



ASD SCREENING IN THE PRIMARY CARE SETTING: THE MCHAT-R & BEYOND

*QUANG-TUYEN NGUYEN, MD
UNIVERSITY OF UTAH
FEB 20, 2019*





HISTORY OF SCREENING RECOMMENDATIONS

- AAP (2007):
 - recommend general developmental surveillance and
 - specific ASD screening at 18 and 24 months
- CDC (2000):
 - CDC established the ADDM (Autism and Developmental Disabilities Monitoring) Network
 - current recommendations mirror AAP

HOW TO PICK THE RIGHT SCREENER?

- General vs specific condition
- Timing of screening
- Ease of use, flow within the practice
- Population risk
- Sensitivity and specificity
- Biases

POPULATIONS – GENERAL RISK

- Racial, ethnic, and cultural differences
- e.g., having a sister, brother or other family member with an ASD), preterm, LBW

HIGHER RISK POP – GENETIC SYNDROMES

- Angelman
- CHARGE
- Cornelia de Lange
- Down
- Fragile X
- Klinefelter
- NF1
- Prader Willi
- PTEN
- Rhetts
- Smith Lemli Opitz
- Smith Magenis
- Sotos
- Tuberous sclerosis

TIMING – CAN BE EVERYTHING

- Window of regression of skill or stagnation
- Those children with better skills may pass
- Parental buy-in
- Timely diagnosis



EASE OF USE, FLOW OF USE

- Parent questionnaires often used
- Can consider having an assistant or someone in office clarify answers
- Consider followup visit or telephone call
- Consider referral process within community



SENSITIVITY AND SPECIFICITY

- Screeners can be validated using different methods
- Use in different populations can change what you expect of sensitivity and specificity
- Consider what a missed false negative is, as well as the consequences of a false positive

BIASES

- Visits might be short, biasing our impression
- Studies have shown that pediatricians at assessments have lower sensitivity than MCHAT (0.244 vs 0.91)
- Caregivers may not have same expectations that we do

SCREENERS AVAILABLE

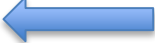


CHAT
ASQ
CSBS
POSI
PSC
PEDS
MCHAT-R/F
M-CHAT/F
M-CHAT
START?

TOOLS

General dev

- PEDS
- PSC
- ASQ 3
- SWYC

Autism specific

- CHAT 
- MCHAT/F 
- MCHAT-R/F 
- POSI
- STAT
- AMSE
- ASRS
- First Year Inventory
- BITSEA
- ESAC
- RITA-T
- SCQ
- ASQ:Social-Emotional 2
- CSBS DP

HISTORY OF CHECKLIST FOR AUTISM

- CHAT (1992)
- M-CHAT (2001)
- M-CHAT/F (2013)
- M-CHAT R/F (2014)

CHAT (1992): CHECKLIST FOR AUTISM IN TODDLERS

- Designed in the UK (Baron Cohen, 1992)
- Validated for 18-36 mo
- Includes parent questionnaire AND provider observations

MCHAT (2001): MODIFIED CHECKLIST FOR AUTISM IN TODDLERS

- 23 item yes/no checklist for 16-30 mo
- Modified for American system
- First 9 items are from the CHAT
- Eliminated provider observation section
- Scoring based on total score 3+ or 2+ of the critical items

MCHAT (2001): MODIFIED CHECKLIST FOR AUTISM IN TODDLERS

- Validated in 2001
 - 1293 screened
 - 58 evaluated
 - 39 diagnosed with ASD
 - Remainder were not typically developing
- Sensitivity 0.87
- Specificity 0.99
- Positive predictive power 0.8
- Negative predictive power 0.99

MCHAT-F INTERVIEW (2013)

MCHAT-FOLLOWUP

- Inclusion of a phone interview after positive MCHAT decreased rate of positive screening from 43% to 30%
- Subsequent studies found that PPV of the MCHAT alone was 0.11, but increased to 0.65 with followup interview
- Telephone/in person followup recommended in low risk populations to review answers, avoid unnecessary referrals and address parental concerns
- Best done if MCHAT score between 3-6
- Note, threshold for failing the MCHAT screener had been set low to avoid misses, but is at the expense of positive predictive power

MCHAT-R/F (2014)

MODIFIED CHECKLIST FOR AUTISM IN TODDLERS, REVISED WITH FOLLOWUP

- The purpose of revising the M-CHAT was to reduce the number of cases who initially screen positive and need the follow-up, while maintaining high sensitivity.

MCHAT-R/F (2014)

MODIFIED CHECKLIST FOR AUTISM IN TODDLERS, REVISED WITH FOLLOWUP

- 20 yes/no questions
- 3 items dropped: peekaboo, playing with toys, wandering without purpose
- Items reorganized to remove agreement bias
- Language simplified
- Examples provided to improve clarity

MCHAT-R/F (2014)

MODIFIED CHECKLIST FOR AUTISM IN TODDLERS, REVISED WITH FOLLOWUP

- Validated on 16,071 toddlers
- Scoring based on 3 risk levels and tiered approach
- **MCHAT-R: sensitivity is 0.91, specificity 0.955**
- **MCHAT-R/F: sensitivity is 0.85, specificity 0.99**
- Better sensitivity than M-CHAT/F (R/F detected 67 cases/1000; MCHAT/F detected 45/1000)
- Positive screens were **114x more likely** to get dx'd with ASD
- **95% of with risk on MCHAT-R/F showed developmental delay or concerns warranting early intervention**

MCHAT R/F (2014)

- Detection rate of MCHAT-R/F is still only 1: 149 cases which is different from prevalence numbers of ASD
- Suggests that despite its sensitivity it will not catch everyone for evaluation
- Reports also have suggested that the followup algorithm not reliably followed, diminishing sensitivity and specificity

MCHAT R/F (2014)

M-CHAT-R™

Please answer these questions about your child. Keep in mind how your child usually behaves. If you have seen your child do the behavior a few times, but he or she does not usually do it, then please answer **no**. Please circle **yes** or **no** for every question. Thank you very much.

1. If you point at something across the room, does your child look at it? (FOR EXAMPLE , if you point at a toy or an animal, does your child look at the toy or animal?)	Yes	No
2. Have you ever wondered if your child might be deaf?	Yes	No
3. Does your child play pretend or make-believe? (FOR EXAMPLE , pretend to drink from an empty cup, pretend to talk on a phone, or pretend to feed a doll or stuffed animal?)	Yes	No
4. Does your child like climbing on things? (FOR EXAMPLE , furniture, playground equipment, or stairs)	Yes	No
5. Does your child make unusual finger movements near his or her eyes? (FOR EXAMPLE , does your child wiggle his or her fingers close to his or her eyes?)	Yes	No
6. Does your child point with one finger to ask for something or to get help? (FOR EXAMPLE , pointing to a snack or toy that is out of reach)	Yes	No
7. Does your child point with one finger to show you something interesting? (FOR EXAMPLE , pointing to an airplane in the sky or a big truck in the road)	Yes	No
8. Is your child interested in other children? (FOR EXAMPLE , does your child watch other children, smile at them, or go to them?)	Yes	No
9. Does your child show you things by bringing them to you or holding them up for you to see – not to get help, but just to share? (FOR EXAMPLE , showing you a flower, a stuffed animal, or a toy truck)	Yes	No
10. Does your child respond when you call his or her name? (FOR EXAMPLE , does he or she look up, talk or babble, or stop what he or she is doing when you call his or her name?)	Yes	No
11. When you smile at your child, does he or she smile back at you?	Yes	No
12. Does your child get upset by everyday noises? (FOR EXAMPLE , does your child scream or cry to noise such as a vacuum cleaner or loud music?)	Yes	No
13. Does your child walk?	Yes	No
14. Does your child look you in the eye when you are talking to him or her, playing with him or her, or dressing him or her?	Yes	No
15. Does your child try to copy what you do? (FOR EXAMPLE , wave bye-bye, clap, or make a funny noise when you do)	Yes	No
16. If you turn your head to look at something, does your child look around to see what you are looking at?	Yes	No
17. Does your child try to get you to watch him or her? (FOR EXAMPLE , does your child look at you for praise, or say “look” or “watch me”?)	Yes	No
18. Does your child understand when you tell him or her to do something? (FOR EXAMPLE , if you don’t point, can your child understand “put the book on the chair” or “bring me the blanket”?)	Yes	No
19. If something new happens, does your child look at your face to see how you feel about it? (FOR EXAMPLE , if he or she hears a strange or funny noise, or sees a new toy, will he or she look at your face?)	Yes	No
20. Does your child like movement activities? (FOR EXAMPLE , being swung or bounced on your knee)	Yes	No

© 2009 Diana Robins, Deborah Fein, & Marianne Barton

MCHAT R/F (2014)

M-CHAT-R Follow-Up Scoring Sheet

Please note: Yes/No has been replaced with Pass/Fail

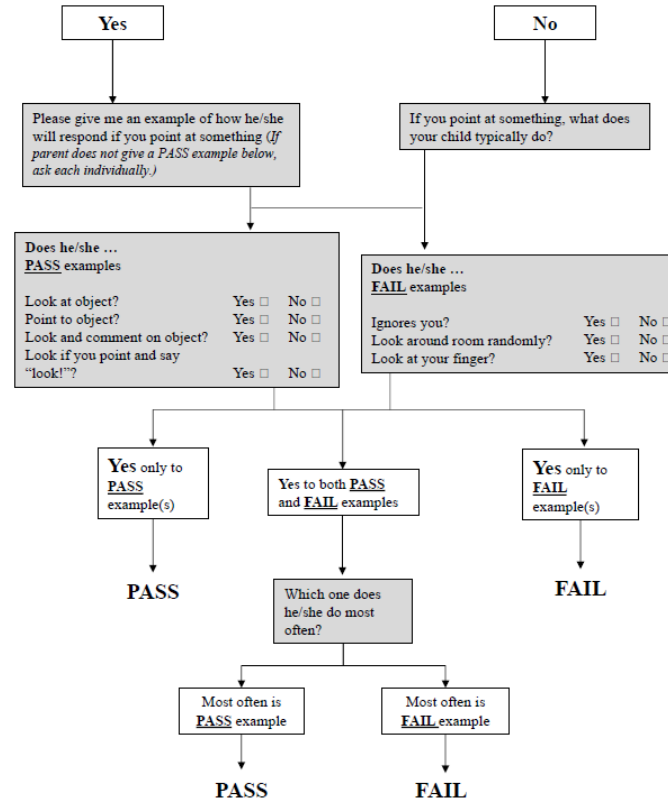
1. If you point at something across the room, does your child look at it? (FOR EXAMPLE, if you point at a toy or an animal, does your child look at the toy or animal?)	Pass	Fail
2. Have you ever wondered if your child might be deaf?	Pass	Fail
3. Does your child play pretend or make-believe? (FOR EXAMPLE, pretend to drink from an empty cup, pretend to talk on a phone, or pretend to feed a doll or stuffed animal)	Pass	Fail
4. Does your child like climbing on things? (FOR EXAMPLE, furniture, playground equipment, or stairs)	Pass	Fail
5. Does your child make <u>unusual</u> finger movements near his or her eyes? (FOR EXAMPLE, does your child wiggle his or her fingers close to his or her eyes?)	Pass	Fail
6. Does your child point with one finger to ask for something or to get help? (FOR EXAMPLE, pointing to a snack or toy that is out of reach)	Pass	Fail
7. Does your child point with one finger to show you something interesting? (FOR EXAMPLE, pointing to an airplane in the sky or a big truck in the road)	Pass	Fail
8. Is your child interested in other children? (FOR EXAMPLE, does your child watch other children, smile at them, or go to them?)	Pass	Fail
9. Does your child show you things by bringing them to you or holding them up for you to see – not to get help, but just to share? (FOR EXAMPLE, showing you a flower, a stuffed animal, or a toy truck)	Pass	Fail
10. Does your child respond when you call his or her name? (FOR EXAMPLE, does he or she look up, talk or babble, or stop what he or she is doing when you call his or her name?)	Pass	Fail
11. When you smile at your child, does he or she smile back at you?	Pass	Fail
12. Does your child get upset by everyday noises? (FOR EXAMPLE, a vacuum cleaner or loud music)	Pass	Fail
13. Does your child walk?	Pass	Fail
14. Does your child look you in the eye when you are talking to him or her, playing with him or her, or dressing him or her?	Pass	Fail
15. Does your child try to copy what you do? (FOR EXAMPLE, wave bye-bye, clap, or make a funny noise when you do)	Pass	Fail
16. If you turn your head to look at something, does your child look around to see what you are looking at?	Pass	Fail
17. Does your child try to get you to watch him or her? (FOR EXAMPLE, does your child look at you for praise, or say “look” or “watch me”)	Pass	Fail
18. Does your child understand when you tell him or her to do something? (FOR EXAMPLE, if you don’t point, can your child understand “put the book on the chair” or “bring me the blanket”)	Pass	Fail
19. If something new happens, does your child look at your face to see how you feel about it? (FOR EXAMPLE, if he or she hears a strange or funny noise, or sees a new toy, will he or she look at your face?)	Pass	Fail
20. Does your child like movement activities? (FOR EXAMPLE, being swung or bounced on your knee)	Pass	Fail

Total Score: _____

© 2009 Diana Robins, Deborah Fein, & Marianne Barton

MCHAT R/F (2014)

1. If you point at something across the room, does _____ look at it?



© 2009 Diana Robins, Deborah Fein, & Marianne Barton

MCHAT R/F (2014)

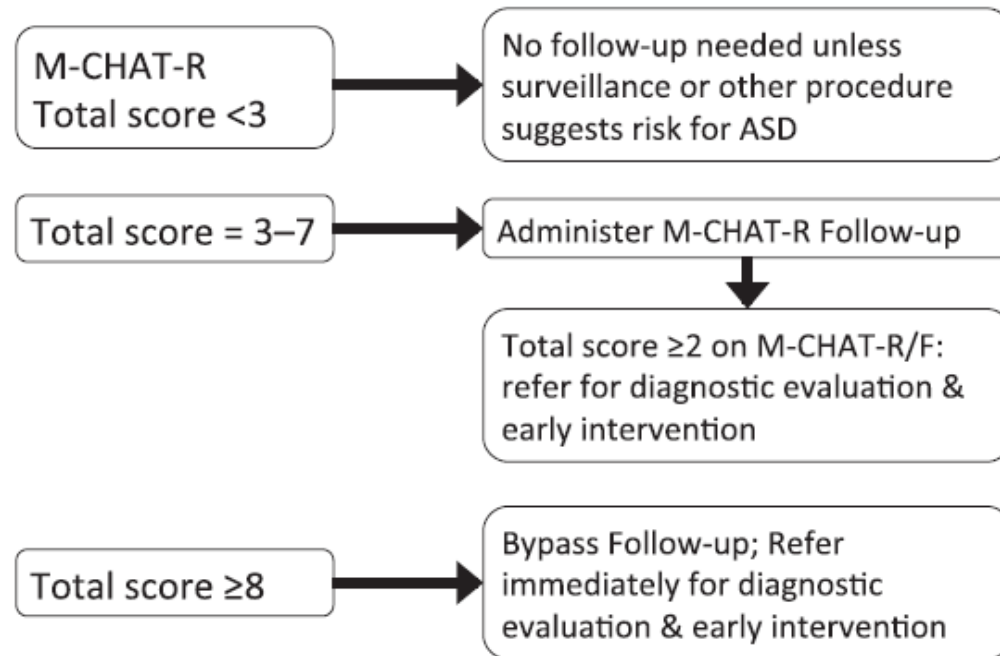


FIGURE 3

Recommended algorithm based on 2-stage M-CHAT-R/F screening.

STAT (2000)

SCREENING TOOL FOR AUTISM IN TODDLERS AND YOUNG CHILDREN

- Designed as a second level screener
- Depends on provider administration and observation
- 12 item test taking 20 min to administer
- Sens/Spec: 0.83/0.86
- Based on DSM4 criteria + CARS

SCREENING CAVEATS

- Difficult to examine exact sensitivity and specificity in a population
- Some children will not have detectable symptoms until late childhood

US PREVENTATIVE SERVICES TASK FORCE

- In February 2016: there is not enough evidence available on the potential benefits and harms of ASD screening in all young children to recommend for or against this screening. This recommendation statement is not a recommendation against screening; it is a call for more research.
www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/autism-spectrum-disorder-in-young-children-screeningExternal.

HELPFUL LINKS/WEBSITES

- <https://www.mchatscreen.com>
- <https://www.cdc.gov/ncbddd/autism/screening.html>



REFERENCES

- Baranek GT. Autism during infancy: a retrospective video analysis of sensory-motor and social behaviors at 9-12 months of age. *J Autism Dev Disord*. 1999 Jun;29(3):213-24.
- Chlebowski C1, Robins DL, Barton ML, Fein D. Large-scale use of the modified checklist for autism in low-risk toddlers. *Pediatrics*. 2013 Apr;131(4):e1121-7. doi: 10.1542/peds.2012-1525. Epub 2013 Mar 25.
- Dumont-Mathieu T, Fein D. Screening for autism in young children: The Modified Checklist for Autism in Toddlers (M-CHAT) and other measures. *Ment Retard Dev Disabil Res Rev*. 2005;11(3):253-62.
- Goldberg et al. Language and other regression: assessment and timing. *J Autism Dev Disord*. 2003 Dec;33(6):607-16.
- Kleinman JM et al. The modified checklist for autism in toddlers: a follow-up study investigating the early detection of autism spectrum disorders. *Autism Dev Disord*. 2008 May;38(5):827-39.
- Lord C. Regression and word loss in autistic spectrum disorders. *J Child Psychol Psychiatry*. 2004 Jul;45(5):936-55.
- Robins DL, Casagrande K, Barton M, Chen CM, Dumont-Mathieu T, Fein D. Validation of the modified checklist for Autism in toddlers, revised with follow-up (M-CHAT-R/F). *Pediatrics*. 2014 Jan;133(1):37-45. doi: 10.1542/peds.2013-1813. Epub 2013 Dec 23.
- Rogers SJ. Developmental regression in autism spectrum disorders. *Ment Retard Dev Disabil Res Rev*. 2004;10(2):139-43.
- Tuchman R, Rapin I. 1997. Regression in pervasive developmental disorders. *Pediatrics*.