - School functioning
 - Adaptive functioning

ADOS-2 is a useful tool but...

- It is not always the most appropriate
 - Toddler Module requires nonverbal mental age of at least 12 months; Modules 1-3 require nonverbal mental age of at least 15 months
 - Not validated with people with blindness or deafness or for people who cannot walk independently
 - Not always appropriate for older children/adults with very limited language
 - Not always appropriate for people with selective mutism, extreme anxiety, severe behavioral issues, severe developmental delay, or cultural/linguistic differences
 - Must be administered in the individual's dominant language (use of translators is NOT appropriate)

ADOS-2 is a useful tool but...

- Research on the use of ASD diagnostic and screening instruments in non-majority cultures is limited
- Examiners should be mindful of the role of race, ethnicity, and gender on ADOS-2 codes

Interrater and Test-Retest Reliability

- Interrater Reliability
 - Module 1 = .97
 - Module 2 = .96
 - Module 3 = .94
- Test-Retest Reliability
 - Module 1 = .87
 - Module 2 = .83
 - Module 3 = .87

Interrater agreement on ADOS-2 Classification

- Module 1 = 95%
- Module 2 = 98%
- Module 3 = 92%

Sensitivity and Specificity

- Assessments that work well have high sensitivity and specificity
 - **Sensitivity** is the ability of a test to correctly identify those with the diagnosis (true positive rate)
 - How many people who truly have ASD are identified as having ASD
 - **Specificity** is the ability of a test to correctly identify those without the diagnosis (true negative rate)
 - How many people who do not have ASD are identified as not having ASD

Sensitivity and Specificity

Gotham et al., 2007

- Sensitivity
 - .79 - .98
 - 79% - 98% of autistic individuals would be correctly classified as autistic
 - 2% - 21% of autistic individuals would score below the cut-off for an autism classification
- Specificity
 - .69 - .86
 - 69 - 86% of non-autistic individuals would correctly be classified as non-autistic
 - 14% - 31% of non-autistic individuals would be incorrectly classified as autistic

ADOS-2 Summary

- ADOS-2 is a semi-structured standardized assessment that creates contexts in which to observe autism-related symptoms and behaviors
- ADOS-2 addresses many diagnostic challenges
- Sensitivity and specificity of classifications good but not 100%
 - As with all assessment measures, some people will be incorrectly classified based on the ADOS-2

ADOS-2 Summary

- ADOS-2 is a valuable tool in the overall assessment of ASD
 - One source of information for determining whether a diagnosis of ASD is appropriate
 - Scores yield a classification NOT a diagnosis
- Accurate diagnosis is dependent on comprehensive assessment by trained clinicians
- Examiners should have experience working with TD individuals, individuals with ASD, and those with other DDs

ADOS-2 Limitations

- Requires extensive experience and training
- Expensive and proprietary materials
- Not always appropriate for all individuals (e.g., sensory impairment, non-walking, older non-verbal individuals)
- Cannot be used in isolation to make an autism diagnosis

Interested in learning more?

- Gain education, training, and experience that includes extensive exposure to ASD.
- Purchase and study the ADOS-2 Manual.
- Attend an online or in-person ADOS clinical training workshop
- Practice administration and coding (usually takes 10 or more practices).

Any Questions?



The Use of the CARS 2 and TELE-ASD-PEDs in Pediatric Primary Care

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Children's Community Pediatrics Castle Shannon and
McMurray

Background

Long wait list for lists for autism evaluations by area professionals

These delays cause behavioral services to children to be delayed, affecting outcomes.

These delays have been concerning to us and our families. We found a solution and proposed a change.

Background

- Rosanne Levine, CRNP, MSN and I are behavioral nurse practitioners at Children's Community Pediatrics (CCP) Castle Shannon and McMurray.
- We provide comprehensive assessment, diagnosis and treatment to children and teens with developmental, behavioral, and mental health disorders from our practice.
- We also provide medication and behavioral management to children and adolescents with autism, ADHD, anxiety, depression, OCD and other developmental and behavioral disorders.

Background

- Brittney Sabo, RN, works with us in behavioral health coordinating our services, performs behavioral intakes, assists with referrals, provides medication advice and behavioral support to parents.
- Susan and Rosanne are ADOS trained but due to the cost of the ADOS kits and lack of space, have not conducted ADOS evaluations in the practice.
- We have worked together since 2011 in the practice and we both have many years of experience in primary care and with children with special needs.

Opportunities for additional training in ASD diagnosis

- In fall, 2023, we completed training using the CARS2 instruments and received certificates of completion. This training was conducted by the ECHO Autism Program at the Children's Hospital of Philadelphia.
- Susan completed training using the TELE-ASD-PEDS and instrument designed for use during a telemedicine-based assessment for autism in toddlers.
- This instrument was developed at Vanderbilt University and Susan was trained in 2021 through the Iowa Leadership Education in Neurodevelopmental and Related Disabilities Project at the University of Iowa where she worked as a Professor for 6 years.

Plan

- We identified a room in the McMurray office that could be used for these evaluations.
- We sent a proposal to CCP and it was reviewed by many professionals at UPMC and CHP and approved in December 2023.

CARS 2

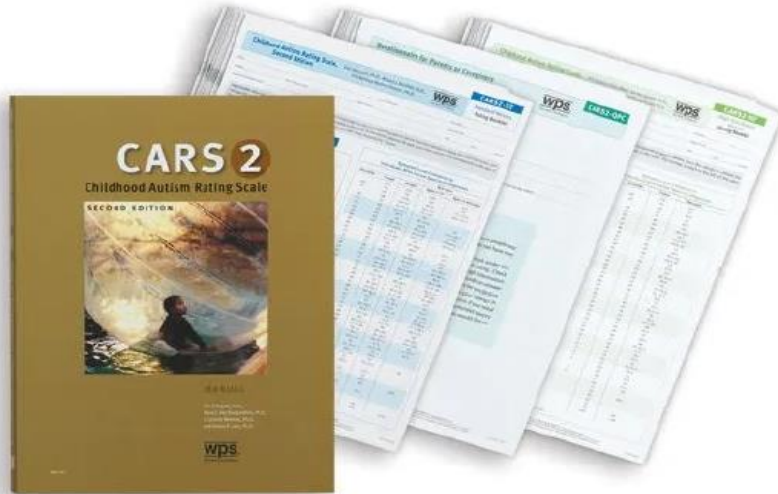
The CARS 2-ST and HF are valid and reliable measures used to make diagnoses of autism in children. There are 2-15-item rating scales completed by the clinician.

They are used along with the DSM 5 criteria for autism in making a diagnosis.

The CARS2-ST is used for evaluations for children ages 2 through 6 years who have a communication delay. It will also be used for children over 7 who have an IQ less than 80.

The CARS2-HF is used for evaluations for children over 7 who are verbal and who have an IQ of 80 or more and have relatively good verbal skills.

These instruments are administered in person using the CARS 2- ST or HF Rating Booklets. In addition, parents or caregivers complete the Questionnaire for Parents or Caregivers that is used with both CARS 2 scales.





A Validation Study of the CARS-2 Compared With the ADOS-2 in the Diagnosis of Autism Spectrum Disorder: A Suggestion for Cutoff Scores

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Objectives: This study examined the validity of the Childhood Autism Rating Scale, Second Edition (CARS-2) compared with the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2) in identifying autism spectrum disorder (ASD).

Methods: A total of 237 children were tested using both the CARS-2 and ADOS-2. We examined the correlation using Pearson's correlation analysis. In addition, we used a receiver operating characteristic graph to determine the optimal standard version of the CARS-2 (CARS2-ST) cutoff score for ASD diagnosis using the ADOS-2.

Results: The concurrent validity of the CARS2-ST was demonstrated by a significant correlation with the ADOS-2 ($r=0.864$, $p<0.001$). The optimal CARS2-ST cutoff scores were 30 and 28.5 for identifying autism and autism spectrum, respectively, based on the ADOS-2.

Conclusion: We suggest a newly derived CARS2-ST cutoff score of 28.5 for screening ASD and providing early intervention.

Keywords: Autism spectrum disorder; ADOS-2; CARS-2; Diagnosis; Screening

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INTRODUCTION

Autism spectrum disorder (ASD) is a neurodevelopmental disorder associated with impairments in social communication and restricted and repetitive behaviors [1]. According to a 2018 survey by the U.S. Centers for Disease Control and Prevention (CDC), approximately 1 in every 44 children

amount of time and thus, is especially useful in community institutions [7]. On the contrary, the tool recognized as the gold standard for diagnosing ASD is the Autism Diagnostic Observation Schedule (ADOS) [8,9]. The ADOS is a semi-structured evaluation tool that comprehensively assesses autism-related symptoms by observing the participant directly over a 40–60 minute period. Although it is extremely useful

TELE-ASD PEDS (TAP)

- Was designed for use during a telemedicine-based assessment for autism in toddlers up to 3 years of age.
- Evaluation performed virtually and is provider-guided and caregiver-led. It uses materials commonly available in the home and is performed in the child's natural (home) setting. The administration is flexible and brief.
- This evaluation is aimed at toddlers who have many symptoms of autism and who would otherwise be waiting for an evaluation and possible diagnosis.

TELE-ASD PEDS (TAP)

- Parents should be asked to have a computer or phone present for the connection, as the screen is bigger and enables better observation of the child in the room.
- The parents are asked to prepare a snack in a closed container that the child can open. They are asked to have some of the child's favorite toys available in the room. They should set aside one hour for the appointment.
- During the evaluation parents are requested to conduct tasks and I observe the child's response to these tasks.



Families (/vkc/triad/forfamilies)	Educators and Service Providers (/vkc/triad/live-training/)	Early Intervention Services (/vkc/triad/early-intervention/)	Community Organizations (/vkc/triad/community-organizations)	Self Advocates (/vkc/triad/self-advocates)
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What is the TELE-ASD-PEDS (TAP)?

TAP is a tool designed for use by providers and families during a telehealth assessment for autism. Using TAP, a provider walks a parent through several basic tasks with their child. These tasks allow the provider to watch for the presence of autism symptoms. Administration is meant to take 10-20 minutes. The entire tele-visit, inclusive of other elements, will take longer.

Data collection and analysis of psychometric properties is ongoing (clinicaltrials.gov, NCT03847337).
Subscribe (<https://mailchi.mp/vumc/tele-asd-peds>) to receive email notification of updates to TAP.

For what age range was TAP designed?

TAP was designed for use with children under 36 months of age who have been referred due to concerns for possible autism spectrum disorder. This measure may not be appropriate for children with flexible phrase speech (e.g., once a child is appropriate for an ADOS-2, Module 2).

Is TAP a screening tool or a diagnostic instrument?

This is designed to be one of many tools that can allow a trained provider to make core behavioral observations of children at significant risk for ASD. The outcomes from those observations, including any decision regarding diagnosis, are based on the confidence and training of the provider and the information they have, not solely on the score from this rating form. TAP is meant to be used as one part of an evaluation by a trained professional, not on its own.

Who can use TAP?

TAP is designed for providers with expertise in recognizing autism symptoms and diagnosing autism spectrum disorder in toddlers. At VUMC, it is used by psychologists and licensed senior psychological examiners with specific experience diagnosing ASD in toddlers. We have also successfully trained

Process

Registered Nurse:

- Receives referral

- Makes comprehensive intake phone call to parent, documents findings, and schedules an appointment.

- Sends rating tools for any possible co-morbid conditions and the CARS ST or HF Parent Questionnaire. There is no parent questionnaire for the TELE-ASD-PEDS. Explains process for the evaluation to parents.

We bill 99215 for both visits.

If the autism diagnosis is questionable, the child is referred to have a second evaluation from an outside clinician using the ADOS for clarification of diagnosis.

Room for Evaluations



Outcomes

Year of Birth	Test Used	Number of Patients	Outcomes
2021	TELE- ASD- PEDS	3	1 ASD Level 3 1 ASD Level 1 with language delay 1 Did not meet criteria- recheck 6 months
2020	CARS 2 ST	1	1 ASD Level 1
2019	CARS 2 ST	6	1 Language delay only 1 Genetic syndrome, language delay 1 Did not meet criteria 3 ASD Level 2
2011	CARS HF	1	1 ASD Level 1, anxiety, ADHD

Consultation available

ECHO Autism at CHOP is for Providers and meets on 2nd Thursday (4-5:30pm EST) and 4th Tuesday (12:30-2pm EST) of each month.

Cases are be presented and reviewed.

Dr Judith Miller is the Director

Challenges

- Patients
 - No shows, incomplete questionnaires
 - 2 families who were referred by providers but are not on board with diagnosis. Both families from other countries.
- Process
 - Interrater reliability
 - Working out challenges in scheduling
 - Follow up visits
 - Documentation is time consuming

Future Plans

- Will continue to participate in ECHO Autism at CHOP.
- Will follow children to make sure they are getting services, treating co-morbidity.
- Continue to work on making documentation less cumbersome.
- Continue to evaluate outcomes in the future.

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Questions?

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