

Improving Access for Autism Diagnosis in Toddlers from a Multicultural and Underserved Community



Roula Choueiri, MD

Neurodevelopmental Disabilities Pediatrician
University of Massachusetts Medical School
Worcester, Massachusetts



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- **I have no conflict of interest**
 - **I do not receive royalties from the RITA-T online training**



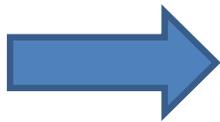


Current state of the evaluation of toddlers with question of ASD

- Shortage of diagnosticians
- ASD signs can be seen as early as 12 months but diagnosis continues to be made close to 4 y of age

Minorities and underserved populations: further delays

- Wait times to be seen for diagnostic evaluation: up to 12 months in some areas



Need a system to screen more efficiently those with high risk for ASD to get them faster to services



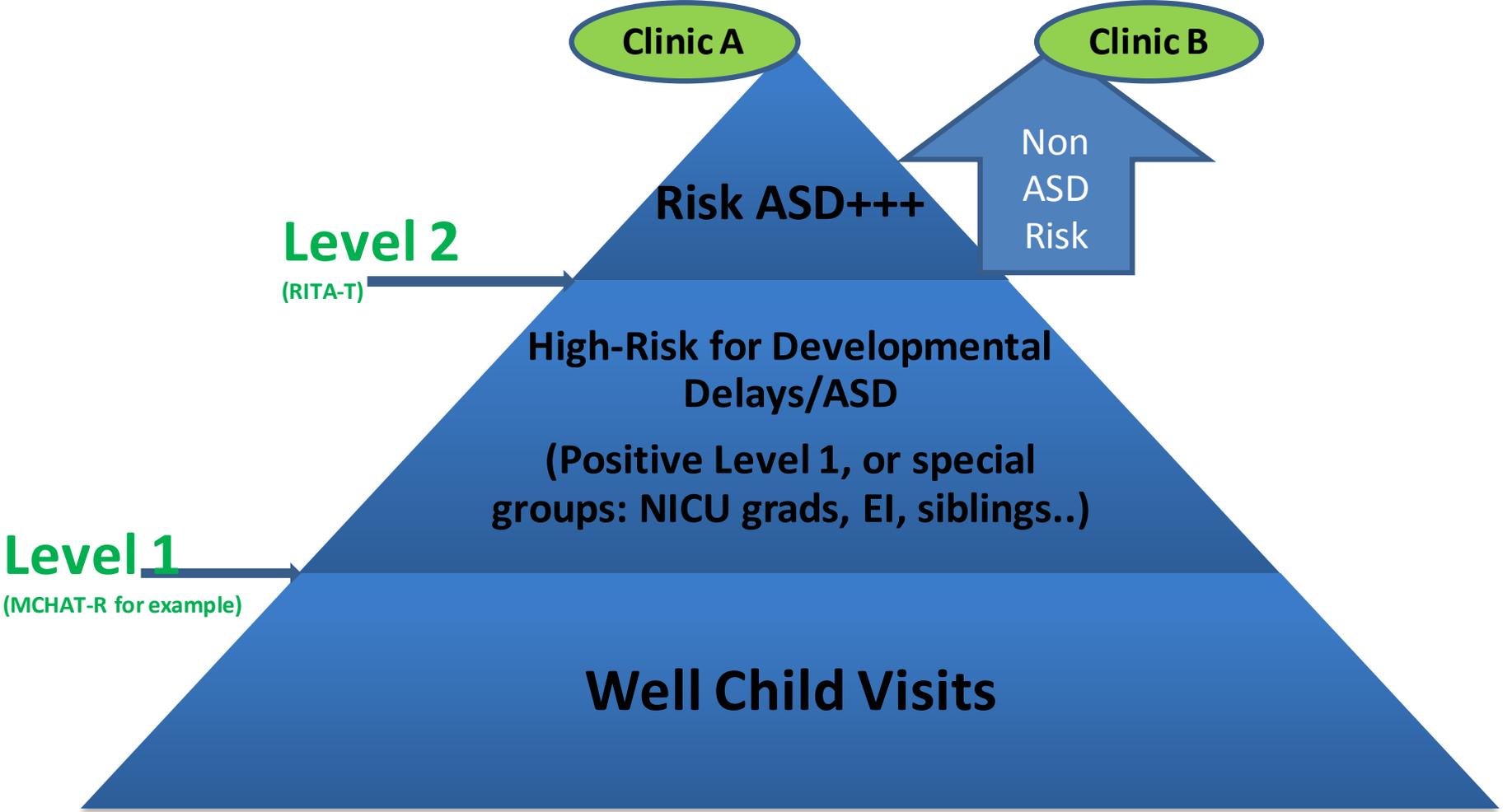
When research meets clinical needs



- Can we create a clinical pathway to decrease wait times
- While keeping the families supported
- And while integrating, collecting data, and generalizing further a Level 2 interactive screening test in practice

Two-Level ASD Screening Model:

@2019UMassMedSchool





Ideal ASD Level 2 screener

Interactive: better at eliciting behaviors associated with ASD

Toddlers with high risk of ASD: **improved access**

Reliable in 18-36 months old

Easy to train and learn: Early Intervention, Early Childhood educators, Pediatricians, nurses, NP, can be trained on it

Discriminates well between toddlers with ASD and those with Delays that are non ASD

Needs to FIT WELL INTO BUSY PRACTICE FLOW



RITA-T: Rapid Interactive Screening Test for Autism in Toddlers @UMassMed

- 9 interactive presses
- Assesses developmental constructs delayed in early ASD
 - *Joint Attention (JA)*
 - *Reaction to Emotions*
 - *Awareness of Human Agency*
- The lower the score, the more typical the reaction.
- Reliable Training: 3 hours
- Excellent correlation with diagnostic tests
- Validated for 18-36 months
- Cut off Scores
 - < 12 unlikely at risk for ASD
 - 12-16: needs further evaluation and mixed
 - >16: most likely associated with ASD



A New Interactive Autism Screening Tool for Early Childhood Providers

[tu/AutismRITA-T/testimonials/](#)

Currently the average age of diagnosis of Autism Spectrum Disorder in the US is close to 4 years of age

❖ Administration and scoring time: **10 minutes**



A New Interactive Screening Test for Autism Spectrum Disorders in Toddlers

Roula Choueiri, MD¹, and Sheldon Wagner, PhD²

Objective To develop a clinically valid interactive level 2 screening assessment for autism spectrum disorders (ASD) in toddlers that is brief, easily administered, and scored by clinicians.

Study design We describe the development, training, standardization, and validation of the Rapid Interactive Screening Test for Autism in Toddlers (RITA-T) with ASD-specific diagnostic instruments. The RITA-T can be administered and scored in 10 minutes. We studied the validity of the RITA-T to distinguish between toddlers with ASD from toddlers with developmental delay (DD)/non-ASD in an early childhood clinic. We also evaluated the test's performance in toddlers with no developmental concerns. We identified a cutoff score based on sensitivity, specificity, and positive predictive value of the RITA-T that best differentiates between ASD and DD/non-ASD.

Results A total of 61 toddlers were enrolled. RITA-T scores were correlated with ASD-specific diagnostic tools ($r = 0.79$; $P < .01$) and ASD clinical diagnoses ($r = 0.77$; $P < .01$). Mean scores were significantly different in subjects with ASD, those with DD/non-ASD, and those with no developmental concerns (20.8 vs 13 vs 10.6, respectively; $P < .0001$). At a cutoff score of >14 , the RITA-T had a sensitivity of 1.00, specificity of 0.84, and positive predictive value of 0.88 for identifying ASD risk in a high-risk group.

Conclusion The RITA-T is a promising new level 2 interactive screening tool for improving the early identification of ASD in toddlers in general pediatric and early intervention settings and allowing access to treatment. (*J Pediatr* 2015;167:460-6).



Current Interactive Level 2 ASD screeners

STAT: Screening for Autism in Toddlers

- 20 minutes to administer
- Difficult training
- Good psychometrics for 2-3 y old
- Less good for < 2y
- Misses mild to moderate forms of ASD
- High Costs

RITA-T: Rapid Interactive Screening Test for Autism in Toddlers

- 5-10 minutes to administer
 - Reliable training in 3 hours
 - Good psychometrics for 18-39 months
 - Training and access to be accessible
- 

Eye Contact and Joint Attention

“Checking in” to share interest/surprise to a magical change in colors or to disappearing ball



Human Agency & preference for faces

**Child aware of person blocking object
not just “the hand”**



Preference for faces



Results- Demographics

	ASD (N=23)	NonASD (N= 19)	NCR (N=19)	P-value
Female N (%)	1 (4)	8 (36)	12 (63)	<0.001
Age months Mean (SD)	27.77 (5.7)	29.46 (6)	21.7 (6.5)	0.001
Race N (%)				0.07
White N (%)	11 (47.8)	15 (79)	8 (42.1)	
Hispanic	8 (34.7)	3 (15.8)	4 (21)	
Other	4(17.3)	1(5.2)	7(36.8)	
Income N (%)				NS
>\$50,000	7 (30.4)	8 (42.1)	6 (31.5)	
<\$50,000	16 (69.5)	11 (58)	13 (68.4)	

P-values for group differences are based on ANOVA for continuous variables and chi-square tests for categorical variables.

Results- Mean Scores (SD) by Diagnoses

	ASD	DD/NON-ASD	NCR	P-VALUE
RITA-T	20.8 (3.6)	13 (2.5)	10.9 (2.12)	<0.0001
M-CHAT				
Total Items failed (SD)	8.7 (4.9)	4 (3.6)	1.3(1.6)	<0.0001
M-CHAT				
Mean critical failed (SD)	2.87 (2.3)	1.42 (1.6)	0.11 (0.31)	<0.0001
DSM IV	8.96 (1.99)	0.89 (1.15)	N/A	<0.0001
DSM 5	6.04 (0.88)	0.75 (1.15)	N/A	<0.0001
MULLEN Receptive Language	29.7 (12.3)	33.8 (15.2)	N/A	NS
MULLEN Expressive Language	28.4 (13.2)	29.6 (13.4)	N/A	NS
MULLEN Visual Reception	32.8 (10.7)	40 (14.65)	N/A	NS



Results- Correlations of RITA-T with Autism measures

Correlations	DSM IV criteria checked	DSM5 criteria checked	ADOS Composite Score
r=	0.78	0.76	0.79
N=	42	42	25
t=	7.81	7.37	6.14
p= (two-tailed)	<0.0001	<0.0001	<0.0001





Measures of test validity

- Sensitivity:

- *Positives are true positives*

- Specificity:

- Negatives are truly negatives

- PPV: Positive Predictive Value

- Proportion of patients with positive test results who are correctly diagnosed

- NPV: Negative Predictive Value

- Proportion of patients with negative test results who are correctly excluded



Sensitivity & Specificity for all cut-off scores

RITA-T Total score	Sensitivity	Specificity	PPV	NPV
8	1	0.05	0.56	1
9	1	0.11	0.58	1
10	1	0.16	0.59	1
11	1	0.26	0.62	1
12	1	0.37	0.66	1
13	1	0.53	0.72	1
14	1	0.84	0.88	1
15	0.96	0.84	0.88	0.94
16	0.83	0.89	0.90	0.81
17	0.74	0.95	0.94	0.75
18	0.65	1	1	0.70
19	0.61	1	1	0.68
20	0.48	1	1	0.61
21	0.35	1	1	0.56
22	0.30	1	1	0.54
23	0.13	1	1	0.49
24	0.09	1	1	0.48
25	0.04	1	1	0.46
26	0	1	1	0.45

Calgary Triaging Model (2013- ongoing)- part of medical record

Paediatrics & Child Health, 2017, 1–6

doi: 10.1093/pch/pxx187

Review Article

OXFORD

Review Article

Redesign of the autism spectrum screening and diagnostic process for children aged 12 to 36 months

Jean-François Lemay MD FRCPC, Meredith Yohemas MSc RSLP, Shauna Langenberger RN BNMN

Department of Paediatrics, Cumming School of Medicine, University of Calgary, Alberta Children's Hospital, Calgary, Alberta

Correspondence: Jean-François Lemay, Department of Paediatrics, Cumming School of Medicine, University of Calgary, Alberta Children's Hospital, 2888 Shaganappi Trail NW, Calgary, Alberta T3B 6A8. Telephone 403-955-7515, fax 403-955-7649, e-mail jflemay@ahs.ca

Abstract

DATE	WAIT TIME TO DIAGNOSTIC VISIT
OCT, 2013	12-13 MONTHS
MAY, 2014	6 MONTHS
SEPT, 2014	2 MONTHS
JAN, 2016	28 days

Calgary Paper: 239 toddlers screened with the RITA-T Results

Original Article

Experience with the Rapid Interactive Test for Autism in Toddlers in an Autism Spectrum Disorder Diagnostic Clinic

Jean-François Lemay, MD, FRCPC, Parthiv Amin, MD, MASC, Shauna Langenberger, RN, MN, Scott McLeod, MD, FRCPC

ABSTRACT: *Objective:* To examine the psychometric properties of the Rapid Interactive Screening Test for Autism in Toddlers (RITA-T) in an autism spectrum disorder (ASD) clinic for children aged 18 to 36 months. *Methods:* The RITA-T (level 2 screening instrument) was integrated into an ASD screening and diagnostic process for evaluating children aged 18 to 36 months who were referred to a pediatric tertiary care center. Scoring of the RITA-T to differentiate ASD from non-ASD developmental concerns was evaluated. Screening instrument measurements included sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), positive likelihood ratio (LR+), and negative likelihood ratio (LR-). *Results:* From a total of 239 participants aged 18 to 36 months (males = 78% and females = 22%), 201 (84%) were diagnosed with ASD (4:1 male-to-female ratio). An ASD diagnosis was significantly associated with RITA-T scores, with ASD patients scoring higher than non-ASD patients [$F(1,235) = 170$, mean difference: males 9.21, mean difference: females 12.4, $p < 0.001$]. The RITA-T score was not statistically correlated with age or sex. The optimal cutoff score of ≥ 14 was determined from a receiver operator curve analysis (area under the curve = 0.953). In the study group, with a cutoff score of ≥ 14 , the RITA-T showed a sensitivity of 0.97, specificity of 0.71, PPV of 0.95, NPV of 0.79, LR+ of 3.33, and LR- of 0.05. *Conclusion:* The RITA-T, as a level 2 screening instrument for ASD, exhibits discriminative psychometric properties similar to previously published results. When integrated into an ASD screening and diagnostic process for families for whom concerns about ASD have been raised with their children aged 18 to 36 months, the RITA-T helps to predict a best-estimate clinical diagnosis of ASD.

(*J Dev Behav Pediatr* 00:1-9, 2019) **Index terms:** autism spectrum disorders, developmental disabilities, screening tools, psychometrics.



b- Hospital-Based Two-level model

(Paediatrics and Child Health Journal- January 2018)

- **Calgary, Canada:** Team in the Division of Developmental and Behavioral Pediatrics trained on the RITA-T (Developmental Pediatrician; two speech therapists, and a psychologist)
- **Goal: Reduce patient wait-list time** for toddlers 18- 39 months referred for diagnostic evaluations for possible ASD
- **October, 2013:** wait to be evaluated for a 0-3y was **12 months**
- **New model and triage with RITA-T:**
 - Parent meeting
 - MCHAT & RITA-T administration then triage to specific testing group (Low risk, moderate risk and high risk) with diagnostic evaluations, treatment and longitudinal follow up provided in each group.





Results of New Triage Protocol Continues after study completion

- The model included:
 - a) An initial mandatory parent education session followed one week later by
 - b) A child visit using the face-to-face level II screening tool (RITA-T) + completion of M-CHAT questionnaire by parents followed in 7-21 days
 - c) an ASD diagnostic evaluation appointment (type dependant on score obtained in screening appointment) and finally the opportunity to attend in the next 2-3 weeks
 - d) “After the ASD Diagnosis” parent group session with a positive diagnosis of ASD.



DBP at the UMass Children's Medical Center, Worcester, MA



Background: Worcester population (Census, 2017)

Residents **below poverty level 21.8%** (state: 10.5%)

- **Ethnicity**
 - **White alone 58.6%**
 - **Hispanic 21%**
 - **Black alone 6.8%**
 - **Asian alone 3.7%**
 - **Two or more races 9.9%**
 - **American Indian alone 0.9%**
 - **Other race alone 0.1%**
- **33.8% speak language other than English**



Background Worcester population



MOST COMMON ORIGIN

- 1. Ghana
- 2. Dominican Republic
- 3. Vietnam

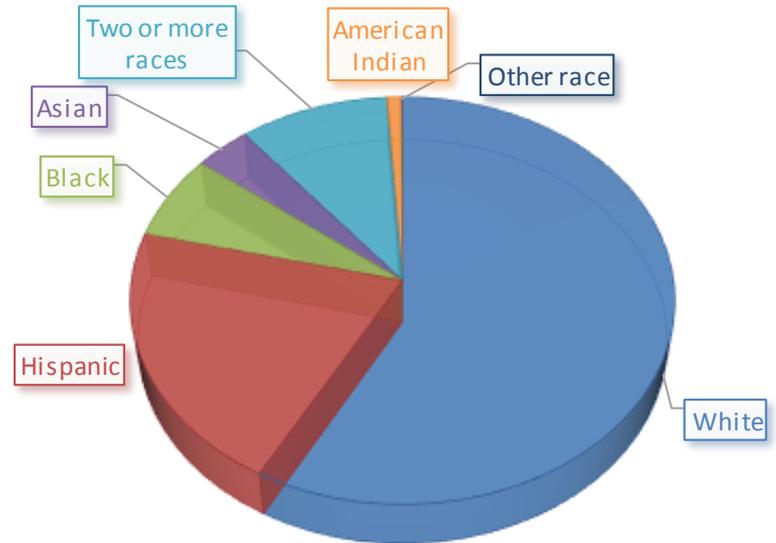
MOST COMMON LANGUAGE SPOKEN

- 1. Spanish
- 2. Portuguese
- 3. West African Languages

ETHNICITY:

- 1. White
- 2. Hispanic
- 3. Black

Population by Race (2017)



Generalization Research Study: collaboration with THOM Early Intervention Program in Worcester: 2015-2018- Exploring different systems



Roula Choueiri, MD; Asher Lindenbaum, PsyD; William Robsky, MPH; Julie Flahive, MS+; Manasa Ravi, BS
Developmental and Behavioral Pediatrics, Department of Pediatrics
and Quantitative Health Sciences, UMass Medical School, Worcester, MA



Background

Preliminary results from the Rapid Interactive Screening Test for Autism in Toddlers (RITA-T) pilot study supported the validity in screening for autism spectrum disorders (ASD) in a controlled research environment. Further testing is needed to determine generalizability across the population.

Objectives

Improve early detection of autism with a two level screening test using the MCHAT R as a Level 1 and the RITA-T (Rapid Interactive Screening Test for Autism in Toddlers) as an interactive Level 2 screening test, and test a new Level-2 model in improving Early Access.

Design/Methods

RITA-T (Rapid Interactive Test for Autism in Toddlers)



The RITA-T is an interactive ASD level II screening test. Easy to learn and to administer reliably; it can be completed in less than 10 minutes, and has demonstrable clinical validity.

RITA-T examines developmental constructs delayed in ASD (9 presses) evaluating these 4 domains: joint attention, response to name, reaction to emotions and social awareness. Initial validation studies showed Sensitivity of 1.0, Specificity of 0.86, Predictive Positive Value (PPV) of 0.89 & Negative Predictive Value (NPV) of 1.0 in screening ASD vs. non-ASD at cut off score of 14. (Choueiri, R and Wagner, S. A New Interactive Screening Test for Autism Spectrum Disorders in Toddlers. J Pediatr. 2015 Aug;167(2):460-6).

Test refined and online training developed:
<http://www.umassmed.edu/AutismRITA-T/rita-t/>

Methods

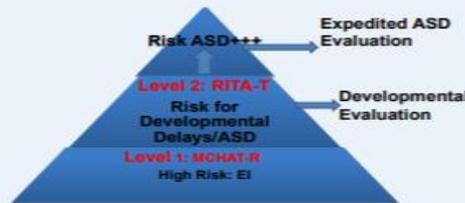
The two-level screening included Early Intervention (EI) providers, and linking EI and diagnostic center for improved early screening, identification, communication and wait times. Early Intervention providers in the largest program in the Worcester area (THOM EI Worcester) were trained with the RITA-T. The EI program screens all their toddlers already enrolled with the MCHAT-R. Those with a positive MCHAT were administered the RITA-T and were then referred for diagnostic evaluation that included ADOS 2, MSEL. This study continues and we currently are testing with the RITA-T a sample of toddlers with a negative MCHAT-R

Statistical Measures

We calculated:

*Sensitivity/Specificity, Positive & Negative Predictive Values of the RITA-T compared to final clinical diagnoses.

*Correlation of the RITA-T scores with Autism Diagnostic Tests



Results

*Seventy toddlers (86.4%) had a positive Modified Checklist for Autism in Toddlers (MCHAT-R) and were screened with the RITA-T. Clinicians administered the Autism Diagnostic Observation Schedule-2 (ADOS-2) and the Mullen Scales of Early Learning (MSEL). Testing and clinical presentation determined final clinical diagnosis.

*Early Intervention (EI) referred 11 (13.5%) low-risk toddlers. MCHAT-R, Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), and Battelle Developmental Inventory determined final clinical diagnosis.

*RITA-T score was compared to their final clinical and ADOS-2 diagnoses to evaluate the validity and determine the optimal cut-off score.

*Referrals for ABA treatment doubled and age decreased from 30 months to 28 months

*Wait time for evaluation : within 6 weeks

***Strong correlation with ADOS-2 Toddler and Module 1

	ASD (N=57)	Non-ASD (N=24)	P-value
Female N (%)	9 (16)	7 (29)	0.22
Age months - Mean (SD)	27.3 (5.1)	27.6 (4.3)	0.68
Race N (%)			0.07
White N (%)	29 (51)	18 (75)	
Hispanic N (%)	3 (5)	5 (21)	
Asian N (%)	5 (9)	1 (4)	
Income N (%)			NS
median	72k (60-87)	81k (63-103)	

Test scores

	ASD	DD/NON-ASD	P-VALUE
RITA-T	20.1 (3.9)	8.7 (2.9)	<0.0001
M-CHAT-R, Total score	8.6 (3.8)	0.1 (0.3)	<0.0001
MSEL Receptive Language, T score	24 (8.5)	46.4 (12.8)	<0.0001
MSEL Expressive Language, T score	24.3 (5.8)	34.4 (12.4)	<0.0001
MSEL Visual Reception, T score	28.2 (8.7)	48.2 (15.4)	<0.0001
MSEL Fine Motor Skills, T score	51.1 (10.6)	48.3 (15.2)	0.002
MSEL Early Learning Composite Score	59.2 (10.5)	89.6 (21.1)	<0.0001
ADOS-2 Toddler Module	17.4 (3.9)	3.9 (2.8)	<0.0001
ADOS-2 Module 1	14.2 (4.5)	3.8 (3.7)	<0.0001

RITA-T Cut off Level

Optimal cutoff score was determined to be 12. A RITA-T score lower than 12 was considered low-risk for ASD, RITA-T score from 12 to 16 needed further evaluation, and scores higher than 16 were high-risk for ASD.

RITA-T Total score	Sensitivity	Specificity	PPV	NPV
8	1	0.42	0.80	1
9	1	0.54	0.84	1
10	1	0.64	0.86	1
11	1	0.67	0.86	1
12	0.86	0.83	0.83	0.85
13	0.93	0.86	0.86	0.85
14	0.88	0.86	0.86	0.77
15	0.83	0.86	0.86	0.70
16	0.67	1	1	0.65
17	0.68	1	1	0.67
18	0.60	1	1	0.51
19	0.53	1	1	0.46
20	0.29	1	1	0.41
21	0.26	1	1	0.36
22	0.19	1	1	0.34
23	0.14	1	1	0.33
24	0.07	1	1	0.31
25	0.05	1	1	0.32

Conclusions

- This two level ASD screening model with the MCHAT-R and the RITA-T improves early detection and wait times and is a sustainable model.
- RITA-T cut off score of 12 has good discriminatory properties with cut-off score of 12-16 a high risk grey area.
- RITA-T correlates with Autism Diagnostic Measures (ADOS-2 and DSM-5)
- This model integrated EI and Diagnosticians and decreased wait times to 6 weeks
- We continue to study the RITA-T and this model.
- Online Training of the RITA-T available <http://www.umassmed.edu/AutismRITA-T/rita-t/>
- Further testing will evaluate the effectiveness of the RITA-T screening in those 12-18 months.
- Patients are now able to access critical community supports and resources in a timely manner.



Results

Manuscript Submitted

Over two years:

- 160 toddlers were evaluated through this model
- Two different research teams
- Data from 2017-2018: **81** toddlers (57: ASD and 24: non ASD)
- Referrals for ABA treatment doubled and age decreased from 30 months to 28 months
 - Wait time for evaluation : **within 6 weeks**
- Strong Correlation with Autism diagnostic measures (ADOS-2 Toddler and Module 1)
 - **Cut off score of 12: high rate of early identification**



Results- Demographics

	ASD (N=57)	NonASD (N= 24)	P-value
Female N (%)	9 (16)	7 (29)	0.22
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Hispanic	13 (23)	3 (13)	
Asian	5(8.8)	1(4.2)	
Income N (%)			NS
median	72K (60-87)	81K(63-103)	

P-values for group differences are based on ANOVA for continuous variables and chi-square tests for categorical variables.

Results- Mean Scores (SD) by Diagnoses

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ADOS-2 Toddler Module	17.4 (3.9)	3.9 (2.8)	<0.0001
ADOS-2 Module 1	14.2 (4.5)	3.8 (1.7)	<0.0001

Sensitivity & Specificity for all cut-off scores

RITA-T Total score	Sensitivity	Specificity	PPV	NPV
8	1	0.42	0.80	1
9	1	0.54	0.84	1
10	1	0.54	0.84	1
11	1	0.67	0.88	1
12	0.98	0.83	0.93	0.95
13	0.93	0.96	0.98	0.85
14	0.88	0.96	0.98	0.77
15	0.82	0.96	0.98	0.70
16	0.82	1	1	0.71
17	0.77	1	1	0.65
18	0.68	1	1	0.57
19	0.60	1	1	0.51
20	0.51	1	1	0.46
21	0.39	1	1	0.41
22	0.26	1	1	0.36
23	0.19	1	1	0.34
24	0.14	1	1	0.33
25	0.07	1	1	0.31
26	0.05	1	1	0.31

Generalization of RITA-T Model to clinics





Fast Track RITA-T model at UMass

- Continue with THOM; Other EI programs
- Trained Two private pediatric practices and community health center
- Pediatric Residents: continuity clinics
- If concerns about ASD:
 - MCHAT
 - RITA-T

Start conversation with families

- Referral received with
 - MCHAT-R scores
 - RITA-T scores

Within DBP

- All clinicians trained on it:
 - Social Work, Nurse Practitioner, psychologists, DBP, Clinical Research Assistants
 - Part of evaluation of younger children when referral question is not clear
- 



Fast Track RITA-T Clinics

- **Diagnostic evaluation over 1 hour:**
 - Family sent intake that they bring with them
 - Possibility of ASD diagnosis has already been discussed with the family
 - EI Provider comes with family most often
 - In Person Interpreter arranged
 - Visits interdisciplinary:
 - DBP and/or Child Psychologist
- **Focused:**
 - History of current concerns
 - Developmental and Medical History
 - Observation of play and behavior
 - Autism Testing
 - Provision of diagnosis and letter
 - Referrals to hearing and genetics
 - **Follow-up within 1-2 months with Social Work**
 - Regular follow up in DBP

Over 1 year (September 9, 2018-September 9, 2019):

520 toddlers evaluated by whole group (3-4 months wait time)

170 were referred to RITA-T Fast Track Clinic (1-3months: insurances)





Testimonials (EI providers)

“The RITA-T is a nice addition to our Universal Screening Program using the M-CHAT-R. It provides direct observation in addition to the questionnaire.”

“Using the RITA-T as a second level play-based screening fits very well into the home visit model of Early Intervention. It is very quick and easy to administer and score and provides supplemental information to the first level screen for ASD”.



Testimonials (Parents)

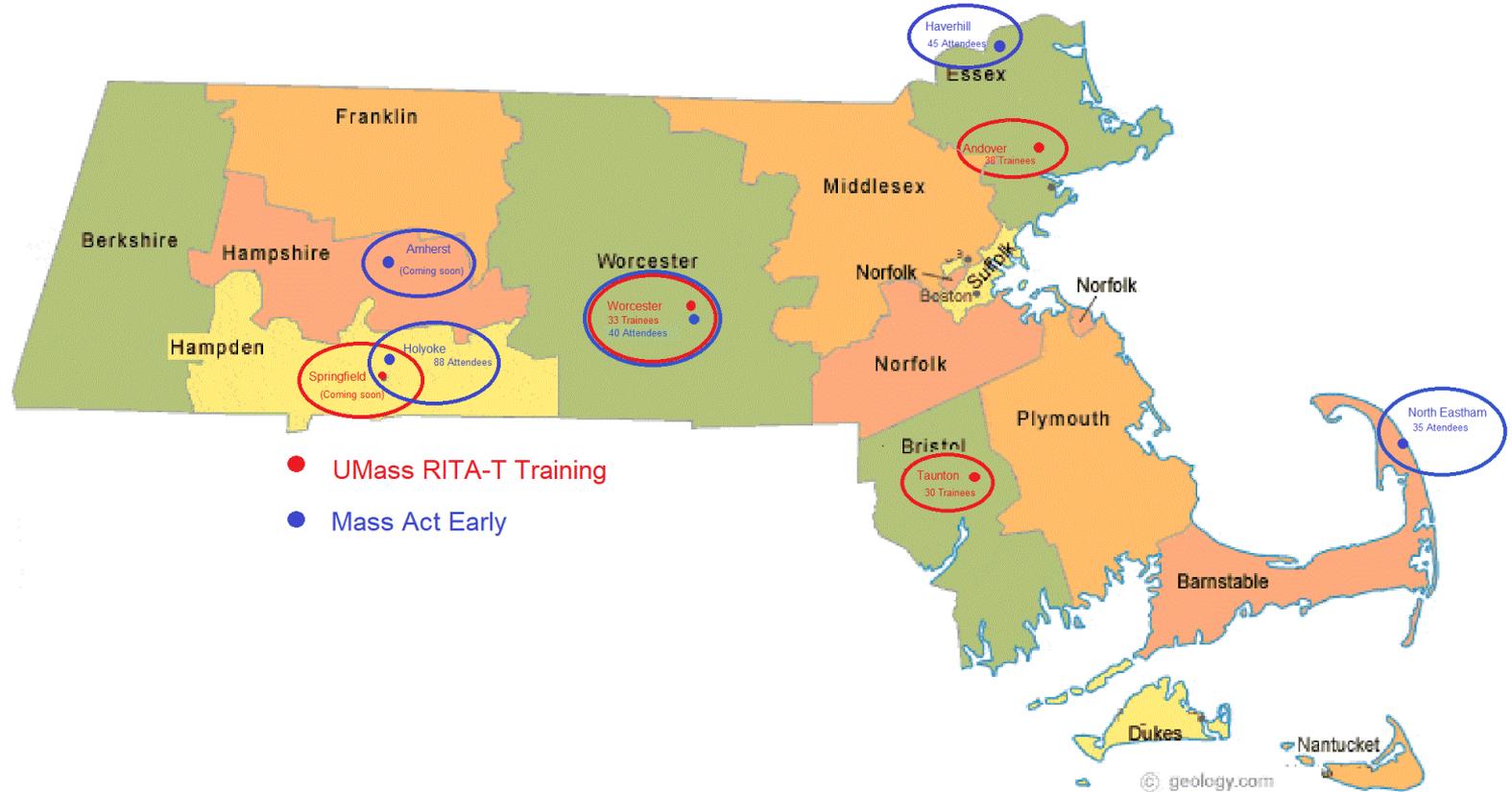
“Grateful to have had the evaluation
without having to wait”

“I feel supported by my early intervention
provider”



Generalization of Model to other areas and EI Programs in MA

Partnering with Department Public Health and with MA Act Early State Team





SUMMARY: The RITA-T

- Facilitates earlier detection and two-level screening models in different settings and low cost models
 - Discriminates well between toddlers with Developmental Delay/Non-ASD & ASD at cut off score of 12
 - “Grey area”: score of 12-16: children will need to be evaluated.
 - Always use clinical judgement
 - At 5-10 minutes, it fits very well into clinic flow
 - Correlates well with Autism diagnostic measures
 - Reliable training is easily obtained in 3 hours
- 

RITA-T online Training

<http://www.umassmed.edu/AutismRITA-T/rita-t/>



UMass Medical School
Division of Developmental and Behavioral Pediatrics

RITA-T Online Training

Rapid Interactive Screening Test for Autism in Toddlers

About	Details	Importance
<ul style="list-style-type: none">• Interactive autism screening test for children younger than 3 years of age.• Allows a better identification of toddlers at a very high risk for autism spectrum disorders, which will then expedite their referral for diagnostic evaluation and start of treatment.• Easily learned and administered, allowing it to fit in a diverse range of environments, across many professional disciplines.	<ul style="list-style-type: none">• Online training program for a new level 2 interactive ASD screener.• Includes a 45 minute educational PowerPoint on the early signs of ASD and the concept of a level 1 and level 2 screener.• Consists of 9 interactive activities designed to evaluate five developmental constructs known to represent early signs of ASD in toddlers 18-36 months.• Upon certification, participants will receive a test kit.	<p>The RITA-T online training teaches participants how to detect early signs of autism in toddlers.</p> <p>By screening earlier in life, providers can identify if the disorder is present and begin treatment.</p> <p>If you are interested in this course, visit the website below to find out how you can register!</p> <p> UMMSRITAT  UMMSRITA_T</p>

 www.umassmed.edu/AutismRITA-T

 **University of Massachusetts**
UMASS. Medical School

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For information or questions:

RITA-T@umassmed.edu

