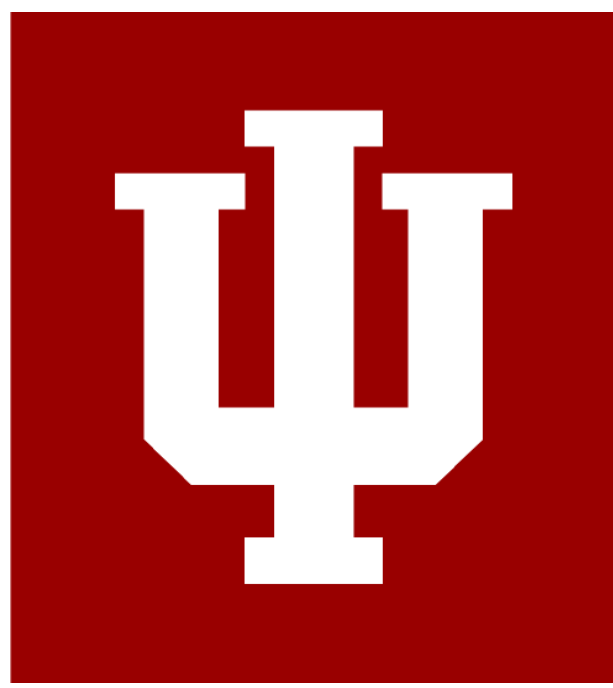




Telehealth evaluation of autism spectrum disorder during COVID-19: Comparative outcomes from implementation of the TELE-ASD-PEDS

Rebecca McNally Keehn,¹ Cristina James,¹ Qing Tang,² Angela Paxton,¹ & Brett Enneking¹
¹Department of Pediatrics, Indiana University School of Medicine, ²Department of Biostatistics, Indiana University School of Medicine



INTRODUCTION

- The COVID-19 pandemic has demanded rapid development and deployment of novel diagnostic tools and approaches for the evaluation of autism spectrum disorder (ASD), including use of telehealth.^{1, 2}
- Research has previously explored telehealth ASD diagnostic evaluations with promising results.³⁻⁶
 - However, extant studies have largely focused on homogenous samples of high-risk children, employ a rigorous research evaluation protocol, and/or do not allow for comparative analyses.
- The Riley Child Development Center (RCDC), an outpatient neurodevelopmental evaluation clinic set within an academic medical center and children's hospital, rapidly transitioned to telehealth at the onset of COVID-19 in order to safely allow for continuity of ASD diagnostic services.

OBJECTIVES

- Compare clinician- and caregiver-reported outcomes between ASD evaluations using the TELE-ASD-PEDS (TAP) and telehealth as usual (TAU).
- For children receiving TAP evaluations, examine associations between:
 - TAP risk classification and diagnostic outcome
 - Child characteristics and diagnostic outcome

METHODS

- Telehealth clinical evaluation protocols**
 - Telehealth evaluation using TELE-ASD-PEDS (TAP)**
 - Standard caregiver developmental and ASD diagnostic interview
 - TELE-ASD-PEDS
 - Remote assessment tool designed to observe ASD behaviors in young children; clinician coaches caregiver in administering play-based social presses. Seven key behaviors are scored on a Likert scale (1-3; Total score range: 7-21).⁷
 - Vineland Adaptive Behavior Scales-3 (Caregiver Form)
 - Diagnostic feedback and recommendations
 - Telehealth evaluation as Usual (TAU)**
 - Standard caregiver developmental and ASD diagnostic interview
 - Behavior observations of the child
 - Diagnostic feedback and recommendations
- Participants**
 - 13 clinicians (i.e., licensed psychologists, MDs) with ASD expertise
 - 208 children $\leq$ 48 months of age
 - No differences in age, insurance type, race/ethnicity, family income, or caregiver education across evaluation groups (all $p > .05$)
 - Difference in sex distribution (TAP: 72% males; TAU: 50% males, $p = .04$)

METHODS

Procedures

- From May-July 2020, referred children were randomly scheduled to TAP or TAU telehealth evaluations. Given clinic success with TAP evaluations, all children referred for ASD were triaged into TAP evaluations beginning in August 2020.
- Demographic information was gathered via review of Electronic Medical Records. Following each evaluation, providers and caregivers were sent a secure, individualized link to complete an online survey.
 - Clinician surveys included questions related to diagnosis, diagnostic certainty, and satisfaction.
 - Caregiver surveys included 10 questions related to satisfaction with the telehealth evaluation. A summary score is calculated from all 10 items (range 5-50).

RESULTS: COMPARISON BETWEEN TAP AND TAU

	TAP (n=177)	TAU (n=27)	p
Diagnostic Outcome			
ASD Diagnostic Outcome, n (%)			0.002
ASD Present	90 (52)	4 (18)	
ASD Absent	42 (24)	5 (23)	
ASD Uncertain (i.e., ASD rule out)	43 (25)	13 (59)	
Primary Diagnostic Outcome, n (%)			0.08
ASD	90 (52)	4 (18)	
Developmental delay	75 (43)	9 (60)	
Other diagnosis	8 (5)	2 (13)	
Diagnostic Certainty, n (%)			<0.001
Completely certain	77 (44)	7 (26)	
Somewhat certain	78 (44)	8 (30)	
Somewhat uncertain	17 (10)	10 (37)	
Completely uncertain	5 (3)	2 (7)	
Recommended follow-up in-person evaluation	31 (17)	9 (33)	0.046
Clinician Satisfaction			
Telehealth evaluation was adequate to answer the referral question, n (%)	142 (80)	13 (48)	<0.001
Preference to evaluate child in-person, n (%)	102 (58)	17 (63)	0.002
Satisfaction with the information obtained during the evaluation, n (%)			<0.001
Very satisfied	64 (36)	6 (22)	
Satisfied	102 (57)	12 (44)	
Neutral	4 (2)	2 (7)	
Somewhat unsatisfied	7 (4)	5 (19)	
Not satisfied	0 (0)	2 (7)	
Overall satisfaction with the evaluation service, n (%)			<0.001
Very satisfied	59 (33)	6 (22)	
Satisfied	107 (61)	14 (52)	
Neutral	4 (2)	3 (11)	
Somewhat unsatisfied	6 (3)	2 (7)	
Not satisfied	1 (<1)	2 (7)	
Caregiver Satisfaction			
Caregiver satisfaction summary score, mean (SD)	45.6 (5.5)	45.9 (6.1)	0.832

Diagnostic outcome and clinician satisfaction were analyzed with generalized mixed effect models with random effects to account for correlations within the same provider. Diagnostic certainty and clinician satisfaction were dichotomized (i.e., certain/uncertain; satisfied/neutral or unsatisfied) for between groups comparisons due to small sample size. Caregiver satisfaction summary scores were analyzed with one-way ANOVA. Developmental delay: developmental/language delay/disorder or intellectual disability. Other diagnosis: ADHD, learning disability, behavior disorder, or anxiety.

This research was supported by Riley Children's Foundation (Robert & Helen Haddad Family Foundation; award to RMK) and T73MC00015-27-01 (HRSA; PI: Tomlin). For correspondence or to obtain a copy of this poster, please e-mail mcnallyr@iu.edu.

RESULTS: TAP DIAGNOSTIC OUTCOMES

TAP Risk Classification & Diagnostic Outcome

	ASD Present (n= 75)	ASD Absent (n= 53)	ASD Uncertain (n= 20)
TAP At-Risk, n (%)	75 (100)	15 (75)	15 (75)
TAP Low Risk, n (%)	0 (0)	5 (25)	5 (25)

TAP At-Risk defined as Total Score $\geq$ 11. Diagnostic classification based on clinician's best-estimate diagnosis via integration of all evaluation data.

Child Characteristics & Diagnostic Outcome

	ASD Present (n= 75)	ASD Absent (n= 53)	ASD Uncertain (n= 20)	p
Age (months)	34 (8)	37 (8)	34 (12)	0.112
Sex [male, n (%)]	56 (75)	39 (74)	16 (80)	0.849
TAP Total Score	17 (3)	10 (2)	13 (3)	<0.001
Vineland-3 Communication	65 (15)	74 (14)	76 (13)	0.081
Vineland-3 Daily Living	73 (17)	78 (13)	81 (4)	0.233
Vineland-3 Socialization	73 (10)	81 (19)	83 (12)	0.135
Vineland-3 Motor	82 (14)	84 (18)	85(13)	0.905
Vineland-3 ABC	71 (9)	77 (13)	78 (7)	0.087

All data reported as mean (SD) except where indicated. Vineland-3 scores are reported as Standard Scores; ABC= Adaptive Behavior Composite. Chi Square/Fisher's Exact test (categorical variables) and one-way ANOVA (continuous variables) were conducted.

SUMMARY & CONCLUSIONS

- Across telehealth evaluations using the TAP (vs. TAU):
 - A greater proportion of children were diagnosed with ASD.
 - ASD outcome was "uncertain" less frequently.
 - Fewer in-person follow-up evaluations were recommended.
 - Clinicians rated diagnostic certainty higher.
 - Clinicians rated satisfaction higher.
- All caregivers reported high satisfaction with telehealth.
- TAP risk classification was highly aligned with clinician's diagnostic classification.
- No associations between ASD outcome and age, sex, or Vineland-3 scores were found.
- TAP Total Scores varied by ASD diagnostic outcome with higher scores in the ASD Present group and lower scores in the ASD Absent group.
- Overall, the TAP is well accepted by both clinicians and caregivers and adds significant benefit over TAU for differential ASD diagnosis.
- Deployment of novel ASD telehealth assessment tools and procedures has promising potential to improve access to high-quality evaluation services during the COVID-19 pandemic and beyond.

REFERENCES

- Jiang J, White SP, Ester AN, et al. Diagnostic Evaluations of Autism Spectrum Disorder during the COVID-19 Pandemic. *Journal of autism and developmental disorders*. 2021;1-12.
- Corona LL, Wagner L, Wade J, et al. Toward Novel Tools for Autism Identification: Fusing Computational and Clinical Expertise. *Journal of autism and developmental disorders*. 2021;1-10.
- Afuraydan M, Croxall J, Hurt L, Kerr M, Brophy S. Use of telehealth for facilitating the diagnostic assessment of Autism Spectrum Disorder (ASD): A scoping review. *PLoS one*. 2020;15(7):e0236415.
- Corona LL, Weitauf AS, Hine J, et al. Parent Perceptions of Caregiver-Mediated Telemedicine Tools for Assessing Autism Risk in Toddlers. *Journal of autism and developmental disorders*. 2020;1-11.
- Wagner L, Corona LL, Weitauf AS, et al. 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*. 2020;1-10.
- Juarez AP, Weitauf AS, Nicholson A, et al. Early Identification of ASD Through Telemedicine: Potential Value for Underserved Populations. *Journal of autism and developmental disorders*. 2018.
- Corona LL, Hine J, Stone C, et al. TELE-ASD-PEDS: A Telemedicine-based ASD Evaluation Tool for Toddlers and Young Children. Vanderbilt University Medical Center; 2020.