



# PEDStest ONLINE

Evidence-based developmental and behavioral screening and monitoring in children from birth to 8 years old

PEDS®  
PEDS:DM®  
M-CHAT-R  
PEDS:DM-AL®  
ONLINE

## GUIDE TO ADMINISTERING SCREENS AND MEASURES ON *PEDSTESTONLINE.COM*

### WELCOME TO PEDSTEST ONLINE

The *PEDStest ONLINE* service ensures accurate detection of children with developmental-behavioral problems by providing access to validated high-quality screens: *Parents' Evaluation of Developmental Status*® (*PEDS*®), the *PEDS:Developmental Milestones*® (*PEDS:DM*®), the *Modified Checklist of Autism in Toddlers-Revised* (*M-CHAT-R*), and the mid-level assessment measure, the *PEDS:DM-Assessment Level*® Version (*PEDS:DM-AL*®). These measures determine children's risk for various kinds of developmental-behavioral/mental-health problems. *PEDStest ONLINE* provides decision support based on extensive research, i.e., when to refer and where, whether parent education is the best course versus reassurance or watchful waiting.

*PEDStest ONLINE* provides test results, billing and diagnosis codes, summary reports for parents, and, when needed referral letters. All information is returned in real-time, immediately upon completion of the screens. Thus, *PEDStest ONLINE* helps providers save time, receive appropriate reimbursement, and provide accurate measurement. *PEDStest ONLINE* is designed to keep data in compliance with HIPAA, or HL-7.

### When to use PEDStest ONLINE:

The American Academy of Pediatrics (AAP) recommends screening as well as surveillance:

1. eliciting and addressing parents' concerns at each well-visit;
2. monitoring milestones as each well-visit;
3. using an autism-specific screen at 18 and 24 months.

*PEDStest ONLINE* addresses AAP policy via evidence-based measures that are not only screens but also tools for longitudinal surveillance, i.e., *PEDS*®, *PEDS:DM*® and the *M-CHAT-R*. The *PEDS:DM-Assessment Level*® Version is also available on *PEDStest ONLINE*.

### Ways to Implement PEDStest ONLINE

There are three approaches to using *PEDStest ONLINE*. These include:

- **Letting parents self-administer** the measures in paper-pencil format (e.g., in a waiting or exam room) and then having office staff type in responses.
- **Sending parents to our "Parent Portal"** to complete measures before the visit (e.g., on a home computer or office kiosk/tablet). Parents will not see the results. If completed at home, providers will receive an email alerting them of a completed screen.
- **Live interview**, i.e., having office staff administer the measures by interview with the parent and child, and typing parents' comments into *PEDStest ONLINE* as they respond to the questions.

This guide will give you an overview to implementing *PEDStest ONLINE*. Please see the downloadable "Authentication and Security Guide" at <https://pedstestonline.com/myadmin/briefguide> for detailed instructions on signing in to the Professional section, the MyAdmin section, and creating a Parent Portal.

### Getting Started:

To access your Professional account go to [pedstestonline.com/login](https://pedstestonline.com/login) and enter the Username and Password you have chosen.

You can sign up for a Parent Portal on this page.

If you have lost your Username or Password you can request it on this page.

Notes:

## Ways to Implement PEDStest ONLINE Services: Three Methods

### METHOD 1. Letting Parents Self-administer Measure(s) in Writing: Transcribing comments onto PEDStest ONLINE after parents complete paper-pencil Forms (e.g, in the waiting/exam rooms, by mail-out, etc.)

- Printable files for PEDS® (in multiple languages) and the M-CHAT-R are provided as part of your license agreement. For the PEDS:DM® we prefer to provide multiple copies of the laminated Family Book; while this is an initially more expensive outlay, in the long run it is cheaper than photocopying. The PEDS:DM-AL® Booklet uses the stimuli from Section 3 of the PEDS:DM® Family Book.
- The laminated PEDS:DM® Family Book also houses the M-CHAT-R, the Brigance Parent-Child Interaction Scale, the Family Psychosocial Screen, the Vanderbilt Diagnostic ADHD Scale, and other measures for children ages 8 to 14+ years of age, i.e., the Pediatric Symptom Checklist and the Safety Word Inventory and Literacy Screener.

! If using the PEDS:DM® in print make sure you have calculated chronological age correctly so that you can select the correct form. A chronological age calculator is at [www.pedstest.com/AgeCalculator](http://www.pedstest.com/AgeCalculator) This identifies the correct PEDS:DM® Form to use for the child's age.

#### Step 1 Before giving parents any printed copies: 1) Identify the parents' primary language and select the appropriate version of the PEDS Response Form; 2) Then ask, "Would you like to complete the form on your own or have someone go through it with you?"

! Usually, parents with reading problems or language barriers will ask for help. If you are unsure of parental literacy, administer the M-CHAT-R and/or PEDS®, PEDS:DM® or PEDS:DM-AL® by interview.

! If parents haven't written any words on the PEDS Response Form, they need to be asked the questions by interview to make sure they actually understood them.

! If parents completed PEDS in languages other than English, you will need to translate comments into English before entering onto the site.

#### Step 2 Next, go to <https://pedstestonline.com/test>

Enter your Username and Password in the login section at the start of your session. (The form will 'remember' these fields for the remainder of your session, but you will need to re-enter them if you restart your computer or browser.) Alternatively, you can go to <https://pedstestonline.com>, choose **Sign In** and select **Professional Login**.

#### Step 3 Next, select test options

You will now see a selection page where you can opt to start with PEDS® and continue (optionally) to the PEDS:DM® and/or M-CHAT-R. Or you can start with the PEDS:DM® and then take the optional M-CHAT-R. If you are licensed to use the PEDS:DM-AL® you will see that as a test option.

The screenshot shows the PEDStest ONLINE PROFESSIONAL interface. At the top, there is a navigation bar with 'Home', 'MyAdmin', 'Reference', and 'Test Company'. The main heading is 'Please select the test you want to administer:'. Below this, there is a section titled 'Please select the test you want to administer:' with a dropdown menu for 'Preferred Language' set to 'English'. A green box on the right indicates 'Test Company: City One, TN License Type: PEDSplus'. The main content area lists 'PEDS + PEDS:DM and/or MCHAT-R' as the selected test. A note at the bottom states: 'Please note: PEDS is offered to bilingual practices in both English and Spanish. With PEDS, each of the ten questions are rendered on the page in both languages to assist when administering to Spanish-speaking parents. However, at this time ALL PARENT RESPONSES MUST BE TYPED IN ENGLISH. Both MCHAT-R and PEDS:DM are offered with questions displayed when 'Spanish' is selected as the preferred language. These tests are optional and all multiple choice selections (no test responses are needed).

**Step 4 Next, enter the child's information**

Enter child's first and last names, date of birth, date of test, and number of weeks premature (if more than three weeks premature). Other fields (e.g., Subject ID, ethnicity, parents' level of education or optional but recommended).

! Because we will be returning a written report, it will be more readable if the child's first and last name are used. Fields without \* are not required but preferred.

**Step 5a If starting with PEDS®, make sure families have a written comment and have answered all multiple-choice questions. Then type in parents' comments and answers to "Not concerned/Concerned/A little concerned" questions**

! If you have additional concerns about a child but the parent did not express these, please add your own concerns and change any "Not concerned" answers to "Concerned/A little concerned," **but do NOT eliminate parents' concerns or "Concerned/A little concerned" answers.**

**Step 5b If starting with PEDS:DM® - You need to determine parents' literacy and thus whether an interview administration is needed in order to complete the PEDS:DM® questions. Always ask, "Would you like to complete the form on your own or have someone go through it with you?"**

**Step 6 Review parents' comments and answers and double-check birthdate, age computation, and test date**

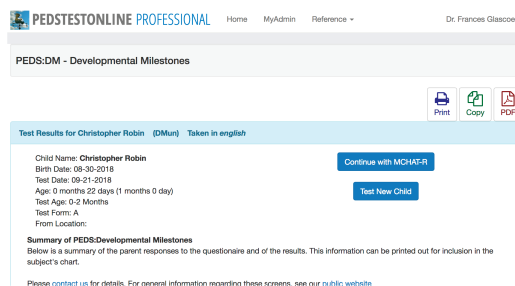
The site will prompt you if parents haven't answered all questions or written any words on the PEDS® Response Form or completed the PEDS:DM®.

**Step 7a Click the Review Responses button at bottom of page to double-check age to see the results**

You will have the option here to go back and make any corrections to the child's information or changes to the responses.

**Step 7b Then select "Age and Responses Are Correct-Submit Now"**

You will immediately receive the test results along with a recommendation of varying strength to deploy other available (but always optional) measures.



**Step 8 You have the option on the results page to print, copy, save to pdf or save to Word; to continue onto another measure with this same child; or to select Test New Child**

If you opt to administer additional measures, after completing each you will see a new set of combined results, recommendations, referral letters and parent summary reports that you can save if not continuing with other tests. If the M-CHAT-R is failed, you can (and should), click on each failed item and re-interview families.

If you opt not to complete other measures, be sure to print the parent summary and any referral letters, or paste results into your records before you test a new child or log out.

## METHOD 2. Using the Parent Portal - Having Parents complete the Screens on their own (from home or from a computer/kiosk in waiting/exam rooms):

**Using the Parent Portal:** You will need to use the MyAdmin section to create a Parent Portal for your parents with a Username and Password (**different from your Professional login credentials**) which you can share with parents in order to allow them to take the measures self-guided prior to the office visit, either at home or from a tablet or kiosk in the waiting/exam room. Parents will not have access to any other parts of the PEDStest ONLINE site. The Parent Portal is offered in Spanish, Chinese (Traditional) and English.

- **From a Waiting room or Exam room computer:** If requesting that a parent complete screens on an office kiosk/tablet, be sure to ask them, "Would you like to complete the form on your own or have someone go through it with you?".

1. Got to <https://pedstestonline.com/portal>. This will open a Login page for the Parent Portal.
2. Login using the unique Parent Portal Username and Password you created for your practice. All measures will be presented on the Parent Portal pages.

- **Parents with Internet Access (including smart phones) at Home, Libraries or Schools:** Most parents, even low-income ones, have internet access, including smart phones. So, you can direct parents before an appointment (e.g., along with an appointment reminder) to <https://pedstestonline.com/portal> and provide them your unique Parent Portal Username and Password. Parents will receive a message stating that the results of their screens will be sent to you and discussed at the next visit.

\* **Note:** all parents using the Parent Portal who have children in the 16 – 48 month age range will be asked to complete the Modified Checklist of Autism in Toddlers (M-CHAT-R).

### Ideas for directing parents to the Parent Portal include:

- If your practice has a website of its own, we can send you a link and icon to add to your site so that parents can come from your site directly to PEDStest ONLINE. If interested, please contact us at: [helen@pedstestonline.com](mailto:helen@pedstestonline.com)

- Putting the link and the Parent Portal Username and Password on the back of appointment reminder cards

- Sending parents an email appointment reminder that directs them to the site and provides Parent Portal Username and Password information

### How to retrieve records from the Parent Portal:

- **You will receive an email alert of a completed screen.** This will include a link back to our website.
- **Next, go to your MyAdmin section.** If you are already logged in to the Professional page, click on the MyAdmin link at the top of your navigation bar and re-enter your professional password.

Alternatively, go directly to the MyAdmin page at [www.pedstestonline.com/myadmin](http://www.pedstestonline.com/myadmin) and enter your professional Username and Password. On the menu at the left, select "Most Recent" or "Show All By Page". You will then see a record of either recent or all screens, including those completed by parents via the parent portal.

## METHOD 3. Live Interview - When Parents and Children are Present (Interview/Directly to Children)

### Administration by Live Interview - Children 0 to 3 years of age

- To administer the tests by interview go to <https://pedstestonline.com/test>
- Enter your Username and Password
- Select your tests
- Continue through the steps (as in Method 1)
- Interview parents with PEDS® and/or PEDS:DM® (and optional M-CHAT-R) or the PEDS:DM-AL®. Type in or select parents' answers as they speak. (Be sure to translate all comments on PEDS® into English before entering onto the site)
- If parents are "stumped" by a PEDS® question, **do not offer examples of milestones**. Instead, say, "I'd like to know what you think.". If necessary offer broad descriptions of domains (e.g., for the question about self-help skills, ask, "How do you think he/she is doing with such things as dressing, feeding and bathing and so forth?").

### METHOD 3. cont'd.

- If parents say things like, “I don’t know what a six-month-old should be doing.”, mark this as a concern. This is a risk factor associated with problematic developmental outcomes. Such parents need developmental promotion suggestions and their children need careful screening

### **Additional Instructions for administering PEDS:DM® and/or PEDS:DM-AL® by Live Interview, by Observation, and/or Hands-On for Older Children (3 to 8 years of age)**

#### **If you opt to use the PEDS:DM® or PEDS:DM-AL® live, here’s what you need to know:**

- Once logged on the site, and you have entered basic information about each child (e.g., name, birthdate, and age) you will see the PEDS:DM® or PEDS:DM-AL® questions.
- The PEDS:DM® can be administered by interview or by observation up to about 3 years of age. For older children some PEDS:DM® items require actual demonstration of skills (e.g., color and letter naming). To administer such tasks you can:
  - **To have parents elicit skills:** Read aloud each question as written. Ask parents to have their child perform the skills for those items requiring a demonstration.
  - **For providers to elicit skills:** Be sure to read the directions to children exactly as they are written so that you are administering tasks in a standardized way and so can confidently compare each child’s performance to the PEDS:DM® norms/cutoffs.



*Essential images for helping children demonstrate skills (e.g., numbers and letters to name) are shown on the screen. Blank paper and a marker will be needed for writing tasks (e.g., scribbling, copying a triangle, spelling, etc.). It is helpful, but optional, to have 1” blocks available because some parents, often those at risk, may not have blocks at home.*

## What PEDSTEST ONLINE Results Mean

### **Results and Recommendations for PEDS® and the (optional) Modified Checklist of Autism in Toddlers Path A: High Risk**

**Path A: High Risk.** Children who land on Path A are those whose parents hold multiple developmental and frequent behavioral concerns. These children have a high risk of problems—11 times that of children whose parents do not have concerns—50% have disabilities or substantial delays. The *M-CHAT-R* is recommended for all children on this path if they are within the age range of the measure. If the *M-CHAT-R* is administered and passed, children on Path A still need prompt referrals for assessment and services. The summary report/referral letter identifies the kind(s) of professional whose diagnostic services would be most helpful.

On the site output you’ll see that Path A subdivides, based on constellations of concerns into **Path A-1** (indicating the need for a speech-language evaluation, and **Path A-2** (indicating the need for testing by a developmental or school psychologist). If the *M-CHAT-R* is administered and failed, the recommendations will include the services of an autism specialist.

In all Path A cases, vision, hearing, and lead screening is recommended. Use your clinical judgment, information from the physical exam, knowledge of families’ needs, and parents’ concerns to decide if additional referrals are needed (e.g., physical or occupational therapy, medical subspecialty, mental health).

Refer children under 3 to the local early intervention, program, those 5 and older to the public schools, depending on age restrictions. (Follow links on the website to NECTAC or to the public schools, and from there to local programs). These services are free to families and of reasonable quality, although they may not provide a definitive diagnosis until children are older. Next, if indicated, refer to subspecialty clinics or other diagnostic clinics where available and/or to private therapies if needed and affordable. Children usually have to wait for private and subspecialty services, so first help enroll them in early intervention or public school special education.

**Note:** *It is neither essential nor desirable for health care providers to make a developmental diagnosis in young children. Criteria for early intervention or public school services generally depend only on indicators such as percentage of delay based on the testing the public services will provide. A medical diagnosis is only needed in cases of physical impairment such as cerebral palsy, significant health issues, or traumatic brain injury.*

## Path A: High Risk cont'd.

In some cases, children on Path A will not be found to have disabilities. In these cases they are still likely to have below-average performance. Early intervention programs are usually willing to monitor these children and advise parents about things they can do to help. In addition, private speech therapy, early stimulation programs (e.g., Head Start or day care) and other services should be marshaled.

## Path B: Moderate Risk

**Path B: Moderate Risk.** Path B splits into **B-Other/Health(B-1)** and **B-Developmental (B-2)**. Children on **Path B-Developmental (B-2)** have parents with at least one predictive developmental concern and often numerous behavioral concerns. These children have 7 times the risk of children whose parents do not have concerns—30% have disabilities and many of the remaining children have delays that place them at continuing risk. Additional screening is needed to determine which children need referrals and which do not. Taking the *PEDS:DM*<sup>®</sup> and an *M-CHAT-R* is recommended for all children on Path B.

A passed *PEDS:DM*<sup>®</sup> suggests that a child is probably developing typically for his or her age and that referrals are not needed, unless there are psychosocial or health risks that suggest otherwise. Nevertheless, these families need two things: a) developmental promotion, i.e., suggestions for how to help their child at home; and b) vigilantly monitoring of developmental progress (e.g., seeing the family again in 6 months).

Missed milestones on the *PEDS:DM*<sup>®</sup> indicate a prompt need for referral. *PEDS:DM*<sup>®</sup> milestones have cutoffs at the 16th percentile or lower, meaning that 84% or more of same age peers are successful on these tasks. Children with delayed milestones are very likely to have trouble in school without intervention. Although some will not qualify for Early Intervention, services such as Early Head Start, Head Start, or a quality day care or preschool program are invaluable. Parent education and developmental promotion are also needed. Add your own observation of psychosocial or health risks and refer if indicated to parent training, subspecialists, social services, etc.

A failed *M-CHAT-R* will result in a recommendation for further assessment by an autism specialist. These may be available through early intervention programs or public schools. If referring to private services, the wait will probably be long. So, it is best to refer to public programs to get intervention started as well as to autism-specific services.

A passed *M-CHAT-R* indicates limited risk for autism spectrum disorders but does not rule out any of the more common disabilities: speech-language impairment, mental retardation, or learning disabilities. So, either in-depth broad-band screening is needed or you can simply refer for screening through early intervention or the public

If you have also given the *PEDS:DM*<sup>®</sup> and the child has mastered all milestones, we still recommend a referral given the evidence behind *PEDS*<sup>®</sup>.

Expect about 1 out of every 10 patients (up to twice that in Medicaid and high risk clinics) to receive Path A results; more in the case of children with a history of prematurity or chronic illness, or in clinics serving a large population of indigent families.

schools. Those who fail additional screening should be referred for further testing. Those who pass screening need developmental promotion, patient education and vigilant follow-up, since they may have emerging disabilities or below-average intelligence, language, or school skills. Where facilities, time, or tools are limited, children can be referred for screening through the public schools or early intervention programs (see [www.nectac.edu](http://www.nectac.edu) for local programs).

Children on **Path B-Other/Health (B-1)** have parents with non-developmental concerns. These usually focus on health issues (e.g., eating, sleeping, hearing, vision, etc.) and occasionally on psychosocial issues (e.g., divorce, death in the family, etc.). When health concerns are raised, the optimal response may include the following (e.g., screening vision and hearing, reviewing with the parent height/weight charts, a repeat discussion of prior or current medical problems, providing written information about existing conditions, etc.). If you are not in a healthcare setting you will need to refer children to a healthcare provider.

Because there is a moderate association between health problems and developmental problems, it is also wise to monitor development more vigilantly with all children on Path B, perhaps seeing them again in 6 months for repeat screening.

Again, a passed *M-CHAT-R* indicates limited risk for autism spectrum disorders but does not rule out any of the more common disabilities: speech-language impairment, mental retardation, or learning disabilities. So, either in-depth broad-band screening is needed or you can simply refer for screening through early intervention or the public schools. Those who fail additional screening should be referred for further testing. Those who pass screening need developmental promotion, patient education and vigilant follow-up, since they may have emerging disabilities or below-average intelligence, language, or school skills. Where facilities, time, or tools are limited, children can be referred for screening through the public schools or early intervention programs (see [www.nectac.edu](http://www.nectac.edu) for local programs).

Expect to follow Path B with about 1 out of every 5 patients. If working in very high risk clinics (e.g., NICU or crisis warm lines), Path B rates may be closer to 1 out of every 3 patients.

## Path C: Elevated Risk

**Path C: Elevated risk for behavioral/mental health problems.** Path C splits into two paths. **Path C-1** (for children 4 1/2 years of age and older) and **Path C-2** (for children younger than 4 1/2 years of age). Children on Path C have only a low risk of developmental disabilities (1.3 times that of children whose parents have no concerns). Only about 5% of these children have developmental disabilities, although about 25% have emotional and behavioral difficulties, and the frequency is higher still when children are 4 1/2 years of age and older.

**Path C-2** - The best response with parents of young children is to counsel them about their concerns, provide information handouts, and to monitor their progress closely. If such counseling is unsuccessful (it is advisable to check on progress after several weeks) more intensive interventions are needed. These may include a parent-training program or the services of a mental health professional (e.g., a psychologist or guidance counselor in the public schools or early intervention program, a family therapist, private child psychiatrist or psychologist,

a clinical social worker, or professionals at local mental health centers, etc.).

The *M-CHAT-R* is suggested for younger children on Path C, but is not essential except if the *M-CHAT-R* has never been administered. (The American Academy of Pediatrics recommends the administration of an autism specific screen at 18 months and 24 months).

**Path C-1** - Children 4 1/2 and older need additional behavioral/emotional screening. The *PPSC-17* is available in Spanish and English, is used with children 4 - 18 and screens for attentional problems, conduct problems, and depression/anxiety. If attention deficits are found, follow up with the *Vanderbilt ADHD* scale to confirm problems and decide on treatment. If the conduct and/or depression/anxiety scales of the *PPSC-17* are failed, refer for mental health interventions and also consider medications if appropriate. Both types of interventions when offered together, ensure better outcomes.

Expect to follow Path C with about 1 out of 5 children.

## Path E: Low Risk

**Path E (Low Risk for Developmental or Behavioral Problems).** These children have parents with no concerns. Most offer descriptions of healthy development are at low risk and only 5% have delays or disabilities. If all milestones are met on the *PEDS:DM*<sup>®</sup> and when the *M-CHAT-R* is passed, you can be confident that this child is progressing well. But...



*If using the *PEDS*<sup>®</sup> Response Form in writing and parents only circle "yes", "a little" or "no", literacy may be a problem and *PEDS* should be re-administered by interview.*



*Use your clinical judgment with children on Path E. If you suspect a problem, you can add your concerns to the parents' responses. Or, you can simply refer for additional screening or testing.*

visit, or sick/return visit when families do not keep well-visit appointments. It is nonetheless wise to ask whether parents wish for information on child development and to provide information handouts if requested.

The *M-CHAT-R* is optional for younger children on Path E, but is not essential except if the *M-CHAT-R* has never been administered. (The American Academy of Pediatrics recommends the administration of an autism specific screen at 18 months and 24 months). The *PEDS:DM*<sup>®</sup> is always advisable in order to comply with recommendations for milestones monitoring at all well visits.

Expect to follow Path E with about 5 out of 10 children.



*Note to those familiar with *PEDS*<sup>®</sup> in print: *PEDStest ONLINE* does not produce a Path D because we anticipate that you or your staff will interview parents who have not written comments on the Response Form, and/or that you will add your own concerns to those parents have offered.*

If literacy is not a problem, and clinicians lack concerns, families with children on Path E require only reassurance and routine monitoring by re-administering *PEDS* at the next expected check point (e.g., annual re-screening, well

## Results and Recommendations for *PEDS:Developmental Milestones*<sup>®</sup> (*PEDS:DM*<sup>®</sup>) and the (optional) Modified Checklist of Autism in Toddlers (*M-CHAT-R*)

***PEDS:DM*<sup>®</sup>.** If a child has met all milestones on the *PEDS:DM*<sup>®</sup> it suggests that he or she is developing typically for his or her age, and that referrals are not needed, unless clinical observation, psychosocial or health risks suggest otherwise. Nevertheless, families whose children meet all milestones, still need two things: a) developmental promotion, i.e., suggestions for how to help their child at home; and b) monitoring of developmental progress (e.g., seeing the family again in a year or less, at the next well-visit, etc.).

Missed milestones on the *PEDS:DM*<sup>®</sup> indicate a prompt need for referral. *PEDS:DM*<sup>®</sup> milestones have cutoffs at the 16th percentile or lower, meaning that 84% or more of same age peers are successful on these tasks. The 16th percentile is fine for head circumference, height and weight but it is not for development: Children with delayed milestones are very likely to have trouble in school without intervention. Although some will not qualify for Early Intervention, services such as Early Head Start, Head Start, or a quality day care or

preschool program are invaluable. Parent education and developmental promotion are also needed. Add your own observation of psychosocial or health risks and refer if indicated to parent training, subspecialists, social services, etc.

***M-CHAT-R*.** A failed *M-CHAT-R* will result in a recommendation for further assessment by an autism specialist. These may be available through early intervention programs or public schools. If referring to private services, the wait will probably be long. So, it is best to refer to public programs to get intervention started as well as to autism-specific services.

A passed *M-CHAT-R* indicates limited risk for autism spectrum disorders **but does not rule out any of the more common disabilities:** speech-language impairment, mental retardation, or learning disabilities. So, if the *M-CHAT-R* is passed but there are missed milestones on the *PEDS:DM*<sup>®</sup> or predictive concerns on *PEDS*<sup>®</sup>, it is best to refer for additional assessment (e.g., to the public schools or to Early Intervention, depending on age). See [www.nectac.edu](http://www.nectac.edu) to find local programs.

## The *PEDS:DM-Assessment Level*<sup>®</sup> Version (*PEDS:DM-AL*<sup>®</sup>)

*PEDS:DM - Assessment Level*<sup>®</sup> (*PEDS:DM-AL*<sup>®</sup>) *ONLINE* determines children's strengths and weaknesses across developmental-behavioral and social-emotional/mental health domains, monitors progress over time, offers effective, nuanced intake data, and helps establish eligibility for early intervention and other services such as NICU and other subspecialty follow-up. In addition, *PEDS:DM-AL*<sup>®</sup> *ONLINE* offers measures with metrics useful for research outcomes. All information is returned in real-time. *PEDStest ONLINE* saves time and helps providers receive appropriate reimbursement (via the 96111 procedure code).

### What *PEDS:DM-AL*<sup>®</sup> *ONLINE* Provides:

The *PEDS:DM-AL*<sup>®</sup> *ONLINE*:

- Presents age-appropriate items
- Determines basals/ceilings
- Scores and generates a test report that includes age-equivalent scores, raw scores, percentage of delay, and (more positively) percentage of skills mastered, results, and recommendations for services
- Renders the report as a .pdf or Word .doc so providers can add observations and personalize recommendations
- Provides billing and CPT-10 codes
- Also offers *Parents' Evaluation of Developmental Status*<sup>®</sup> (*PEDS*<sup>®</sup>) a measure eliciting parents' verbatim concerns. *PEDS*<sup>®</sup> helps parents describe their own worries along with observations of disordered typical development; and *The Modified Checklist of Autism in Toddlers-Revised (M-CHAT-R)*. Shows items failed so examiners can re-interview if needed

### Settings Appropriate for *PEDS:DM-Assessment Level*<sup>®</sup>:

- NICU Follow-up programs (both mail-out initiatives and services providing direct contact with families)
- Triage in Developmental-Behavioral Clinics
- Child Find (for determining initial eligibility and monitoring)
- Services for Children with Special Health Care Needs (CSHCN)
- Head Start (for pre- and post-testing and program evaluation)
- Preschool and special education programs (for program planning and charting progress, and identifying children with delayed or advanced development)
- Research initiatives requiring a brief but comprehensive measure of developmental status and skills



- Foster care intake and monitoring
- Home-visiting programs (such as Project Launch)

## Implementation suggestions:

There are several approaches to using the *PEDS:DM-AL*<sup>®</sup> *ONLINE*, including

- Having clinicians or paraprofessionals administer the measures (e.g., over the phone, via observation/ live-interview, and/or hands-on) using protocol print-outs (digital files are provided) or entering responses online
- Letting parents self-administer the measures in paper-pencil format (e.g., in a waiting or exam room), or on an office computer or tablet and then having office staff type responses into the PEDStest *ONLINE* website.
- Sending parents to our “Parent Portal” so they can complete measures before the visit (e.g., on a home or office computer). Parents will not see the results. Instead, providers will receive an email alerting them of a completed screen. Please email [helen@pedstestonline](mailto:helen@pedstestonline) for a unique link to share with parents and, if helpful, how to put an icon with a link on a practice website.

## *PEDS:DM-AL*<sup>®</sup> Results:

- *Raw scores* (the total number of successfully completed items)
- *Age-Equivalents* (the cumulative age in months credited per item)
- *Age-Equivalent Range* (bands the age-equivalent score with the standard error of measurement). The lower score reflects the independent learning level and is useful for selecting developmentally appropriate toys. The higher score reflects age-related tasks likely to be too difficult, i.e., a “frustration level”. In between is the age-range appropriate for instruction.
- *Percentage of Delay* (is the age-equivalent score divided by chronological age and then multiplied by 100) and used for IDEA eligibility determination
- *Percentage of Skills Mastered* is the reciprocal of percentage of delay and useful for explaining to parents, in a positive way, children’s accomplishments

## Working With Translations

Translations are often needed for effective encounters with parents. If you are using one of our translations of the *PEDS:DM-Assessment Level*<sup>®</sup> with the *ONLINE* service, some guidelines for using translations include:

- If you are using an interpreter to interview the parents and child, you must use an official translation of the test, and the translator must use the exact wording of the translation. Word choices may have very different meanings in other languages. For example, in translating *PEDS*<sup>®</sup> into Chinese, the word “concerns” also means “care” (as in “do you care about your child?”). Of course Chinese and all other parents care about their children and so we found inordinately high rates of Chinese parents expressing concerns. Researchers had to substitute a far stronger word, “worries,” in order to obtain appropriate response rates. Meanwhile, in English, the word “worries” does not work well. All this means that words have different connotations across languages and our translations have been culturally and linguistically vetted.
- If translation support is needed for clinical care, make sure translators (whether working in person within clinics or via a telephone translation service), have fully vetted translations of tools. Although professional translators are bilingual, questions about child development and behavior can be delicate (as described above) and need to be very carefully written, vetted, and tested to make sure they work. Ad hoc translations are often problematic, ineffective and may be marred, even within the same language, by dialectical differences between translators and families.

## Bilingual and Non-English-Speaking Children

1. Children who are non-English-speaking should be tested in their primary language, the language spoken most in the home. Even children who speak some English perform best when tested in their native tongue, although testing in both languages is often wise, especially if they are enrolled in an English-speaking daycare, preschool or school program. If the examiner is not fluent in the child’s language, an interpreter will be needed during assessment (be sure to use established translations for measures if these are available). Interpreters must be available to elicit parental information and explain results. If an interpreter is not available parents should be asked to bring a friend to help interpret to both the parent and child. LanguageLine Solutions is a helpful site for connecting with an interpreter. Their website is: <https://www.language.com>.

2. Lay interpreters will need the same guidance given to parents who accompany children into testing (See Chapter 9 of the *PEDS:DM*® technical manual. Contact [research@pedstest.org](mailto:research@pedstest.org) if you need a pdf of this chapter.). Professional (and lay) interpreters should be asked to comment on the children's articulation and syntax skills in their native language. These areas of language development are difficult to assess by examiners who do not speak the child's native tongue. Casual comments by interpreters such as, "When he speaks Japanese, his words are not in the usual order," offer invaluable clues to the possible presence of a language disorder.
3. Overall, it is critical to recognize that many professionals miss developmental-behavioral problems in bilingual/dual-language children and are far too willing to dismiss poor performance on measures. To avoid this error, be alert to behavioral problems that may manifest during language-related tasks because these are important clues to the presence of difficulties. Also listen carefully to parents' observations about how a child performs compared to his or her peers, take careful note of psychosocial risk factors because these predict ongoing difficulties whether a child is a dual-language learner or not. Ultimately err on the side of caution—refer rather than defer.
4. When interpreting screening results, recognize that bilingualism often contributes positively to cognitive development and typically produces only temporary and mild expressive language delays. Below-cutoff performance in areas other than expressive language is rarely due to bilingualism alone. Bilingualism rarely contributes to native language difficulties in the areas of receptive language or articulation, and is not a contributor to disordered patterns of expressive syntax, i.e., putting words in the wrong order in the native language. Such difficulties suggest the presence of a language disorder or other developmental disability.

### Explaining and Reporting Test Results

1. Make sure your report concludes with recommendations for any needed non-medical services and for follow-up in your clinic (if needed) and consider customizing recommendations with information about local services.
2. For explaining results to parents, remain positive and encouraging about the value of recommended services.
3. Make sure you give parents telephone numbers and descriptions of recommended services, brochures if possible, and preferably also make appointments for parents.
4. Establish two-way communication with referral services so both you and they can remain updated on progress.
5. For children with chronic illness who may need temporary home-bound instruction, make sure to create a time-frame for reviewing discharge instructions and updating recommendations for returning to school.
6. All parents, even when their children are referred to special services, benefit from developmental promotion. When children have a vast range of needs, provide parents a list of websites and parent support programs. When issues are fewer in number, provide one or two written information handouts. See [www.pedstest.com/TheBook](http://www.pedstest.com/TheBook) for links to web-based parenting information.

### Interested in Research Studies?

Research is still needed on the effectiveness of a comprehensive model of developmental surveillance in early identification. Ideally such studies should embrace all components of surveillance simultaneously (e.g., with *PEDS*®, the *PEDS:DM*®, the *M-CHAT-R*, etc.). Future research should also view the value of developmental surveillance as a platform for preliminary intervention into children's development and into the many factors that influence it including family functioning and well-being, parenting skills, and psychosocial risk. Are developmental outcomes improved when comprehensive surveillance is offered? Do parents come to view providers as invaluable collaborators in child-rearing? What are the strengths and limits of intervention in primary care settings? Additional studies on the *PEDS:DM*® should view its relationship to performance on other criterion tools, professional-parent concordance for items not standardized by parental report, and its discriminant validity in detecting each of the broad categories of developmental disabilities. Finally, research is needed on optimal ways for primary care and non-medical providers to implement surveillance in their practices.

We welcome studies on the *PEDS:DM*® and on developmental surveillance in general. We are also happy to work with those who wish to translate the measure and standardize it for other nations (we typically donate its use in developing countries after completion of a donation license agreement). Otherwise, a percentage of *PEDS:DM*® sales are given by PEDStest.com,LLC, Curriculum Associates, and Albert Brigrance to international non-profit organizations focused on promoting child development and positive parenting. Interested researchers, clinicians, and foundations are welcome to contact Dr. Frances Glascoe ([francespageglascoe@gmail.com](mailto:francespageglascoe@gmail.com)) for assistance with projects. We are honored to post abstracts of completed and in-progress studies on our website so that *PEDS:DM*® users can readily share information and findings. Finally, we welcome feedback on the tool because this is critical for improving its

value to practitioners engaged in early detection and intervention.

## References and Resources

### ***PEDS:Developmental Milestones® Professionals' Manual***

Contains guidance on how to administer the *PEDS:DM-AL*® hands-on and guidance for trainees learning to manage children and parents during testing, psychometric studies on the *PEDS:DM*®, etc. To order a physical or digital copy go to [www.pedstest.com/ordering](http://www.pedstest.com/ordering).

### ***PEDS® Tools website: [www.pedstest.com](http://www.pedstest.com)***

Includes freely downloadable videos, case examples, and slide shows, independent learning modules for trainees covering basics of child development, guidance on billing and coding, resources for professionals including links to typical referral resources, translation updates, ongoing and completed research projects, etc.

***Identifying and Addressing Developmental and Behavioral Problems: A Practical Guide for Medical and Non-medical Professionals, Trainees, Researchers and Advocates.*** Glascoe FP, Marks KP, Poon JK, Macias MM (eds). Nolensville, Tennessee: PEDStest.com, LLC, 2013. [www.pedstest.com/ordering](http://www.pedstest.com/ordering).

This textbook covers prevalence, referral resources, basics of child development for trainees, how to deliver difficult news to parents, well-child visit templates useful for complying with AAP policy, psychosocial risk and public domain tools for measuring risk, how to work with bilingual and dual-language learners, psychometric standards, assessment for subspecialty services such as NICU follow-up, research methods in child development, training professionals in practice including collaboration across service sectors, advocacy strategies and includes pre- and post-tests for evaluating learning and training effectiveness.

## HOW TO USE YOUR ADMINISTRATION PANEL

You will find your Administration Panel login at <https://pedstestonline.com/myadmin>

Login to this area by entering your Professional Username and Password.

Once logged in, use any of the menu items to:

- **Review and print screens on file**
- **Search by subject's name, birth date, test date or unique child identifier**
- **Search and group screens by *PEDS*® path**
- **Search and group screens by year and month**
- **Make corrections to completed screens**
- **Edit and rescore screens**
- **Add optional measures to existing screens\***
- **Review the license agreement**
- **Review *Online Brief Guide***
- **Export all data into a file for Excel or other spreadsheets**
- **Optional measures such as the M-CHAT-R can be added to existing screens up to 30 days after initial screening**

Go to <https://pedstestonline.com/myadmin/briefguide> for an in-depth downloadable guide to your MyAdmin features, and click on “MyAdmin Features Guide”.

## TIPS AND TROUBLESHOOTING

Please find your issues below and the answers that follow:

### The *PEDStest ONLINE* site is down:

1. First make sure you are still online and that your internet access is still working.
2. Try again in a few minutes. Sometimes sites “go down” for maintenance. We will do our best to make sure maintenance occurs on weekends when you are less likely to be screening children. But, if continuing or lengthy problems occur please let us know by email to: [helen@pedstestonline.com](mailto:helen@pedstestonline.com).

### My Username/password/license ID don't work:

1. Please make sure you have entered each one correctly. They are case sensitive so check capitalization. Extra spaces before or after will cause problems too.
2. Go to <https://pedstestonline.com/myadmin> and click “Get Login”- this will automatically send your login information to the email associated with your account. If this does not work please contact [helen@pedstestonline.com](mailto:helen@pedstestonline.com).
3. Has your license expired? We will send a prompt about 1 month before your expiration to see if you want to renew. If you need to reach us, please contact [helen@pedstestonline.com](mailto:helen@pedstestonline.com).

### I've lost a record/my computer crashed/or parent made a mistake on the birthdate or name—what do I do?

1. **Lost Records/Computer Crashes:** Go to <https://pedstestonline.com/myadmin> and enter your Username and Licensee ID. You'll then see all your records. If the record in question is not there, it is because screens weren't completed or because your computer crashed before a screen was submitted. In such cases, you will need to readminister our screens.
2. **Wrong birthdate/name:** Go to <https://pedstestonline.com/myadmin> and open the record in question. Change the birthdate or name as needed and resubmit the results.

### How do I copy *PEDStest ONLINE* results and then paste into my electronic record?

Go to the browser window where your PEDStest Online results are displayed and click the Copy button at the upper-right of the report. This will create a text-only version of the results displayed at the bottom of the browser window. This text is automatically selected, so simply use CTRL+C (hold down the CTRL and C keys at the same time) to copy it. Switch to your EHR application, position the cursor in the field where you want the results to be placed and use CTRL+V (hold down the CTRL and V keys at the same time) to paste the text into your EHR.

### I'd like to view all our results what do I do?

Go to <https://pedstestonline.com/myadmin>

After entering your Username and Licensee ID, you will see all your screens.

### I'd like to put all my screen results into my own database. Can I export them?

Yes. Please go to <https://pedstestonline.com/myadmin> and select “Full Extract” from the left menu. This allows you to download all your results for use with SPSS, Excel or other database programs.

### **I'm working on a quality improvement initiative and would like to look at changes in early detection before and after implementation of *PEDStest ONLINE*. What do you suggest?**

Go to <https://pedstestonline.com/myadmin> After entering your Username and Licensee ID, you will see all your screens. These are arranged by month along with the frequencies of various *PEDS*® Paths. By comparing prior data to results from *PEDStest ONLINE*, you will see whether there have been improvements over time.

### **Can you help me create true integration with my electronic record (e.g., so that results return to the child's chart)?**

Yes, but this requires the commitment of your EHR vendor or IT staff. As part of your license agreement *PEDStest ONLINE* will support 5 hours of our IT time, but after that your EHR or IT staff will need to cover all costs. Please ask one or both to contact us at: [helen@pedstestonline.com](mailto:helen@pedstestonline.com).

### **Why do children whose parents simply want to know about child development land on the high or moderate risk path?**

When parents express concerns about their child-rearing knowledge or skills (e.g., they don't know what to expect from their child), the site will produce a risk path. In such cases, there is a clear need to provide parenting information such as educational handouts. BUT, it is important to remember that parents unsure about what their child should be doing, may also be families at risk. So... for optimal advice to parents, monitoring of progress, and swift detection of emerging delays, it is critical to offer vigilant watchful waiting, prompt referrals to Head Start or quality day care for children who may be delayed but not disabled, and careful follow-up (e.g., a return visit in 6 months or less).

**Other questions?** Please see our FAQs at [www.pedstest.com/FrequentlyAskedQuestions](http://www.pedstest.com/FrequentlyAskedQuestions). If you have suggestions for site improvement or concerns about a specific result, please let us know by email: [helen@pedstestonline.com](mailto:helen@pedstestonline.com).

## PREMISES UNDERLYING *PEDS*<sup>®</sup>

To fully understand the value of *PEDS*<sup>®</sup>, it is important to recognize its underpinnings and rationale:

1. *PEDS*<sup>®</sup> is both a screening and surveillance tool measuring children's development, behavior and social-emotional/mental health status from birth to 8 years of age (0 through 7 years, 11 months). Surveillance is a longitudinal process of monitoring concerns, milestones, risk factors, etc. while screening means a brief test that provides immediate cutoff scores to indicate when referrals are needed. *PEDS*<sup>®</sup>, especially in conjunction with *PEDS: Developmental Milestones*<sup>®</sup> accomplishes both screening and surveillance with the same tool and complies with recommendations from the American Academy of Pediatrics.
2. *PEDS*<sup>®</sup> prompts parents to think about their child's development including social-emotional/behavioral/mental health, along with health status in 10 domains: cognitive, expressive language, receptive language, fine motor, gross motor, self-help, behavior, social-emotional, academic, and health/other. Parents respond, in their own words. *PEDS*<sup>®</sup> thus promotes true collaboration between parents and professionals.
3. *PEDS*<sup>®</sup> directs professionals to an appropriate decision based on risk levels (for developmental and/or mental health problems) associated with various types of concerns and children's ages.
4. Screening and surveillance lead to much more than a simple binary result—pass or fail. Instead, professionals make a wide range of decisions about how to best help families, i.e., when to refer, screen further, advise and educate, monitor vigilantly, versus reassure. These decisions must depend on evidence-based support so that we don't "wait and see" when, in fact, referrals are needed. So voluminous research studies are basis for the *PEDS*<sup>®</sup> decision-support algorithm.
5. Another premise behind *PEDS*<sup>®</sup> is that developmental problems should be ruled out before proceeding to mental health evaluations. The reason is that we don't want to plunge in with behavior modification or counseling before we know, for example, how well a child hears and understands what we say. For this reason, when behavioral/social-emotional risk is present but is also combined with any developmental risk (e.g., expressive or receptive language problems, fine or gross motor problems, difficulties with cognition or school skills), the *PEDS*<sup>®</sup> algorithm prioritizes developmentally-focused evaluations (e.g., psychoeducational, speech-language, physical therapy evaluations, etc). Nevertheless, providers are prompted: a) to use clinical judgment to decide if mental health, social work or other types of evaluations are also needed and; b) to follow up/collaborate with referral sources to decide if additional evaluations are needed (e.g., if developmental problems are ruled out, to proceed when indicated, with mental health services or parenting assistance).
6. A final and particularly critical underpinning is that, unlike most other screening tools, *PEDS*<sup>®</sup> is designed to detect, not just children with disabilities and thus eligible for special education services/early intervention, but also children with delays, who are ineligible for special services, but still in need of help if they are to succeed in schools [e.g., those with language, academic, or intelligence quotients < 85 (16th percentile or less)]. Help for such children comes in other forms (e.g., parent training, Head Start/Early Head Start, quality day care, after school tutoring, summer school, etc.). So, *PEDS*<sup>®</sup> sorts the probably disabled from the probably delayed enabling providers to make focused referrals.

## SUMMARY OF *PEDS*<sup>®</sup> 2013 PSYCHOMETRIC DATA

### STANDARDIZATION SUMMARY

- *PEDS*<sup>®</sup> was restandardized in 2012 on a nationally representative sample of 47,531 families in 16 US states and Canada, representing the major geographic regions of the US.
- Sites included rural and urban/suburban areas in proportion to prevalence.
- Parents' levels of education were similar to US Census Bureau 2010 indicators (e.g., 16% had not completed high school while 28% had completed college).
- Ethnicities were represented at percentages between US Census Bureau indicators for 2010 and projections for 2020, and included white (not Hispanic), black, American Indian, Asian, Hawaiian/Pacific Islander, Hispanic, etc.
- Six percent of families were administered *PEDS*<sup>®</sup> in Spanish (in keeping with Census Bureau indicators for those not speaking English well).
- Children's gender and poverty rates also matched Census information.
- Children ranged in age from 0 – 11 months (20%, N = 13,523) to 8 years (2%, N = 913), i.e., a much younger sample than in *PEDS*<sup>®</sup> original norming studies.
- 91% of children and families participated in general pediatric clinics with the remainder participating from public schools (kindergarten intake), day care/preschool programs, developmental-behavioral pediatric clinics, and non-emergent crisis call centers.
- The frequency of parents' concerns and risk on *PEDS*<sup>®</sup> rises, as expected, with children's age, and with psychosocial risk factors. Hispanics and blacks were more likely to have concerns as well as higher risk *PEDS*<sup>®</sup> paths.
- Educated families are more likely to receive Path C scores (i.e., to be the "worried well" in need of professional advice).
- Native Americans are more likely to have social-emotional and behavioral concerns as compared to other ethnicities, probably in keeping with the tribal custom of respect for elders. These families are more likely to have Path C results, but the *PEDS:DM*<sup>®</sup> should be administered in these cases.
- *PEDS*<sup>®</sup> has been translated into 65 languages and standardized separately in many other nations and languages. In many international studies, different constellations of concerns and thus assignment of *PEDS*<sup>®</sup> Paths have been established. For example, self-help concerns are of greater concerns to parents and also more predictive of overall problems than in the US.
- *SURVEY PEDS*<sup>®</sup> (used in National Institutes of Health surveys such as, National Survey of Child Health, First Five California, the Promoting Healthy Development Survey, etc.) depends only on 12 closed-ended questions and is scored from "yes", "no", or "a little" responses. Results are problematic (due to poor quality translations but also due to the fact that 24% to 32% of families across clinical *PEDS* do not answer the questions according to their intended content). Although risk rates on *SURVEY PEDS*<sup>®</sup> are similar to clinical *PEDS*<sup>®</sup>, assignment to *PEDS*<sup>®</sup> Paths is strikingly different. As a consequence *SURVEY PEDS*<sup>®</sup> may not be used for clinical care with individual children.

# PSYCHOMETRY AND DEVELOPMENT OF *PEDS: DEVELOPMENTAL MILESTONES*<sup>®</sup>

*Provides information on the psychometric support for the PEDS:DM, including standardization, reliability, validity, and accuracy, and directions for future research*

## ***RATIONALE FOR THE PEDS:DM***<sup>®</sup>

The American Academy of Pediatrics recently revised its recommendations for early detection of developmental problems to embrace not only screening, the essential focus of its 2001 statement (AAP, 2001), but also developmental/behavioral surveillance (AAP, 2006; AAP 2016). Surveillance, as defined initially by British, and later by American researchers (Hall & Elliman, 2003; Dworkin, 1989; Glascoe, 1998; Hall & Blair, 2006; Glascoe & Dworkin, 2008), is a bicameral process that includes: 1) the careful accretion of information about multiple dimensions of child and family health, well-being and functioning. This component of surveillance involves capturing parents' concerns, assessing children's developmental accomplishments in all domains (language, motor, academics, self-help, social-emotional and behavioral skills) via occasional use of screening tools, viewing parent-child interactions for strengths and difficulties, identifying family psychosocial risk and resilience factors that may affect parental and child functioning, and detecting via medical history and physical examination, health and sensory problems that can interfere with development; and 2) intervening when problems and potential problems are encountered. Intervention occurs via an armamentarium that may include in-office counseling, parent education, and referrals to early intervention, parenting programs, social, mental health, and subspecialty medical services.

The value of developmental surveillance to both identify and intervene with both potential and actual problems, dovetails neatly with decades of research on early special education and prevention programs such as Head Start. Numerous studies provide indisputable support for the academic, social and economic value of interventions, not only for children with manifest problems but also for those with potential delays because these often have, as their root cause, psychosocial risk factors (Sameroff et al, 1987; Reynolds et al, 2001).

Still, surveillance as a model for early detection and intervention in health care settings, suffers from a lack of evidence of effectiveness and accuracy. In Great Britain and Canada, where surveillance has been promulgated for many years, detection rates of children with developmental problems is less than 50% (Rydz, et al, 2005). In the United States, where pediatricians also tend to rely on non-validated milestones checklists, particularly key items from larger but problematic measures such as the Denver-II, identification rates are 20% to 30% (Earls & Hay, 2006; Sand et al, 2005; Sices, 2003; Glascoe et al, 1992). These sad findings illustrate that informal checklists lack criteria for determining problematic versus typical performance, over-estimate the likelihood of normal development, contain items that are too easy relative to the skills expected at various age levels, and/or fail to include tasks that are strong predictors of delays/disability or school success. Even milestones lists created by skilled developmentalists lack the psychometric scrutiny needed to determine what constitutes problematic versus acceptable performance. None have proven sensitivity and specificity to developmental status. In contrast, research shows that repeated high quality screening at well-child visits aligns early intervention enrollment rates to levels commensurate with prevalence (Pinto-Martin et al, 2005; Earls & Hay, 2006) while also lowering the age at the time of referral. Thus,



we know that early intervention works and that accurate screening tests are effective in detecting children early while also facilitating their enrollment in needed services.

Given the potential value of developmental surveillance to both detect and address problems and in light of changing AAP policy, it is essential to make the process of surveillance as accurate and scientifically-driven as possible. Many elements of surveillance have been studied and include: An evidence-based method for eliciting and addressing parents' concerns (Glascoe, 2007); a validated tool facilitating clinical observations of parent-child interactions (Glascoe, 2006); accurate measures of family psychosocial risk factors (Kemper & Kelleher, 1996); measures of parent-child interactions identifying resilience and risk factors predictive of developmental status (Glascoe, 2006); and screens for developmental, mental health, social-emotional issues as well as risk for autism spectrum disorder (Jellinek et al 1986; Gardner et al, 1999; Leiner et al, 2005; Robins et al, 1999).

One fundamental but lacking element in an evidence-based approach to surveillance is the availability of an accurate milestones checklist that affords brief longitudinal monitoring of development status and its trajectories across motor, language, social-emotional, self-help, and academic domains. Given that developmental surveillance requires multi-dimensional measurement (which promptly raises the challenge of actually fitting the many components into the well-visit schedule), there is a need for a measure of critical milestones that has: a) sufficient brevity to afford providers the time to assess other dimensions within a surveillance model; b) items of proven predictive value; c) clear criteria for passing versus failing performance; d) high levels of sensitivity and specificity; d) clear guidance on what to do with the results; and e) a mechanism for longitudinal monitoring of developmental skills across domains. These goals form the rationale for developing *PEDS:Developmental Milestones*® (*PEDS:DM*®).

## **METHODS**

### **Measurement**

Items on the *PEDS:DM*® were drawn from standardization and validation studies of two diagnostic level instruments:

#### 1. The BRIGANCE® Inventory of Early Development-II (IED-II)

The IED-II (BRIGANCE®, 2004; Glascoe, 2004) is a diagnostic measure of child development for children from birth to 6 – 11 years of age. It is used for determining special education eligibility, developmental strengths and weaknesses, and educational programming. The measure contains more than a thousand items across developmental domains including fine and gross motor, receptive and expressive language, academics including reading and math, self-help, and social-emotional skills. The IED-II was originally standardized in 1978 on 1156 children and families from across the US. In 2003, it was updated and restandardized on a nationally representative sample (meaning that the population matched the population parameters defined by the US Census in terms of geographic location, ethnicity, gender, age, parents' marital status, income, and level of education) of 1171 families from 22 US States. All participating parents provided informed consent as approved by the Vanderbilt University Committee for Protection of Human Subjects. Sites included pediatric offices/public health clinics, day care/preschool programs, and Head Starts.

Most IED-II items were standardized both by professional administration and by parental report (con-

sistently in the 0- 2 year age range and for older children in the domains of social-emotional, self-help, and gross motor). Remaining items (those in the language, fine-motor, and academic/preacademic domains) were normed by direct administration.

The IED-II has a high degree of reliability: (.82 - .99) for internal consistency, test-retest, and inter-rater). The measure was validated against a range of other diagnostic tests including measures of intelligence, language, motor skills, adaptive behavior, and academics and enjoys strong concurrent validity as viewed by correlations between measures of similar content (.51 - .87). Discriminant validity studies illustrated unique patterns of performance ( $p < .05$ ) in the presence or absence of prematurity, psychosocial risk, developmental disabilities, and advanced versus typical/delayed development).

2. The BRIGANCE® Comprehensive Inventory of Basic Skills—Revised (CIBS-R). The CIBS-R (BRIGANCE®, 1999, Glascoe, 1999) is a diagnostic measure of academic and readiness skills and is designed for children in kindergarten through 6th grade. The test was standardized on 1121 children enrolled in public schools across the US. At the first through sixth grade levels, the CIBS-R focuses on academic skills: including several measures of reading (phonetic analysis, sight word vocabulary, reading comprehension); written language (spelling and sentence writing); math (computations and applied problems); information processing speed, and receptive language skills. At the kindergarten level, the CIBS-R includes measures of motor, grapho-motor, reading readiness, expressive and receptive language, as well as self-help skills.

Reliability research included test-retest, inter-rater, and internal consistency and produced strong levels of agreement (.71 to .94). Concurrent validity studies were conducted against a range of measures including group and individually administered diagnostic achievement tests as well as measures of intelligence. Correlations ranged from .48 to .84 between the CIBS-R and measures of achievement and from .57 to .71 for measures of intelligence. Discriminant validity studies (how well the CIBS-R discerned children with various kinds of disabilities or intellectual giftedness) revealed unique performance patterns across conditions at  $p < .01$ .

## ***PROCEDURES***

Data were concatenated from the IED-II and CIBS-R norming studies (using from the latter, only subjects less than 8 years of age). The characteristics of the norming sample were recomputed and compared to US demographics using 2006 data from the US Census Bureau.

Validity, particularly criterion-related, was studied as follows: To derive cutoff of scores, performance on each domain of the IED-II/CIBS-R was grouped into those whose quotients fell at or below the 16th percentile versus the above. The 16th percentile was chosen because it approximates the prevalence of disabilities in the US population according to the Centers for Disease Control, and because it captures the performance of most children at psychosocial risk who are likely to be retained in grade or drop out of high school.

Binary logistic regression analyses were run at each age level using items within each domain to predict overall performance in that same domain. This identified one to six potential items per domain, per age level. Each potential item was then viewed for its sensitivity and specificity to performance above and below the 16th percentile. For academic/pre-academic tasks, math-related items were regressed against overall performance on quantitative tasks, while reading-related tasks were regressed against overall performance on reading-related tasks. When choices among items were available, final selection was based on speed of administration, simplicity of directions, mini-

mal need for stimulus materials (such as scissors), and likely or observed ability of parents to engage their child in the task or to have reported such skills successfully. Items not standardized by parental report were reworded so that information could be readily elicited from children by their parents.

Internal consistency was evaluated using Guttman's Lambda coefficient. Kappa coefficient (unweighted) was computed between items standardized both by parental report and by professional administration, i.e., directly to children. Readability analyses were conducted for each set of selected items per age level, with and without response options included.

## ***STANDARDIZATION AND ITEM SELECTION***

Data from all children who participated in the IED-II norming study (N = 1171) and all children between 5 and 8 years of age who participated in the CIBS-R norming study (N = 448) were used in the current study for a total sample of 1619 children. Numbers within age groups (in annual intervals) varied slightly: 0 – 1 year olds comprised 19% of the sample and 1 – 2 year olds comprised 17% (due to the need for more cutoff scores and items to capture the rapid changes in development in the first years of life). Remaining age groups represented from 8% to 14% of the total. Fifty-one percent of the subjects were male and 32% resided in the Western US, with the South, Central and Northern US comprising 26%, 23% and 19% respectively. Among the sites, pediatric offices recruited 37% of subjects, day care centers and preschools 22%, child-find programs 14%, and public schools 27%. Across sites, 16% of children were either found to be eligible for special education services or were already enrolled, a figure in keeping with prevalence estimates from the Center for Disease Control ([www.cdc.gov](http://www.cdc.gov), site accessed July 4, 2006). Ethnicities fell somewhere between the 2000 and 2010 US Census count/projections: 66% were white, 15% African-American, 16% Hispanic and the rest Asian/other ([www.census.gov](http://www.census.gov), accessed July 7, 2006). Educational attainment of parents closely conformed to Census parameters: 18% had not graduated from high school (as compared with a national prevalence of 17%). Similarly 36% of children were enrolled in either Medicaid or the free/reduced school lunch program as compared with the 37% reported by the Health Resources and Services Administration ([www.hrsa.gov](http://www.hrsa.gov); accessed July 4, 2006). Ninety-three percent of administrations were conducted in English, 6% in Spanish, and 0.6% in Dakota (Spirit Lake Tribe).

**Item Selection.** A total of 112 items met selection criteria resulting in 1 item per domain per age level (grouped in 1 – 3 month intervals in the first and second years of life, and in 4 – 6 month intervals up to 5 1/2 years of age, and semi-annual intervals thereafter). Domains included fine motor including written language (in older children), self-help, gross motor, expressive language, receptive language, social-emotional, and, for older children, math and reading. Thus at each age level, 6 – 8 items, one per domain, were included in the final selection. In some domains, especially with older children, there were either no items available or those that were available failed to discern problematic from average performance. In these cases, some domains were dropped after certain ages (e.g., gross motor for children 4 1/2 years of age and older).

## ***CRITERION-RELATED VALIDITY: THE ACCURACY OF THE PEDS:DM®***

Table 1 shows the accuracy of the *PEDS:DM* to performance at or below versus above the 16th percentile in each domain. The row labeled Total reflects the numbers of items administered, summarizes pass/fail rates, and shows overall sensitivity and specificity of each item within its domain.

**Table 1. Accuracy of the *PEDS:DM*® according to developmental areas in identifying performance in that same domain on the IED-II/CIBS-R.**

<b>Domain</b>	<b>Ns failing item/Ns below 16th %tile</b>	<b>Sensitivity</b>	<b>Ns passing items/Ns above 16th %tile</b>	<b>Specificity</b>
Fine Motor	200/232	86%	911/1130	81%
Gross Motor	172/197	87%	678/828	82%
Expressive Language	146/176	83%	866/1003	86%
Self-Help	138/157	88%	922/1058	87%
Receptive Language	177/218	81%	938/1138	86%
Social-Emotional	133/177	75%	797/936	85%
Academic/ Preacademic (for children 39 months and older with Math and Reading combined)	111/ 139	80%	676/825	82%
TOTAL	1077/1296	83%	5833/6922	84%

Table 2 shows the accuracy of the *PEDS:DM*<sup>®</sup> to performance at or below versus above the 16th percentile broken down by age levels. Sensitivity was consistently 70% or greater and specificity also exceeded minimum standards (70% or greater) and ranged from 77% to 93%.

**Table 2. Accuracy of the *PEDS:DM*<sup>®</sup> according to child's age in correctly predicting performance on the IED-II /CIBS-R**

Age in months	Ns failing items/Ns below 16th %tile	Sensitivity	Ns passing items/Ns above 16th %tile	Specificity
0 - 2	41/59	70%	260/298	87%
3 - 4	61/65	94%	289/355	81%
5 - 7	75/87	86%	297/387	77%
8 - 10	58/76	76%	282/338	83%
11 - 13	70/82	85%	343/386	89%
14 - 16	43/51	84%	228/273	84%
17 - 19	68/80	85%	355/442	80%
20 - 22	41/49	84%	261/319	82%
23 - 25	67/72	93%	318/342	93%
26 - 28	24/30	80%	205/228	90%
29 - 33	67/77	87%	277/337	82%
34 - 38	58/67	96%	329/359	92%
39 - 43	93/111	84%	433/519	83%
44 - 48	60/68	88%	214/275	78%
49 - 53	60/79	76%	379/473	80%
54 - 58	24/34	71%	277/330	84%
59 - 65	44/56	79%	255/301	85%
66 - 72	24/30	80%	185/213	87%
73 - 83	32/41	78%	200/250	80%
84 - 95	67/82	82%	446/497	90%
TOTAL	1077/1296	83%	5833/6922	84%

## ***RELIABILITY***

Guttman's Lambda coefficient was used to view the internal consistency of the *PEDS:DM*<sup>®</sup>. Across domains this produced a value of .98. The finding illustrates that items within each domain of the *PEDS:DM*<sup>®</sup> cluster to form a distinct and cohesive set of developmental skills. Test-retest reliability (meaning that the same examiner retested the child within 1 week) produced agreement of .98 and .99 on a sample of 75 children who were readministered the entire IED-II or CIBS-II. Inter-rater reliability across two different examiners retesting a sample of 77 children revealed agreement of .82 to .96 across subtests. Of the 112 items on the *PEDS:DM*<sup>®</sup>, 67 were standardized both by parental report and by examiner administration. On these, kappa was .81 indicating a high level of concordance between parent self-administration and direct administration by professionals/paraprofessionals.

## **READABILITY**

Analysis of readability was conducted for items on each form of the *PEDS:DM*<sup>®</sup>. Because readability formulas depend in part on sentence length, inclusion of the short phrases used as response options can produce a reading level result that is lower than actuality. With response options excluded, the Flesch-Kincaid index produced a reading level of 1.8 grades (range 1.1 – 2.6), well within the recommended readability recommendations for parent-oriented medical literature.

## **COMMENTS ON THE PSYCHOMETRY OF THE *PEDS:DM*<sup>®</sup>**

This study shows that the *PEDS:Developmental Milestones*<sup>®</sup> is a reliable, valid, and accurate, milestones-based checklist with nationally representative standardization. The *PEDS:DM*<sup>®</sup> reaches and often exceeds minimum standards for sensitivity and specificity (AAP, 2001; 2006), not only across age levels but also across domain related performance on diagnostic measures of development. Both a strength and weakness of the *PEDS:DM*<sup>®</sup> is its brevity. While clearly a worthwhile substitute for informal checklists such as those built into age-specific encounter forms, the *PEDS:DM*<sup>®</sup>, like any checklist, has a very limited number of items at each age level. This means that only a small dimension of each domain can be measured at a single encounter. As a consequence, a child with receptive language disorder with strengths, for example, in listening vocabulary but weaknesses in understanding grammar, might not be detected on a one-time administration of the *PEDS:DM*<sup>®</sup>. Thus we recommend, in keeping with American Academy of Pediatrics' policy (2006), that the *PEDS:DM*<sup>®</sup> should be administered repeatedly along with other measures tapping dimensions of surveillance that enjoy a strong evidence-base [(e.g., Parents' Evaluation of Developmental Status (Glascoe, 2006a) for eliciting and addressing parents' concerns, the Family Psychosocial Screen (Kemper & Kelleher, 1996) for detecting risk factors including parental depression, the BRIGANCE<sup>®</sup> Parent-Child Interactions Scale (Glascoe, 2006b) for honing observations about the presence or absence of resilience factors such as parenting skills, etc.)].

It should be noted that the *PEDS:DM*<sup>®</sup> does not offer a picture of average development, i.e., a depiction of performance around the 50th percentile. Rather, the *PEDS:DM*<sup>®</sup> should be viewed instead as helping define the lower limits of normal development. For this reason, we do not recommend using *PEDS:DM*<sup>®</sup> items to indicate or teach typical development (e.g., with providers, residents, medical students, psychology or education graduate students, or parents themselves). For such endeavors it is best to use quality milestones checklists such as those included in this manual (derived from a team of experts in child development including those at the Centers for Disease Control), AAP brochures (also derived from expert opinion), and most preferably, highly regarded texts that explain how children learn and grow, such as Dixon & Stein's, *Encounters with Children* ([www.amazon.com](http://www.amazon.com)).

## DIRECTIONS FOR FUTURE RESEARCH

Research is still needed on the effectiveness of a comprehensive model of developmental surveillance in early identification. Ideally such studies should embrace all components of surveillance simultaneously (e.g., with *PEDS*®, the *PEDS:DM*®, the *Modified Checklist of Autism in Toddlers*, etc.). Future research should also view the value of developmental surveillance as a platform for preliminary intervention into children's development and into the many factors that influence it including family functioning and well-being, parenting skills, and psychosocial risk. Are developmental outcomes improved when comprehensive surveillance is offered? Do parents come to view providers as invaluable collaborators in child-rearing? What are the strengths and limits of intervention in primary care settings? Additional studies on the *PEDS:DM*® should view its relationship to performance on other criterion tools, professional-parent concordance for items not standardized by parental report, and its discriminant validity in detecting each of the broad categories of developmental disabilities. Finally, research is needed on optimal ways for primary care and non-medical providers to implement surveillance in their practices.

We welcome studies on *PEDS*®, *PEDS:DM*®, *PEDS:DM-AL*® and on developmental surveillance in general. We are also happy to work with those who wish to translate the measure and standardize it for other nations (we typically donate its use in developing countries after completion of a donation license agreement). Otherwise, a percentage of *PEDS:DM*® sales are given by PEDStest.com, LLC, Curriculum Associates, and Albert Brigance to international non-profit organizations focused on promoting child development and positive parenting. Interested researchers, clinicians, and foundations are welcome to contact Dr. Frances Page Glascoe ([FrancesPageGlascoe@gmail.com](mailto:FrancesPageGlascoe@gmail.com)) for assistance with projects. We are honored to post abstracts of completed and in-progress studies on our website so that *PEDS*® *Tools* users can readily share information and findings. Finally, we welcome feedback on our tools because this is critical for improving their value to practitioners engaged in early detection and intervention.

## RESOURCES FOR PEDSTEST ONLINE USERS

### REFERRAL RESOURCES: LINKS TO COMMONLY NEEDED SERVICES

- For locating state, regional and local early intervention programs under the Individuals with Disabilities Education Act, and testing services for young children with suspected or known disabilities go to [www.nectac.org](http://www.nectac.org)
- American Academy of Pediatrics: Find a Pediatrician [www.healthychildren.org](http://www.healthychildren.org) to locate developmental-behavioral, neurodevelopmental, general and other subspecialty pediatricians. See also the Society for Developmental and Behavioral Pediatrics [www.sdbp.org](http://www.sdbp.org)
- For help locating Head Start programs see <http://eclkc.ohs.acf.hhs.gov/hslc>
- For help locating quality preschool and day care programs visit [www.childcareaware.org](http://www.childcareaware.org), and [www.naeyc.org](http://www.naeyc.org)
- For help locating parent training programs see [www.patnc.org](http://www.patnc.org) and the YWCA [www.ywca.org](http://www.ywca.org)
- For locating services for school age children, call the school psychologist or speech-language pathologist in the child's school of zone.
- For help locating mental health services go to [www.mentalhealth.gov](http://www.mentalhealth.gov)
- For services and information about autistic spectrum disorders go to [www.firstsigns.org](http://www.firstsigns.org)
- Social services including domestic violence, child abuse and neglect, adoption, state, and local services, etc. can be found at [www.acf.hhs.gov](http://www.acf.hhs.gov)
- For after school programs, check with the child's school of zone, visit the websites of the Boys and Girls Club [www.bgca.org](http://www.bgca.org), and the YWCA [www.ywca.org](http://www.ywca.org)

### INTERNET RESOURCES FOR PROFESSIONALS

See [pedstest.com](http://pedstest.com) for handouts useful for parent education and additional links.

#### • [www.pedstest.com](http://www.pedstest.com)

The site offers abstracts of research on *PEDS*<sup>®</sup> and the *PEDS:DM*<sup>®</sup>, and FAQs about both measures. In addition there are training slide shows and short movies on how to give various screens including case examples, and downloadable parent information handouts in English and Spanish. The site also houses a discussion list on early detection issues.

#### • [www.dbpeds.org](http://www.dbpeds.org)

This is the web site for the American Academy of Pediatrics Section on Developmental and Behavioral Pediatrics. It houses information on routine as well as challenging aspects of developmental-behavioral pediatrics (e.g., obesity, autism, medication management, etc.). In addition to numerous articles for physicians, there is also an e-mail discussion in which participants are general pediatricians and developmental-behavioral pediatrics as well as a few speech-language pathologists and other allied health professionals. You can post challenging cases, discuss various management strategies, etc. The section has a spiffy newsletter with a coding column, helpful how-to articles, etc.

#### • [www.firstsigns.org](http://www.firstsigns.org)

This organization promotes early detection of autism and other developmental disorders through routine screening, and collaboration among medical and non-medical professionals. The organization assembled an information kit for physicians including a wonderful video showing the behaviors of children on and off the spectrum. States can contract with First Signs for local training. The website is a repository of information for both parents and professionals.

#### • [www.aap.org](http://www.aap.org)

The American Academy of Pediatrics website



## RESOURCES FOR PEDS ONLINE USERS CONT'D.

### INTERNET RESOURCES FOR PROFESSIONALS CONT'D.

houses policy statements, parenting information, and its online book store offers brochures for families, texts on parenting and health-related topics.

- **[www.reachoutandread.org](http://www.reachoutandread.org)**

Reach Out and Read (ROR) helps providers promote school success by encouraging book reading. The site explains the process, training requirements, sells appropriate books for different age children, etc.

- **[www.medicalhomeinfo.org](http://www.medicalhomeinfo.org)**

This site from the American Academy of Pediatrics, helps providers organize their practices to best help families whose children have special needs and provides information on collaboration with non-medical professionals and advocacy.

### INTERNET PARENTING RESOURCES

- **American Academy of Child and Adolescent Psychiatry: Facts for Families** ([www.aacap.org](http://www.aacap.org)) has numerous handouts that can be downloaded for free. Written in multiple languages, they address such topics as divorce, disaster recovery and how to choose a psychiatrist.

- **American Academy of Pediatrics: You and Your Family** ([www.aap.org](http://www.aap.org)) describes child-care books, videos, hand-held health records, waiting room magazines, etc.

- **British Columbia Council for Families**

([www.bccf.ca](http://www.bccf.ca)) Well maintained site with articles, online questionnaires and links to resources on a variety of parenting and family topics. Includes individual and bulk copies of books and brochures on such topics as adolescence, marriage, family cohesion, and child development, as well as a parenting program, Nobody's Perfect.

- **Children and Youth Health** ([www.cyh.sa.gov.au](http://www.cyh.sa.gov.au)) From the South Australian Department of Human Services, this site has extremely rich information for

parents on a huge range of psychosocial issues for teens and young children. Diapers are “nappies” and ear infections are “glue ear,” but other than that, the depth and quality of parenting advice is unparalleled.

- **Kids' Health** ([www.kidshealth.org/](http://www.kidshealth.org/)) From the Nemours Foundation, this site has excellent information on health and safety, emotional and social development and positive parenting, focused on teens and younger children.

- **Center for Community Child Health**

([www.rch.org.au/ccch](http://www.rch.org.au/ccch)) This website has sections for parents and professionals interested in developmental and behavioral issues in early childhood. It houses parent information sheets (Adobe Reader is required) in various languages including Arabic, Bosnian, Chinese, Croatian, Somali, Spanish, Turkish, Vietnamese and English.

- **Tufts University** has a site housing downloadable handouts in various Asian languages on health, child-rearing and disabilities (<http://spiral.tufts.edu/>)

- **The U.S. Department of Education** website houses information for Spanish-speaking families on how to promote child development, help school age children, etc. ([www2.ed.gov/parents](http://www2.ed.gov/parents))

- **California First Five** has child-rearing guidance for Spanish speaking parents ([www.ccfca.gov](http://www.ccfca.gov))