Early Detection of Autism Spectrum Disorder

Diana L. Robins, Ph.D.  Jeannette Newman, Ph.D.
Professor Policy & Planning Specialist
Early Detection & Intervention
Research Program Leader
AJ Drexel Autism Institute
Drexel.edu/AutismInstitute
drobins@drexel.edu
Jeannette.newman@phila.gov
Drexel.edu/AutismInstitute
www.mchatscreen.com

Denise Taylor Patterson, MSW
Director
Intellectual disAbility Services
Denise.t.Patterson@phila.gov
Disclosures - Robins

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✧ Collaborators:
  • Deborah Fein (Univ. of Connecticut)
  • Lauren Adamson (Georgia State Univ.)
  • Aubyn Stahmer (Univ. of California, Davis MIND Institute)
Early Detection & Intervention Program

Katherine Sand, Kerry Traub, Adreeja Guha Ray, Diana Robins, Sarah Nanovic, Giacomo Vivanti, & Connor Kerns; Not pictured: Lauren Bradstreet, Taralee Hamner, Georgina Perez Liz
Objectives

1. Identify common warning signs for autism spectrum disorders and methods used to screen for these concerns
2. Emphasize importance of universal toddler screening for ASD
3. Identify Philadelphia resources and processes for screening
4. Importance of early diagnosis and intervention
Autism Spectrum Disorder (ASD)

- Social/Communication Deficits
- Restricted/Repetitive/Stereotyped Interests & Behaviors

Prevalence: 1 in 59 (CDC, 2018)

DSM-5

- Reciprocity
- Nonverbals
- Relationships

Repetitive (speech, motor, objects)
Routines & Rituals
Fixations
Hypo- or Hyper-Sensory
ASD symptoms most common in young children

Please Do Not Record the Videos
Por Favor, No Grabar los Videos
Red Flags in Toddlers: Social-Emotional Reciprocity

✧ Reduced response to name or voice
✧ Failure to orient to parent’s face
✧ Reduced interest in games like peek-a-boo
✧ Failure to brings things to show parent
✧ Reduced interest in peers
✧ Limited or absent pretend play
Red Flags in Toddlers: Nonverbal Communication

- Reduced eye contact
- Lack of pointing (esp. to declare interest)
- Reduced joint attention
- Infrequent or limited use of gesture
Red Flags in Toddlers: Restricted, Repetitive, Stereotyped Behaviors, Interests, & Activities

✧ Often emerge later than symptoms in the social and communication domains

✧ When present in toddlers, generally the lower-order, or less sophisticated behaviors, rather than preoccupations and rituals, which may require more cognitive skills
Delay in Diagnosis

78% parents concerned before 2\textsuperscript{nd} birthday

Average age of diagnosis 4 or older

Parent concerns prior to diagnosis relate to child’s diagnosis and treatment needs

Increased delays for children who are from underserved communities – in the US, this is African-American, Latino, and low income families

Chawarska et al., 2007; CDC, 2016; Guinchat et al., 2012; Mandell et al., 2002, 2005, 2009; Richards et al., 2016; Zuckerman et al., 2013, 2015
Benefits of Early Detection & Intervention

Early Detection

- Reduce family stress

Early Intervention

- Speed up referral to treatment and special educational programs

Improve developmental outcomes/prognosis across the lifespan

Related words:
- independence
- success
- achievement
- career
- confidence
- responsibility
- graduation
- diploma
- social-skills
- mental-health
- citizenship
- adaptive-functioning
Evidence-Based ASD-Specific Early Intervention

✧ Applied Behavior Analysis
✧ Early Start Denver Model
✧ Pivotal Response Training

http://bringingaba.com/2012/06/03/aba-101-an-overview-of-applied-behavior-analysis/
Naturalistic Developmental Behavioral Interventions: Empirically Validated Treatments for Autism Spectrum Disorder

Laura Schreibman · Geraldine Dawson · Aubyn C. Stahmer · Rebecca Landa · Sally J. Rogers · Gail G. McGee · Connie Kasari · Brooke Ingersoll · Ann P. Kaiser · Yvonne Bruinsma · Erin McNerney · Amy Wetherby · Alycia Halladay
Strategies to detect ASD

“Developmental surveillance is a flexible, longitudinal, continuous, and cumulative process whereby knowledgable health care professionals identify children who may have developmental problems.” (AAP, 2006, p. 407)
Developmental screening is the administration of a brief standardized tool that aids the identification of children at risk of a developmental disorder. (AAP, 2006, p. 414)

- Reliable and Valid
- Administered the same way to everyone
- Scored consistently
- Clear algorithm for interpretation and next steps

Screening is not done in isolation
Complements developmental surveillance
Not a diagnosis – next step: referrals!
summary: surveillance vs. screening

✧ surveillance
  • clinical judgment
  • informal assessment

✧ screening
  • standardized
  • scored
  • compared to normative sample
  • validated
    ▪ sensitive
    ▪ specific

both surveillance and screening are critical for accurate identification of risk for developmental delays.
Reliability and Validity

Reliability: “the ability of a measure to produce consistent results”

Validity: “ability to discriminate between a child at a determined level of risk for delay (i.e., high, moderate) and then rest of the population (low risk)”

AAP Surveillance and Screening Policy Statement, 2006, p 416
**Psychometric Properties: Sensitivity & Specificity**

- Ability to detect illness when truly present
  - True positives/all ASD in sample; TP/(TP+FN)

- Ability to detect wellness when truly present
  - True negatives/all nonASD; TN/(TN+FP)

<table>
<thead>
<tr>
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<tbody>
<tr>
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<td>FN</td>
</tr>
<tr>
<td>nonASD</td>
<td>FP</td>
<td>TN</td>
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T=\text{True} \quad F=\text{False} \quad P=\text{Positive} \quad N=\text{Negative}
Psychometric Properties: Positive & Negative Predictive Value

- Likelihood that positive result is a true positive case; Confidence that screen + = ASD risk
- True positives/all screen positives; $\frac{TP}{TP+FP}$
- Likelihood that negative result is true negative;
- True negatives/all screen negatives (missed cases); $\frac{TN}{TN+FN}$

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Likelihood Ratio +: $\frac{Sens}{1-spec}$
Likelihood Ratio -: $\frac{1-sens}{spec}$
Major Challenge of Low Risk Toddler Screening

Trade-off between false positives and false negatives (sensitivity vs. PPV)
The Modified Checklist for Autism in Toddlers: An Initial Study Investigating the Early Detection of Autism and Pervasive Developmental Disorders

Diana L. Robins,1,2 Deborah Fein,1 Marianne L. Barton,1 and James A. Green1

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.

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1. If you point at something across the room, does your child look at it? (<strong>FOR EXAMPLE</strong>, if you point at a toy or an animal, does your child look at the toy or animal?)</td>
<td>Yes</td>
</tr>
<tr>
<td>2. Have you ever wondered if your child might be deaf?</td>
<td>Yes</td>
</tr>
<tr>
<td>3. Does your child play pretend or make-believe? (<strong>FOR EXAMPLE</strong>, pretend to drink from an empty cup, pretend to talk on a phone, or pretend to feed a doll or stuffed animal?)</td>
<td>Yes</td>
</tr>
<tr>
<td>4. Does your child like climbing on things? (<strong>FOR EXAMPLE</strong>, furniture, playground equipment, or stairs)</td>
<td>Yes</td>
</tr>
<tr>
<td>5. Does your child make unusual finger movements near his or her eyes? (<strong>FOR EXAMPLE</strong>, does your child wiggle his or her fingers close to his or her eyes?)</td>
<td>Yes</td>
</tr>
<tr>
<td>6. Does your child point with one finger to ask for something or to get help? (<strong>FOR EXAMPLE</strong>, pointing to a snack or toy that is out of reach)</td>
<td>Yes</td>
</tr>
<tr>
<td>7. Does your child point with one finger to show you something interesting? (<strong>FOR EXAMPLE</strong>, pointing to an airplane in the sky or a big truck in the road)</td>
<td>Yes</td>
</tr>
<tr>
<td>8. Is your child interested in other children? (<strong>FOR EXAMPLE</strong>, does your child watch other children, smile at them, or go to them?)</td>
<td>Yes</td>
</tr>
<tr>
<td>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? (<strong>FOR EXAMPLE</strong>, showing you a flower, a stuffed animal, or a toy truck)</td>
<td>Yes</td>
</tr>
<tr>
<td>10. Does your child respond when you call his or her name? (<strong>FOR EXAMPLE</strong>, does he or she look up, talk or babble, or stop what he or she is doing when you call his or her name?)</td>
<td>Yes</td>
</tr>
<tr>
<td>11. When you smile at your child, does he or she smile back at you?</td>
<td>Yes</td>
</tr>
<tr>
<td>12. Does your child get upset by everyday noises? (<strong>FOR EXAMPLE</strong>, does your child scream or cry to noise such as a vacuum cleaner or loud music?)</td>
<td>Yes</td>
</tr>
<tr>
<td>13. Does your child walk?</td>
<td>Yes</td>
</tr>
</tbody>
</table>
9. Does ________ show you things by bringing them to you or holding them up for you to see? Not just to get help, but to share?

Yes

No

Please give me an example of something he/she might bring to show you or hold up for you to see. (If parent does not give one of the following PASS examples, ask each individually.)

<table>
<thead>
<tr>
<th>Does your child sometimes bring you...</th>
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<tbody>
<tr>
<td>A picture or toy just to show you?</td>
</tr>
<tr>
<td>A drawing he/she has done?</td>
</tr>
<tr>
<td>A flower he/she has picked?</td>
</tr>
<tr>
<td>A bug he/she has found in the grass?</td>
</tr>
<tr>
<td>A few blocks he/she has put together?</td>
</tr>
<tr>
<td>Other (describe):</td>
</tr>
</tbody>
</table>

Yes to any of the above

Is this sometimes just to show you, not to get help?

Yes

No

FAIL

PASS

No to all of the above
Robins et al., 2014

Total Low-Risk Sample

N = 16115

Excluded

n = 44

M-CHAT-R screen Neg

n = 14916

M-CHAT-R screen Pos (Need Follow-up)

n = 1155

Incomplete M-CHAT-R/F

n = 94

Based on alternate scoring criteria

Follow-up screen Neg

n = 598

Follow-up screen Pos (Need evaluation)

n = 348

Incomplete

n = 209

Incomplete

n = 29

Evaluations completed

n = 42

ASD

n = 18

Non-ASD

n = 24

Evaluations completed

n = 221

ASD

n = 105

Non-ASD

n = 116
Psychometric Properties of M-CHAT-R/F

<table>
<thead>
<tr>
<th>M-CHAT-R(/F)</th>
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<tr>
<td>nonASD</td>
<td>FP</td>
<td>TN</td>
</tr>
<tr>
<td>Total3/2</td>
<td>105</td>
<td>18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>M-CHAT-R(/F)</th>
<th>Sens</th>
<th>Spec</th>
<th>PPV</th>
<th>NPV</th>
<th>LR+</th>
<th>LR-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total3/2</td>
<td>.854</td>
<td>.993</td>
<td>.475</td>
<td>.999</td>
<td>114.052</td>
<td>0.147</td>
</tr>
</tbody>
</table>

PPV for any diagnosed disorder = .833; PPV for any delay or concern = .946

Mean age at Dx = 25.6 m (SD = 5.6 m)
TWO YEARS EARLIER THAN NATIONAL AVERAGE!

M-CHAT-R/F detected 105/123 ASD cases (85.4%)
Physician Concern detected 30/123 cases (24.4%)

Robins et al., 2014
Recommended Algorithm

Total < 3
No follow-up needed unless surveillance or other procedure suggests risk for ASD

Total 3-7
Administer M-CHAT Follow-up Interview

Total ≥ 8
Bypass Interview & refer immediately for evaluation and intervention

Total score of 2+ on Interview: refer for diagnostic evaluation & early intervention
Take Home Messages

✧ ASD-specific screening is effective at identifying many toddlers with ASD
  • Median age of diagnosis \( \downarrow \) 2 years
  • Most false positive cases have other developmental issues needing intervention

✧ BUT... there is still work to be done
  • Implementation challenges:
    Document barriers - Reduce barriers
Thank you!

drobins@drexel.edu
drexel.edu/AutismInstitute
www.mchatscreen.com
Philadelphia Infant Toddler Early Intervention
Intellectual disAbility Services
Screening and Intervention for Toddlers
Philadelphia Infant Toddler Early Intervention: Use of M-CHAT

✧ Early adopter: Since 2005
✧ Encourage screening info to be shared as part of the referral
✧ 2018 – increased use of SWYC (Survey of Well Being of Young Children) and M-CHAT
Philadelphia Infant Toddler Early Intervention: Use of M-CHAT

- We do M-CHATs for children 16 months and older
  - When initially referred
  - Or when child is already in ITEI or Regular Developmental Screening reaches 16 months
- Annually: 2000 M-CHATs, 500 children receive ASD related services
Since 2005, we’ve recognized and addressed the need for intensive intervention to address core deficits in young children who may have ASD.

Diagnosis not required in Infant Toddler Early Intervention
Philadelphia Infant Toddler Early Intervention: Developmental Behavioral Assessment

✧ Will pilot a revised DBA process to include level 2 screener and assessments that identify core deficits of ASD

✧ DBA determines recommendation for ASD related services
January 1, 2019: Begin implementation of Project ImPACT, Brooke Ingersoll & Anna Dvortscak (2010)
  • Improving Parents as Communication Teachers

3 (of 13) agencies, 12 Early Interventionists

Ingersoll & Wainer, 2013; Stadnick, et al., 2015
Improving Parents As Communication Teachers is an ABA parent coaching program that teaches parents of young children evidence-based strategies to support their child’s social engagement, communication, imitation, and play. ImPACT is a naturalistic, developmental, and behavioral intervention.

### Naturalistic
- Teaching occurs during play and daily routines

### Developmental
- Supports the parent-child relationship

### Behavioral
- Uses ABA teaching and learning techniques

Philadelphia Infant Toddler Early Intervention is now using ImPACT in home-based services, since parent coaching is best practice for supporting parents and young children in EI. We plan to use ImPACT in center-based services in the future.

**What can parents expect?**
- You and your child meet with a coach for 2-hours twice a week over several months
- Work together with your coach to set goals, learn, practice, and problem solve
- Sessions focus on teaching you how to teach your child
- Practice what you learn daily

**What are the benefits of parent coaching?**
- Helps child transfer skills learned to everyday settings
- Meet recommended 25 intervention hours a week with coaching and practice
- Helps parent feel more confident in supporting their child
- Improves the parent-child relationship and decreases parenting stress

Philadelphia Infant Toddler Early Intervention: Future

- Develop a partnership with Evidence-Based Practice and Innovation Center (EPIC)
- Support families and teams to connect and integrate with behavioral health while in ITEI and to prepare for transition to Preschool Early Intervention, as appropriate
Thank you!

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