VANDERBILT KENNEDY CENTER
TREATMENT & RESEARCH INSTITUTE FOR AUTISM SPECTRUM DISORDERS

VANDERBILT UNIVERSITY MEDICAL CENTER

Assessment of ASD in Children via Telemedicine

Feasibility, Lessons Learned, and Future Directions

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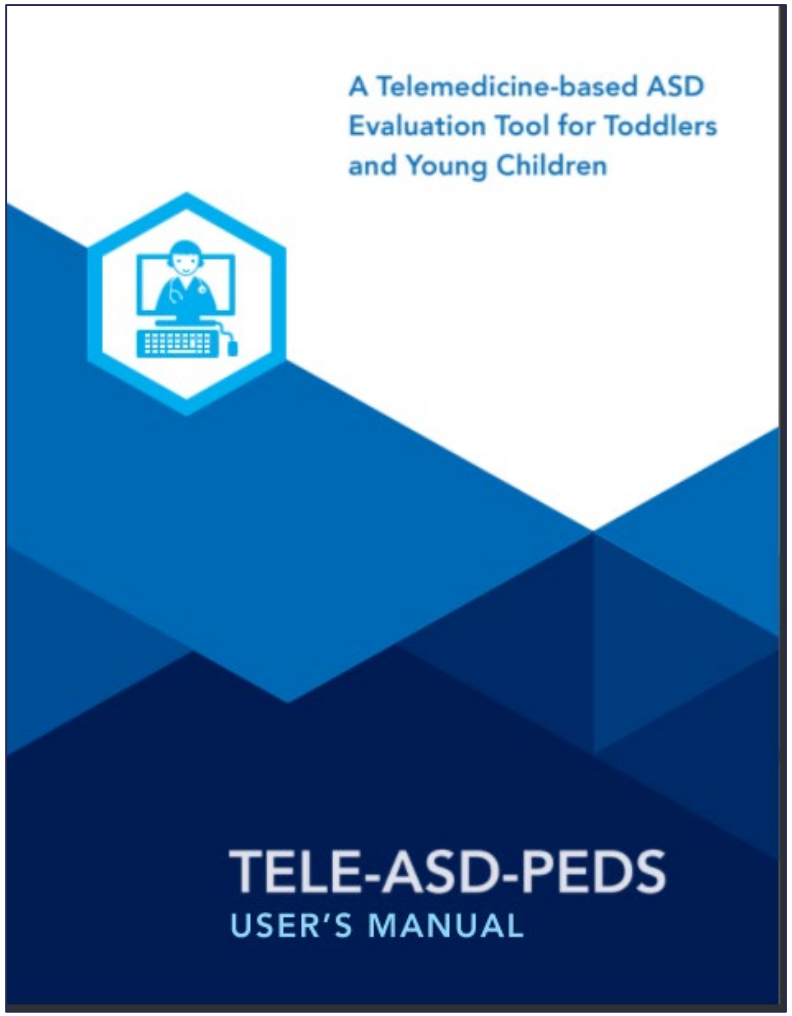
Overview

- Development of models and tools for tele-assessment
- TELE-ASD-PEDS model overview, feasibility studies
- Lesson learned and future directions of tele-assessment



Training materials:

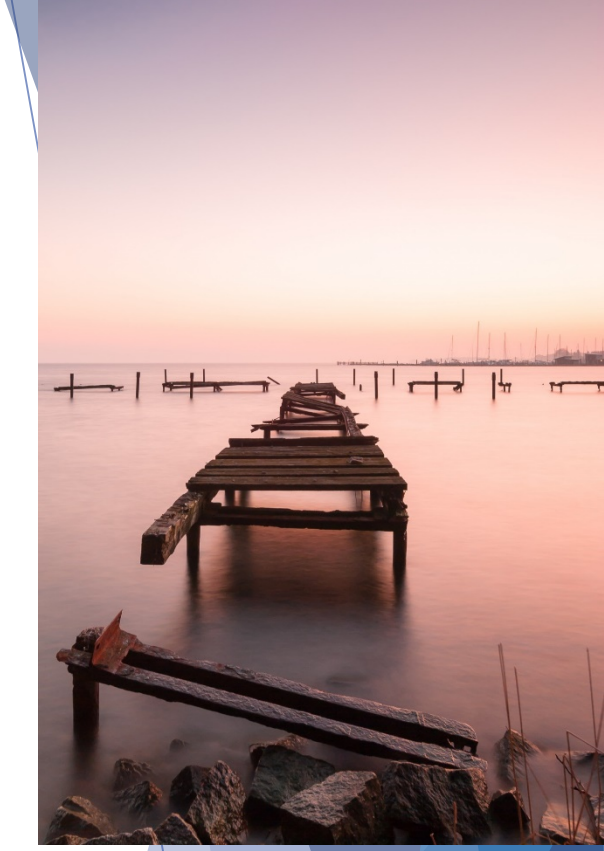
https://vkc.vumc.org/vkc/triad/tele-asd-peds

Manual:

https://vkc.vumc.org/vkc/triad/manuals/

Brief history of tele-diagnostic assessment

- Very few studies systematically evaluated accuracy or clinical value of diagnosing ASD via telemedicine
- Need models that meet families where they are
- Gold-standard approach should emphasize options
- Best-estimate clinical judgement through integration of data



Berger NI, et al. **Characterizing available tools for synchronous virtual assessment of toddlers with suspected autism spectrum disorder: A brief report**. Journal of Autism and Developmental Disorders. 2022 Jan;52(1):423-34.

Types of Remote Assessment

- **Store-and-Forward/Asynchronous** (NODA,[1] Cognoa[2])
  - Enables sampling across time/contexts
  - Asynchronous
  - Does not allow for adjustment of presses, key behaviors missed
  - High tech demands, limited access to software
  - Pay-per-use requirements
- **Synchronous Virtual Screening** (SORF,[3] TEDI,[4] ADEC,[5] STAT[6])
  - Substantial parent coaching and materials
  - Designed to be level 2 screening (in-person) measures

Berger NI, et al. **Characterizing available tools for synchronous virtual assessment of toddlers with suspected autism spectrum disorder: A brief report**. Journal of Autism and Developmental Disorders. 2022 Jan;52(1):423-34.

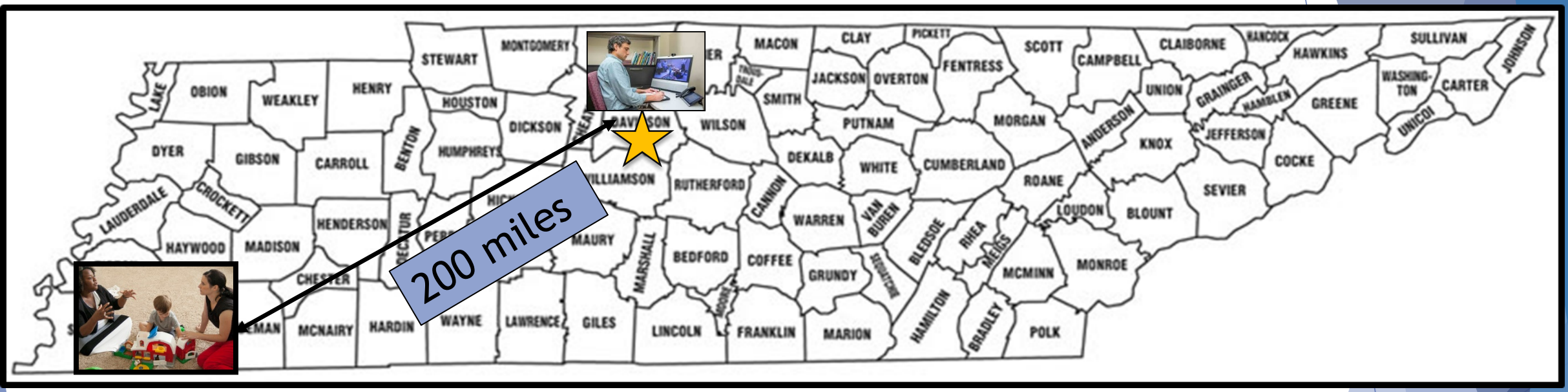
[1] Smith et al., 2017; [2] Abbas et al., 2020; [3] Dow et al., 2020; [4] Talbott et al., 2020; [5] Nah et al., 2020; Corona et al., 2020

Synchronous Virtual Diagnostic Assessment

- **ASD-DIAL**: ASD-Diagnostic Interview and Activities-Lifespan (Miller, 2020; CHOP)
- **A-VABO**: Adapted Virtual Autism Behavior Observation (Kryszak & Albright, 2020; Nationwide Children's)
- **BOSA**: Brief Observation of Symptoms of Autism (Lord et al., 2020; UCLA)
- **OOPS-HE**: Observation of Play Screener (Nickel, 2020; OHSU)
- **TELE-ASD-PEDS:** (Corona et al., 2020; VUMC)
- General Benefits
  - Clinician and caregiver/child dyad
  - Flexible/available materials
  - Simple technology
  - No assessment specific training required

Berger NI, et al. **Characterizing available tools for synchronous virtual assessment of toddlers with suspected autism spectrum disorder: A brief report**. Journal of Autism and Developmental Disorders. 2022 Jan;52(1):423-34.

Tele-diagnostic Service Model



- ASD concerns identified with families enrolled in EI System
- Remote observation of STAT administered by trained clinician
- Designed to streamline diagnosis and provide options for families/providers

STAT
Screening Tool for Autism
In Toddlers and Young Children

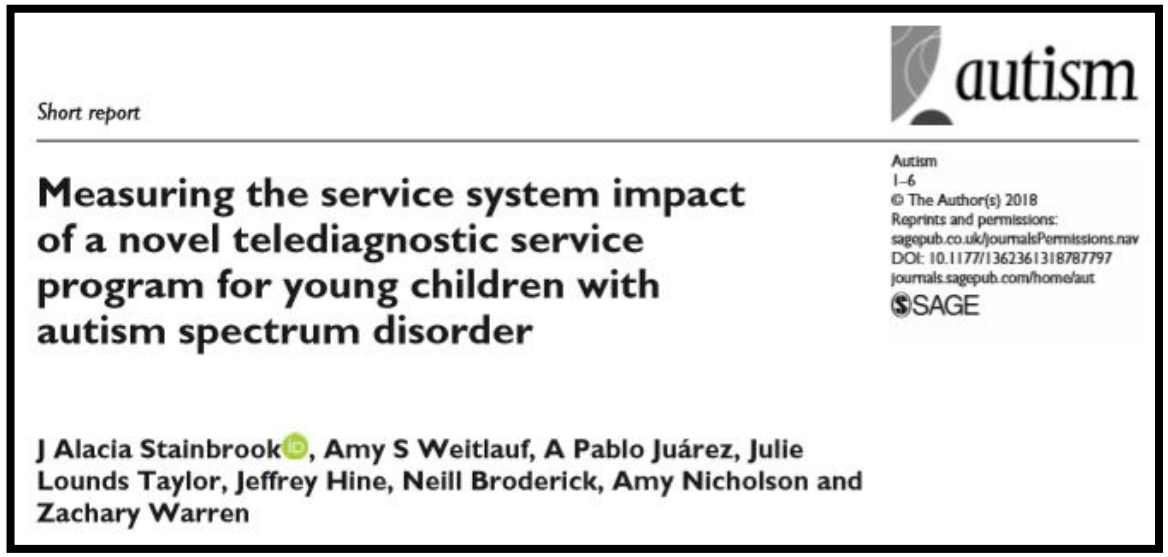
Journal of Autism and Developmental Disorders
https://doi.org/10.1007/s10803-018-3524-y

ORIGINAL PAPER

CrossMark

Early Identification of ASD Through Telemedicine: Potential Value for Underserved Populations

A. Pablo Juárez[1,2,3] · Amy S. Weitlauf[1,2] · Amy Nicholson[1,2] · Anna Pasternak[1,2] · Neill Broderick[1,2] · Jeffrey Hine[1,2] · J. Alacia Stainbrook[1,2] · Zachary Warren[1,2,3,4]



Short report

autism

Measuring the service system impact of a novel telediagnostic service program for young children with autism spectrum disorder

Autism
1–6
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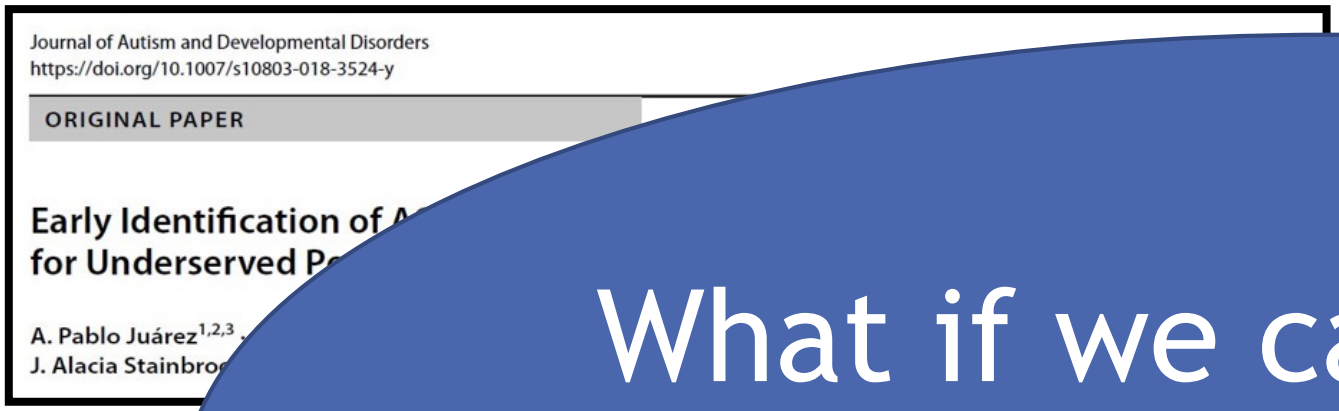
DOI: 10.1177/1362361318787797
journals.sagepub.com/home/aut
SAGE

J Alacia Stainbrook, Amy S Weitlauf, A Pablo Juárez, Julie Lounds Taylor, Jeffrey Hine, Neill Broderick, Amy Nicholson and Zachary Warren

TELE-SUPPORT, RESEARCH, & SERVICE

We have found:

- It is feasible and valid to use an abbreviated autism evaluation process
- Certainty in 90% of cases, all telemed cases confirmed
- *Families* highly prefer telemedicine services over traveling
- Increasing volume (more referrals, but less to tertiary center)
- Decreasing wait times
- Save time/financial costs



We have found:

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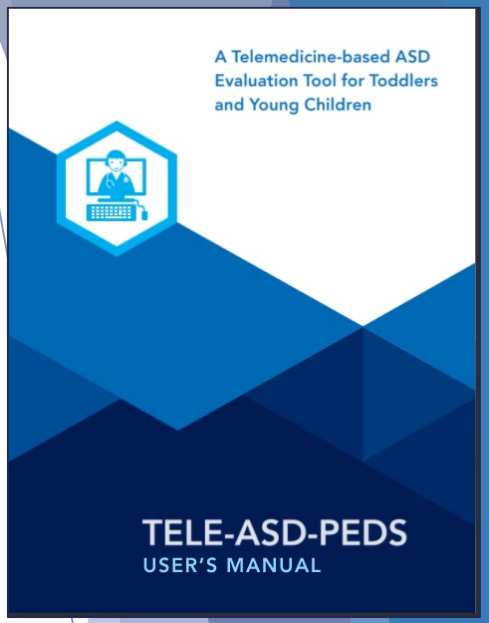
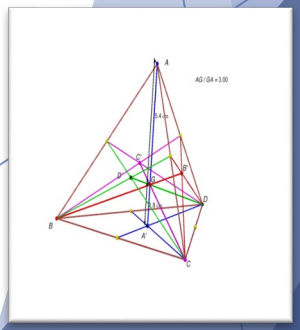
What if we cannot have a trained provider on the other side?

TELE-SUPPORT, RESEARCH, & SERVICE

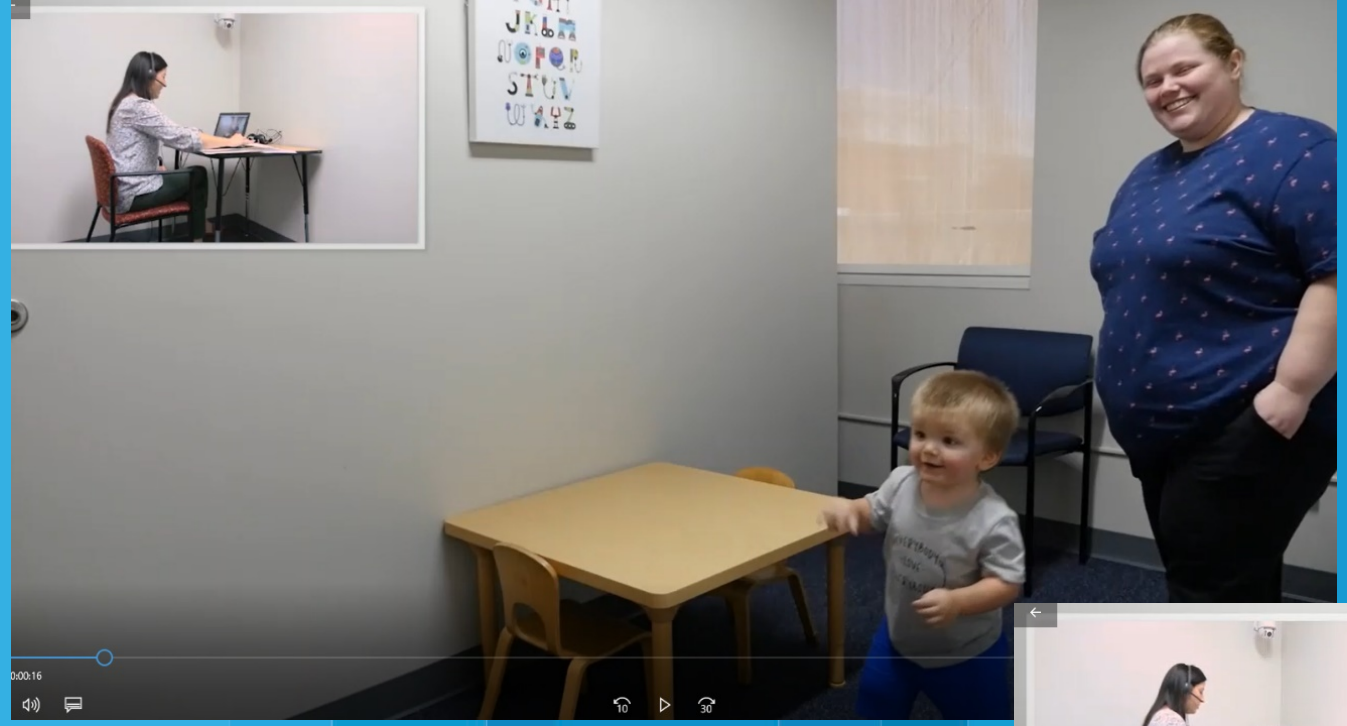
"Can Novel Telemedicine Tools Reduce Disparities Related to Early Identification of Autism?"

- Designed for use during a telemedicine-based assessment
- Play-based procedures could be performed by novel users (no training requirements)
- Designed for open and free use
- Uses widely available/cheap materials
- Time-sensitive





(1R21MH118539-01 /ClinicalTrials.gov: NCT03847337)



TELE-ASD-PEDS

Parent (or non-specialist) is walked through a set of play tasks that can be modified, repeated as needed

Approach: Part 1

- Clinical database containing data from >700 toddler ASD evaluations
- Application of machine learning
- UAR 0.84, Sensitivity 0.90, Specificity 0.78 (Corona et al., 2021)

Journal of Autism and Developmental Disorders
https://doi.org/10.1007/s10803-020-04857-x

ORIGINAL PAPER

Toward Novel Tools for Autism Identification: Fusing Computational and Clinical Expertise

Laura L. Corona[1,2] · Liliana Wagner[1,2] · Joshua Wade[3] · Amy S. Weitlauf[1,2] · Jeffrey Hine[1,2] · Amy Nicholson[1,2,4] · Caitlin Stone[1,2] · Alison Vehorn[1] · Zachary Warren[1,2,4,5]

Accepted: 19 December 2020

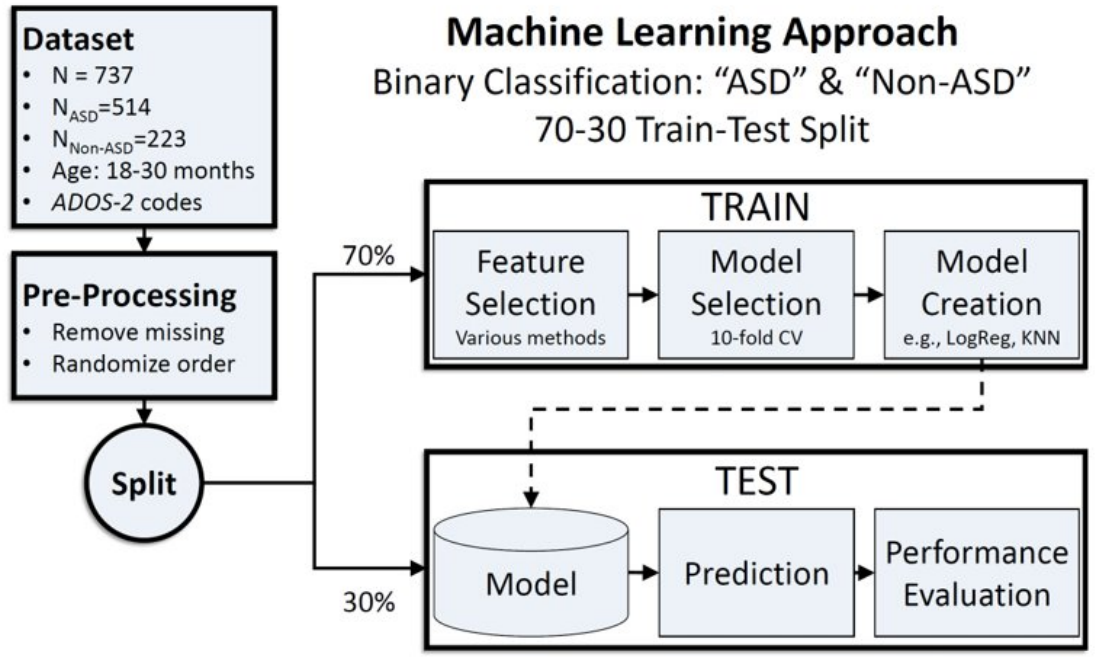


Figure courtesy of Josh Wade

Seven Key Behaviors

1. Socially directed speech/sounds
2. Frequent and flexible eye contact
3. Combines gestures, eye contact, and speech/vocalization

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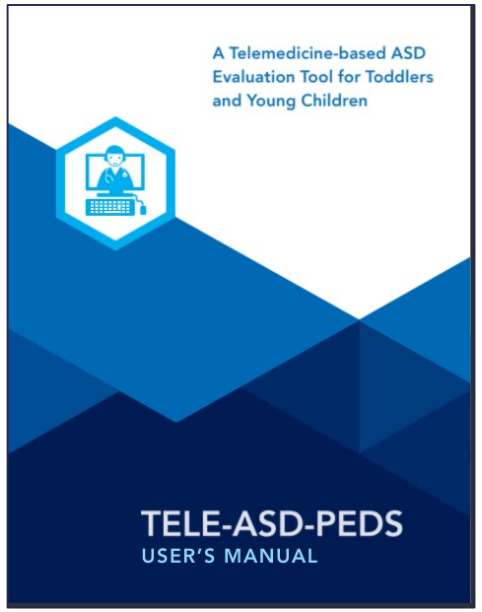
4. Unusual vocalizations
5. Unusual or repetitive play
6. Unusual or repetitive body movements
7. Unusual sensory exploration or reaction

Approach Part 2: Clinical Experts

- Set of administration tasks to best elicit observations
- Created behavioral descriptors and rating system
  - 1 = symptom not present
  - 2 = present but subclinical
  - 3 = clear evidence of ASD

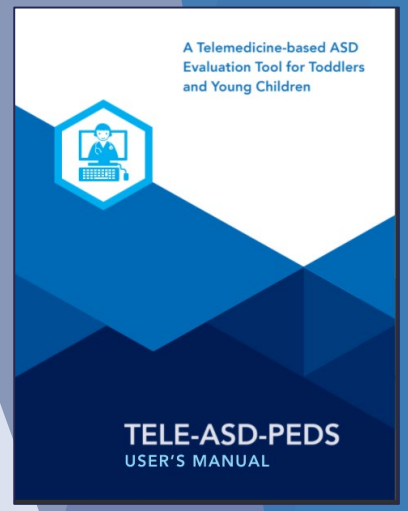
Clinical Trial

Can Novel Telemedicine Tools Reduce Disparities Related to Early Identification of Autism (NIMH 1R21MH118539-01)



Overall diagnostic agreement = 92%

Clinical Diagnosis-Telemedicine Diagnosis	TELE-STAT N = 72	TAP N = 72
ASD-ASD	64 (89%)	60 (83%)
No ASD-No ASD	2 (3%)	7 (10%)
ASD-No ASD	4 (6%)	4 (6%)
No ASD-ASD	2 (3%)	1 (1%)



Can Novel Telemedicine Tools Reduce Disparities Related to Early Identification of Autism *(NIMH 1R21MH118539-01)*

TELE-ASD-PEDS & COVID-19

- Using TAP in clinical trial, COVID highlighted immense need
- Initial web-based training for >2100 providers
- Individual consultation across 45 sites

Use of the TAP at VUMC: Direct-to-home

- 9 providers
- 204 children (3.5 months early pandemic)
- TAP provided enough information when ASD is clearly present (>70%)
  - High levels of diagnostic certainty
  - TAP scores significantly differentiating those with/without ASD

Wagner, L., Corona, L. L., Weitlauf, A. S., Marsh, K. L., Berman, A. F., Broderick, N. A., Francis, S., Hine, J., Nicholson, A., Stone, C., & Warren, Z. (2020, 2020/10/30). Use of the TELE-ASD-PEDS for Autism Evaluations in Response to COVID-19: Preliminary Outcomes and Clinician Acceptability. Journal of Autism and Developmental Disorders.

Appointment Structure

- Pre-visit preparation
- Children 3 and under
  - Visits scheduled for 90 minutes (Zoom)
- Interview, unstructured observations
- TELE-ASD-PEDS (15-20 min)
- Additional measures (VABS-3 Comm/Soc, DAYC-2, CARS-2)
- Feedback/diagnosis/resources

External Providers: Changes in Practice Behavior

- 202 providers completed a survey regarding ASD tele-assessment and the TAP.
- 92% of providers reported using ADOS-2 prior to COVID-19
- **6% using telemedicine for diagnostic services pre-COVID, up to 78% during COVID-19**

Wagner, et al 2021. *Transitioning to telemedicine during COVID-19: Impact on perceptions and use of telemedicine procedures for the diagnosis of autism in toddlers*. JADD

Use and Perceptions of TAP

- 56% using the TAP during tele-diagnostic evaluations during COVID-19.
  - 98% with children 3 and under, **33% with children 4-6**
  - **High level of certainty ruling in/out**
- 85% of the providers currently using the TAP plan to continue using it post-COVID-19-related disruptions

Wagner, et al 2021. *Transitioning to telemedicine during COVID-19: Impact on perceptions and use of telemedicine procedures for the diagnosis of autism in toddlers*. JADD

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ORIGINAL PAPER

Parent Perceptions of Caregiver-Mediated Telemedicine Tools for Assessing Autism Risk in Toddlers

Laura L. Corona[1,2,5] · Amy S. Weitlauf[1,2] · Jeffrey Hine[1,2] · Anna Berman[1] · Alexandra Miceli[1] · Amy Nicholson[1,2,3] · Caitlin Stone[1,2] · Neill Broderick[1,2] · Sara Francis[1,2] · A. Pablo Juárez[1,2,3,4] · Alison Vehorn[1] · Liliana Wagner[1,2] · Zachary Warren[1,2,3,4]

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https://doi.org/10.1007/s10803-020-04767-y

ORIGINAL PAPER

Use of the TELE-ASD-PEDS for Autism Evaluations in Response to COVID-19: Preliminary Outcomes and Clinician Acceptability

Liliana Wagner[1,2] · Laura L. Corona[1,2] · Amy S. Weitlauf[1,2] · Kathryn L. Marsh[5] · Anna F. Berman[1] · Neill A. Broderick[1,2] · Sara Francis[1,2] · Jeffrey Hine[1,2] · Amy Nicholson[1,2,3] · Caitlin Stone[1,2] · Zachary Warren[1]

Journal of Autism and Developmental Disorders
https://doi.org/10.1007/s10803-021-05112-7

ORIGINAL PAPER

Transitioning to Telemedicine During COVID-19: Impact on Perceptions and Use of Telemedicine Procedures for the Diagnosis of Autism in Toddlers

Liliana Wagner[1,2] · Amy S. Weitlauf[1,2] · Jeffrey Hine[1,2] · Laura L. Corona[1,2] · Anna F. Berman[1] · Amy Nicholson[1,2,3] · William Allen[5] · Michelle Black[5] · Zachary Warren[1,2,3,4]

We have found:

- Providers
  - Comfortable completing assessments
  - Making diagnoses with accuracy and certainty
  - Increased access
- Families
  - Comfortable playing with child
  - Instructions easy to follow
  - Took right amount of time
  - Comfortable discussing diagnosis
  - Provider had seen behaviors of concern

Challenges

- Technology-related problems
- Distractions in home environment, difficulty following prompts
- Complexity
  - Language
  - Medical/social complexity
  - Significant developmental delays
  - Comorbidity
- No single model/score acceptable for ALL families

Key Takeaways

- Findings provide initial support and guidance for a re-conceptualization of ASD assessment
- Large percentage of children can accurately be identified through novel/brief tele-diagnostic measures
- For whom does tele-assessment work best – and for whom does it not work?

TAP Resources/References

- TELE-ASD-PEDS: https://vkc.vumc.org/vkc/triad/tele-asd-peds
- Vanderbilt Kennedy Center's Treatment and Research Institute for Autism Spectrum Disorders (VKC TRIAD: https://vkc.vumc.org/vkc/triad/home/
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