

**Screening for Behavioral  
Developmental Problems:  
*Issues, Obstacles, and  
Opportunities for Change***

*David Bergman*

**August 2004**

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by

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## INTRODUCTION

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Recognizing that early intervention can have a lasting impact on children, many states across the country have expressed interest in identifying and serving young children at risk for behavioral developmental problems.<sup>1</sup> This interest is largely based on the growing body of evidence suggesting that these young children are highly receptive to treatment and that prevention and early intervention treatments can be substantially less expensive than those for fully developed problems. Not only are children's lives improved by preventing the establishment of destructive behavioral patterns,<sup>2</sup> but social and emotional health are also essential components of school readiness and success.<sup>3</sup>

*Mental development. Psychological development. Social development. Emotional development. Behavioral development. Psychosocial development.*

The literature on child development employs numerous terms to describe various aspects of childhood development, and these terms are often used interchangeably. Throughout this paper, we have sought to be consistent and specific in our terminology. See footnote 1.

Studies have already demonstrated a significant correlation between poverty and developmental problems in children.<sup>4,5</sup> Consequently, Medicaid, which serves one in four young children and is targeted to those in families with low incomes, can play a vital role in financing and coordinating appropriate services for low-income children

Effective early interventions and treatments do exist once a child is identified; however, the challenge is to identify children who could benefit from preventive and early intervention treatment. Unfortunately, few children are officially diagnosed before they reach school. Studies have shown that 9 percent to 21.4 percent of all children will have a mental development issue, but few children are identified as needing care, and even fewer receive the treatment they need.<sup>6,7,8,9,10,11</sup> Even physicians, for example, often do not identify young children with a clearly

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<sup>1</sup> Throughout this report, this paper makes no references, specifically, to the identification of *developmental delays*, but instead uses the term *developmental problems*. In part, this is because developmental delays are just one type of developmental problem. However, it also reflects a philosophical orientation recognizing that children in need of developmental services are in need not just because they fail to acquire skills within the proper time frame but because their development processes are somehow disordered. In many cases, the literature does not make this distinction and refers to a host of clearly identifiable developmental problems as developmental delays. Wherever possible this report attempts to use the most accurate and appropriate term.

<sup>2</sup> Jane Squires, et al., "Identification of social-emotional problems in young children using a parent-completed screening measure," *Early Childhood Research Quarterly* 16:2001, 405-419.

<sup>3</sup> Kay Johnson and Neva Kaye, *Using Medicaid to Support Children's Healthy Mental Development* (Portland, ME: National Academy for State Health Policy, 2003), 1.

<sup>4</sup> Michael Jellinek, MD, Bina P. Patel, MD, and Mary C. Froehle, PhD, eds, *Bright Futures in Practice: Mental Health—Volume 1. Practice Guide* (Arlington, VA: National Center for Education in Maternal and Child Health, 2002), xix.

<sup>5</sup> Johnson and Kaye (2003).

<sup>6</sup> RAND Health, *Research Highlights: Mental Health Care for Youth* (Santa Monica, CA; Arlington, VA; Pittsburgh, PA: RAND, 2001), 2.

defined developmental problem, and they identify even fewer of those who have a low intensity problem or who are at risk of more substantive problems.<sup>12</sup> In any event, identifying children—both those at risk for behavioral developmental problems and those with identifiable problems—is the first step in linking them with appropriate services.

In the context of Medicaid, streamlining state rules and procedures for developmental screening and assessment activities is a step that can help to identify additional children and offer the opportunity to prevent more serious conditions.<sup>13</sup> The numerous validated tools that screen for behavioral developmental problems can be powerful instruments in helping states improve identification. By recommending specific tools and training pediatric practices, states can facilitate use of validated screening tools. Yet state Medicaid officials often face a laundry list of tools and a maze of professional recommendations when it comes to developmental screening for young children. States need concise, up-to-date knowledge to make informed choices. Specifically, they need information about what screening tools are, why they are important, and how they differ from each other.

The purpose of this technical assistance paper is not to endorse any of the available tools. Rather, it is designed to provide states with a framework for evaluating developmental screening tools for young children so that state officials are equipped to make informed decisions and to work with pediatricians, parents, and other local stakeholders in strengthening services to young children. This paper is specifically intended to help states already addressing the mental development of young children through the second iteration of the *Assuring Better Child Health and Development* initiative (*ABCD II*), as well as other states considering improving developmental services for pre-school children.

Although the box on page 18 summarizes some of the strategies states have adopted or considered when implementing the use of screening tools, this report is not designed to address in depth these strategies and recommendations. Specific implementation strategies and best practices will be addressed in subsequent reports and will be based on the experiences of states participating in the ABCD II initiative.

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<sup>7</sup> Kelly J. Kelleher MD, MPH, et al, “Increasing Identification of Psychosocial Problems: 1979-1996,” *Pediatrics* 105(6):2000, 1313-1321.

<sup>8</sup> Frances P. Glascoe, PhD and Henry L. Shapiro, MD, “Developmental Screening,” Developmental-Behavioral Pediatrics Online Community. Retrieved 5 May 2004.  
[www.dbpeds.org/articles/detail.cfm?id=5](http://www.dbpeds.org/articles/detail.cfm?id=5)

<sup>9</sup> Frances P. Glascoe, PhD and Michelle M. Macias, MD, “How You Can Implement the AAP’s New Policy on Developmental and Behavioral Screening,” *Contemporary Pediatrics* 20(4):2003 85-102.

<sup>10</sup> Annie G. Steinberg, MD; Anne Gadowski, MD, MPH; Michelle D. Wilson, MD, “Children’s Mental Health: Recommendations for Research, Practice and Policy,” *LDI Issue Brief of the Leonard Davis Institute of Health Economics* 5(7):April, 2000, 1-4.

<sup>11</sup> Lynne C. Huffman and Mary Nichols, “Early Detection of Young Children’s Mental Health Problems in Primary Care Settings” in *Handbook of Infant, Toddler, and Preschool Mental Health Assessment*, (Oxford University Press, 2004), 471.

<sup>12</sup> Laura Sices, MD, et al., “How do Primary Care Physicians Identify Young Children with Developmental Delays? A National Survey with an Experimental Design,” *Pediatrics* 113, no.2 (Feb. 2004): 274-282.

<sup>13</sup> Johnson and Kaye (2003), 3.

## ABCD II

With funding from The Commonwealth Fund, the National Academy for State Health Policy launched the ABCD II initiative in 2004. The three-year project is designed to build state capacity to deliver care that supports children's healthy mental development.<sup>14</sup> ABCD II supports efforts in five states—California, Illinois, Iowa, Minnesota, and Utah—to improve developmental outcomes and children's readiness to learn and to prevent the need for more intensive and expensive care at a later age.

ABCD II was designed to create models of service delivery and financing that promote high-quality services supporting children's healthy mental development for Medicaid eligible children, especially those with less intense needs or emerging risks. Together with private-sector stakeholders, state officials in the five states are developing policies and programs to assure that health plans and pediatric providers serving these children and their parents have the knowledge and skills needed to furnish health care in a manner that supports a young child's healthy mental development. The focus is more on prevention and early intervention than on treatment. ABCD II is intended for all Medicaid-eligible children, age 0-3, and is not designed to be a special needs program.

All of the five states involved in ABCD II are working closely with primary pediatric providers, especially those that serve Medicaid beneficiaries. These providers play a critical role in young children's early development; some guidelines recommend that children should be seen by a pediatrician as many as twelve times in the first three years of life. Although this paper focuses on the use of screening tools by states investigating their use in primary pediatric practice, the information can be more universally applied. Furthermore, the paper's framework for talking about the differences between the available tools and its Screening Tool Matrix (see Appendix B) are not specific to any particular setting.

## Methodology

The information included in this paper was obtained by searching Medline, Lexis-Nexis, and ProQuest periodical databases for appropriate articles. Other articles were identified by the ABCD II states and other experts. The search was by no means exhaustive. Representatives from the ABCD II projects served as an advisory group in developing this paper. They

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<sup>14</sup> The Assuring Better Child Health and Development (ABCD) initiative was launched in 1999 by The Commonwealth Fund and is dedicated to strengthening the capacity of the health care system to support the early development of children from low-income families. As part of ABCD, the Commonwealth Fund awarded a grant to the National Academy for State Health Policy (NASHP) to help states improve the delivery of early childhood development services to children through their Medicaid programs. Medicaid agencies in four states (North Carolina, Utah, Vermont, and Washington) were selected to participate in the first phase of the ABCD initiative, which began in early 2000 and concluded in May 2003. Additional information about the ABCD initiative is available at [http://www.nashp.org/catdisp\\_page.cfm?LID=2A78988D-5310-11D6-BCF000A0CC558925](http://www.nashp.org/catdisp_page.cfm?LID=2A78988D-5310-11D6-BCF000A0CC558925)

provided—and continue to provide—input on particularly valuable literature and have reviewed both an outline and a draft of this report to ensure that it would address topics of importance to them. Furthermore, a late draft of this paper was sent to a panel of experts in the use and development of screening tools for young children. The final version of this paper reflects the comments and feedback from all of these reviewers. NASHP took this approach in an effort to provide states with the most useful information possible, in a format that would enable them to make informed, accurate decisions about the screening tools that best suit their needs.

## ISSUES IN SCREENING FOR PROBLEMS IN MENTAL DEVELOPMENT

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Broadly defined, **screening** is the process by which a large number of asymptomatic individuals are tested for the presence of a particular trait. Screening tools, therefore, offer a systematic approach to this process. Ideally, tools that screen for the mental development of young children should:

- help to identify those children with or at risk of behavioral developmental problems,
- be quick and inexpensive to administer,
- be of demonstrated value to the patient and provide information that can lead to action,
- differentiate between those in need of follow-up and those for whom follow-up is not necessary, and
- be accurate enough to avoid mislabeling many children.

Many states have spoken about the desire for a “quick and dirty” screening tool that takes only a few minutes to complete and that identifies a child as being in need of follow-up. This is precisely the role a screening tool should play. But practitioners seeking to screen for a variety of concerns typically confront a challenge: the more domains and realms a tool is designed to cover, the longer it takes to administer and score. Screens designed to capture less information typically take less time to complete.

Unfortunately, knowing that a child has or is at risk of a developmental problem does not provide enough clinical information to determine the kind and intensity of intervention. Once such a child is identified, the degree of his or her impairment must be assessed. Assessment is often confused with screening — possibly because the terms are used interchangeably in some Medicaid regulations. As defined here, however, assessments perform a completely different, but equally vital, function. **Assessment** tools help practitioners determine with greater certainty the degree of impairment, the nature of the condition, and whether the child identified in a screen could benefit from an intervention. In that sense, they might be described as diagnostic tools. Assessment tools require more time to administer, often are more costly, and are more accurate than screening tools. For example, where a screen may identify a child as at-risk, an assessment could determine the same child does not require any intervention.

*Behavioral* constitutes a focus on contextual relationships and functions, the biological and psychosocial factors that enhance or disturb them, and resulting variations and deviations in a child's growth, behavior, and emotions.

*Developmental* constitutes a focus on the manifestations of the maturation of the central nervous system and how it is affected by biology and environment, resulting in abilities and/or disabilities.

*Diagnosis-specific* constitutes behavioral, emotional and developmental issues that are particular to an individual disorder.

--Huffman and Nichols, 2004

Huffman and Nichols (2004) divide screening tools into three different categories: behavioral, developmental, and diagnosis-specific.<sup>15</sup> Because all tools address development in the broadest sense of the word, additional clarity is required in order to minimize confusion of terms. This paper will refer to two kinds of screening tools: behavioral developmental screening tools which primarily address behavioral development; and general developmental screening tools which address neurological development *and* behavioral development. Diagnosis-specific tools which are focused on a particular illness or condition are not relevant to our discussion here.

It is also important to note that efforts to oversee the healthy development of young children are not limited to the use of screening and/or assessment tools. Rather, the tools discussed here are meant to compliment the on-going process, often called **developmental surveillance**, through which physicians continuously monitor the development of any child. Although screening tools can be introduced into a variety of practices, they are best used in the context of developmental surveillance where pediatricians and other clinicians are engaged in other efforts to identify, monitor, treat, and refer children as necessary.

Not only should screening tools be used in the context of developmental surveillance, successful intervention and treatment also depend on proper triage and referral protocols that serve children with or at risk of mental developmental problems. To underscore this point, a report on developmental screening tools by the Center for Community Child Health at the Royal Children's Hospital in Melbourne, Australia could neither recommend nor discourage their use, in large part because researchers could not isolate the cost effectiveness of the screening tools from that of the intervention.<sup>16</sup> Both are necessary and important.

## The Need for Screening and Intervention

In addition to placing screening as part of a process of developmental surveillance, screening must also be understood, not as an end goal, but as a step in the process that can lead to additional services. Screening, after all, plays a vital role in the identification of children with, and at risk for, behavioral developmental problems and is significant only insofar as it leads to the early treatment of potential behavioral developmental problems.<sup>19, 20</sup> Only children who have been identified can receive an appropriate intervention, and the earlier the intervention is

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<sup>15</sup> Huffman and Nichols (2004).

<sup>16</sup> Center for Community Child Health, Royal Children's Hospital, *Child Health Screening and Surveillance: A Critical Review of the Evidence*, (Melbourne, Australia: National Health and Medical Research Council, March, 2002), 179-188.

<sup>17</sup> Steinberg, Gadomski, and Wilson (2000).

<sup>18</sup> Jerry Rushton, MD, MPH; David Bruckman, MS; Kelly Kelleher, MD, MPH; "Primary Care Referral of Children with Psychosocial Problems," *Archives of Pediatric and Adolescent Medicine* 156 (June 2002): 592-598.

<sup>19</sup> Squires, et al., (2001).

<sup>20</sup> US Department of Health and Human Services. *Mental Health: A Report of the Surgeon General* (Rockville, MD: US Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Mental Health Services, National Institutes of Health, National Institute of Mental Health, 1999), 132-133.

received, the less costly—in personal and monetary terms—the behavioral developmental problems.<sup>21</sup> In this sense, screening must be carried out in the context of a continuum of care that also provides for both assessment (diagnosis) and treatment. The Medicaid program was designed to provide financing for such a continuum of care to children.<sup>22</sup>

Mental health issues in children already command a large amount of health care dollars. A RAND Corporation study found that, of the \$12 billion spent nationally on children’s mental health issues in 1998, about \$600 million was attributable to pre-school aged children (ages 1-5), who accounted for approximately 30 percent of all children served.<sup>23</sup>

Although there are no longitudinal studies looking at the cost impact of preventive mental health services for young children, researchers have reasonably concluded that early intervention can result in a significant reduction in health care costs throughout a child’s life.<sup>24</sup> By addressing the need for preventive and early treatments that encourage the healthy mental development of children, states can position themselves to realize savings for years to come.

Strong evidence also exists to support the idea that early intervention can ameliorate many of the pervasive, negative effects of a behavioral developmental problem. Furthermore, the use of systematic screening tools may increase the identification of children at-risk who could benefit from an intervention but do not yet demonstrate any of the signs and symptoms of a full-fledged developmental problem or mental health diagnosis.<sup>26</sup>

## Selecting Screening Tools

Different screening tools may be appropriate for different circumstances, depending on the time they take to administer, reimbursement, training, or any number of different criteria. States and other agencies will want to consider all of these variables and their specific needs when assessing whether or not to approve and/or endorse a tool.

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<sup>21</sup> Squires et al., (2001).

<sup>22</sup> Medicaid’s Early, Periodic Screening, Diagnosis, and Treatment (EPSDT) regulations specifically provide for periodic screening of children to identify treatment needs—and the provision of any care that can be provided under federal Medicaid rules that is needed to treat or ameliorate a condition identified in an EPSDT screen—including services that the state has chosen not to cover under any other circumstances.

<sup>23</sup> RAND Health (2001).

<sup>24</sup> Squires et al. (2001).

<sup>25</sup> Squires et al. (2001).

<sup>26</sup> Squires et al. (2001).

## Focus: general developmental vs. behavioral

Most screening tools under consideration by states either have a general or a behavioral focus. General developmental screening tools are the Swiss-army knife of screening tools. In addition to neurological development—gross motor, fine motor, vision, hearing, etc.—these tools also address many other facets of development: emotional, behavioral, social, cognitive, linguistic, etc. And, because developmental problems may be evident in multiple domains, their general nature does not necessarily produce less accurate results.

Tools with a behavioral focus concentrate specifically on domains that concern the behavioral development of children. While these tools are often used in non-medical settings, they need not be limited in this manner and can be equally useful in pediatric and family practice.

### How to look at screening tools: A 10-point checklist

There are roughly ten ways in which screening tools are likely to differ. These include:

- ✓ Focus: general vs. behavioral
- ✓ Approach: strength vs. deficit
- ✓ Administration: who records the information
- ✓ Elicitation: who reports the information
- ✓ Scorer: who scores the results
- ✓ Age range
- ✓ Time
- ✓ Cost to administer and purchase the tool
- ✓ Utility
  - reliability
  - validity
  - sensitivity
  - specificity
- ✓ Cultural Competency

Unfortunately, comparing the performance of different developmental tools has proved difficult. Tools are often inconsistent in the language they use to describe different developmental domains, and the literature does not analyze their performance on a domain-by-domain basis. For example, it is difficult, if not impossible, to compare the efficacy of the Parents' Evaluation of Developmental Status (PEDS) tool to the Ages and Stages Questionnaire (ASQ) specifically along the behavioral domain.

It is also difficult to compare the efficacy of a behavioral developmental tool and the behavioral component of a general developmental tool. Although it would be logical to assume that tools focusing exclusively on behavioral development—such as the Ages and Stages Questionnaire: Social and Emotional (ASQ:SE)—are more sensitive to behavioral issues than general developmental screening tools, the literature neither supports nor refutes this assumption.

As a result, researchers measuring the sensitivity and specificity of various tools (see Appendix B) assess the entire test. The literature does not report whether a tool that asks only one or two questions in the behavioral domain performs better or worse than another tool that asks five. One of the peculiarities of child development is that developmental domains do not always have clearly delineated boundaries. As a result, two screening tools may address many of the same problems, even though they capture slightly different information. Furthermore, a problem in one domain may very well manifest itself in other domains. The good news is that, in all likelihood, symptoms will be evident in multiple domains, increasing the opportunities for

detection. As a result, two different tools with no overlapping domains may identify the same child as in need of follow-up. While this confounds a strict comparison of different tools, it does mean that a tool need not address every conceivable domain to produce adequate results.

### **Approach: strength vs. deficit-based**

In general, screening tools tend to be oriented around one of two different approaches: a strength-based approach or a deficit-based approach. A strength-based approach looks at the skills, characteristics, and attributes already obtained by a child and compares them to those obtained by other children of a similar age. A deficit-based approach looks for skills and attributes not obtained by a child, yet characteristic of other children at that age. There is no documentary evidence to support one approach over another.

### **Administration: who records the information**

There are two aspects to administering a screening tool: gathering the information and scoring the results. These two steps can be done by different people—with different levels of training and expertise—or by the same person. In many cases, the physician is not required to perform either step, which can have an important effect on a) where the tool can be administered, b) time constraints in a primary pediatric office, and c) the cost of conducting the screening. (One of the main criticisms of screening tools by primary pediatric physicians is that there is not enough time to do the test in a well-child visit.)

For those tools that are conducted or scored by non-physicians, the work may be performed by an allied health professional, or someone else who has received specialized training. This flexibility can be useful in different kinds of offices and programs. The screening tool may be conducted and scored while the family is in the waiting room. Or the tool can be conducted and scored as part of a home visit. Some tools, such as those that can be completed by a parent or caregiver, need only use staff to score the tool and may be sent to parents in advance of a well-child visit in order to minimize the time a clinician needs to devote to eliciting information during the office visit.

### **Elicitation: who reports the information**

There are two different methods of obtaining the input for a screening tool: directly observing the child or asking questions of the child's parent(s). There is evidence that parental elicitation is adequate to determine whether or not there is a problem that needs attention. Proponents of parental elicitation also see it as a vehicle for involving parents in discussions about the health and care of their children.

Parental elicitation has its drawbacks, however, and some experts have expressed concern about its use. Questionnaires that parents are asked to complete on their own must be written at an appropriate reading level and physicians need to know how to identify parents who do not

understand the questions. Even when questions are read to a parent, as in an interview, they must be easily understood. One study of high-risk children—albeit not the target population for ABCD II—found that parents did not reliably report on their children’s development.<sup>27</sup> Other studies express concern that children with behavioral problems tend to have parents with their own problems who may not be able to adequately recognize problems in their children.<sup>28</sup> Nevertheless, tools that utilize parental elicitation are increasingly common and produce valid, reliable results.

A clinician’s direct observation of a child has its own drawbacks. It is often relatively time-consuming compared to parental elicitation. Furthermore, the clinician’s determination is based on seeing the child for a very short period of time and can be influenced by many different factors: the child’s mood, whether or not the child “performs,” or the time of day, for example. Accuracy can also be hindered because such a screen is typically not completed in the child’s natural environment, a significant issue for this age group.

It should also be noted that the mode of elicitation can be an important factor in how and where the test is administered. For example, a tool that uses direct elicitation must be completed in the presence of both the child and the person conducting the tool.

## Scoring

The two most salient aspects of scoring to take into consideration when evaluating a screening tool are: 1) who scores the tool, and 2) whether the scorer needs any special training.

Some of the tests are more complicated to score because they use open-ended questions that physicians find cumbersome to record and interpret. Furthermore, it can be difficult to recommend treatment based upon an answer to an open-ended question. Others feel that open-ended questions foster a greater dialogue with parents and may yield information that would otherwise not have come to the physician’s attention. Additionally, the difficulties experienced by physicians with open-ended questions can be overcome with proper training.

Although multiple choice answers are easier to score, there is some concern that they do not create enough of a dialogue with parents.

## Age range

Each of the different tests has been independently validated for a specific age range. Caution should be exercised when using a tool for an age group for which it has not been validated. Unfortunately, there are only a few tools that are validated for children less than 18 months old; so it may be necessary to consider using tools that have not been validated for the group. (The producers of a number of tools assert that their products can be used for this age group.)

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<sup>27</sup> M. Marie Kim et al. “Do Parents and Professionals Agree on the Developmental Status of High-risk Infants?” *Pediatrics* 97:5(May 1996) 676-681.

<sup>28</sup> Squires et al. (2001).

## **Time**

One of the biggest concerns pediatricians and other physicians have about screening tools is how long it will take to administer and score. Screening tools typically take ten to fifteen minutes, but some take as little as two or as many as twenty. Many tools also utilize threshold questions that trigger additional questions, so a test that produces a negative result can take less time to administer. In any event, the length of time it takes to administer a test can be an obstacle for physicians, especially taking into consideration billing issues and the delivery system (fee-for-service, managed care, primary care case management, etc).

## **Cost factors**

Using screening tools obviously costs money, but the costs occur in three primary areas: staff time (this also depends, of course, on *which* staff), materials, and training. An additional factor is the extent to which the tests change with a child's age. For example, many of the tests require a change in materials depending on the child's age. In cases when the pediatric visit does not coincide with the appropriate age range, the two tools for the surrounding age ranges can be administered. This increases the use of materials, as well as the time that must be spent administering the test.

Furthermore, the materials themselves vary in cost by tool. Some tools only require a small initial fee—or even just the permission of the authors—and can then be copied in house. Others are considerably more expensive and use copyrighted materials that must be purchased and re-purchased as they are used.

A final consideration is how closely the recommended periodicity schedule for the tool matches that for well-child visits. Closer matches facilitate the use of the tool during well-child visits and potentially eliminate the need for separate well-child and screening visits.

## **Utility**

In order to establish accuracy, each screening tool is measured by researchers on a four-point scale: reliability, validity, sensitivity, and specificity.

### *Reliability*

In general, there are two kinds of reliability. The first describes the degree of agreement between different testers looking at the same child; the second describes the consistency of a result over time, the so-called test-retest measure. All of the tools included in the table in Appendix B are considered reliable.

### *Validity*

This describes the degree to which the same test accurately measures different children.

### *Sensitivity and specificity*

Because the most widely accepted screening tools are both reliable and valid, these factors are not very useful in distinguishing among them. Sensitivity and specificity, on the other hand, provide a more effective means for comparison. Screening tools are designed to quickly identify individuals with possible problems. As a result they can be less sensitive and specific than diagnostic assessment tools. The American Academy of Pediatrics describes as “good” those screening tools that score sensitivity and specificity in the 70-80 percent range.<sup>29</sup>

Sensitivity and specificity are used to describe the relationship between the results produced by a screening tool and the actual occurrence, in our case, of behavioral developmental problems in young children. At base, screening tools produce two results: positive and negative, and children tested either have (or are at risk of) a problem or they do not have a problem. The way these two scales interface produces four possible outcomes: True positive, false positive, true negative, and false negative.

	<b>Test Results (True/false)</b>	
<b>Occurrence in Population (Positive/Negative)</b>	True/Positive	False/Negative
	True/Negative	False/Positive

True positives are situations in which children identified as having a developmental problem by a screening tool, in fact, have a developmental problem. False positives are situations in which children identified by a screening tool as having a developmental problem do not, in fact, have a developmental problem. True negatives are those children without a developmental problem who are so identified by a screening tool, and false negatives are those children who do have a developmental problem, but are not identified by a screening tool.

	<i>Test Results</i>	
<b>Total number of children with or at risk of a developmental problem</b>	True Positive	False Negative
<b>Total number of children without and not at risk of a developmental problem</b>	True Negative	False Positive

Typically reported as a percent, **sensitivity** describes a tool’s ability to accurately identify children with or at risk of a developmental problem. It is calculated by dividing the number of true positives by the total number of children with or at risk of a developmental problem. [True Positive ÷ (True Positive + False Negative)]. In other words, if sensitivity is reported as 77 percent, this means that 77 percent of those children with or at risk of a developmental problem will be so identified by the tool.

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<sup>29</sup> American Academy of Pediatrics (2001).

**Specificity**, on the other hand, measures a tool's ability to accurately identify children without a developmental problem. It is calculated by dividing the number of true negatives by the total number of children who do not have and are not at risk for a developmental problem.  $[\text{True Negatives} \div (\text{True Negatives} + \text{False Positives})]$ . In other words for a tool that has a specificity of 84 percent, 84 percent of children without a developmental problem will be so identified by the tool.

## **Cultural issues**

For states with diverse populations, the ability of a tool to effectively identify children from different cultures is important. Simply translating the tool into different languages may change the efficacy of the tool. Many languages consist of different dialects and reflect different cultures that have different expectations about child development. Ideally, these cultural differences would be reflected in the tool. It is also important that the concepts that underlie individual questions be validated for different cultures.

A number of tools have been validated on diverse populations. This suggests that these tools, as written, can be useful in capturing information for children from many different socio-economic and ethnic backgrounds.

## PREVALENCE AND ACCESS TO CARE

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Estimates of the prevalence of social-emotional-behavioral developmental disorders in children suggest that problems are widespread and growing:

- An estimated 15-21 percent children have a “probable” mental health disorder;<sup>30,31</sup>
- Researchers at the RAND Corporation estimate that 9 percent of children have a developmental disability severe enough to cause impairment;<sup>32</sup> and
- The American Academy of Pediatrics estimates that 12-16 percent of children have a developmental disorder<sup>33</sup> which includes behavioral disorders.<sup>34</sup>

As a result of inadequate identification, referrals, and treatment, many children go without the interventions that could help to allay subsequent problems. While precise study results vary, most suggest that only 20-30 percent of those with such conditions receive treatment.<sup>35,36,37,38,39</sup> In addition, Black and Hispanic children are most likely to go without needed developmental care.<sup>40</sup> Given the correlation between race, ethnicity, and poverty, it is likely that access to such care is also an issue for children receiving Medicaid, which further underscores the importance of the state’s role in strengthening the developmental services offered through Medicaid.

A substantial gap also exists between the number of referrals made by physicians and the prevalence of behavioral developmental problems in the population. When presented with written vignettes of demonstrably developmentally disabled children, physicians provided referrals in much higher proportions than suggested by other studies.<sup>41</sup> Even so, between 13 percent and 24.4 percent of pediatricians and family practitioners who were presented with three

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<sup>30</sup> John Lavigne et al. “Prevalence Rates and Correlates of Psychiatric Disorders among Preschool Children,” *Journal of the American Academy of Child and Adolescent Psychiatry*, 35:2 (February 1996): 204-214.

<sup>31</sup> Kelly J. Kelleher et al, “Increasing Identification of Psychosocial Problems: 1979-1996,” *Pediatrics* 105:6 (June 2000): 1313-1321.

<sup>32</sup> RAND Health (2001).

<sup>33</sup> American Academy of Pediatrics Committee on Children with Disabilities “Developmental Surveillance and Screening of Infants and Young Children,” *Pediatrics* 108(1):2001, 192-196.

<sup>34</sup> American Academy of Pediatrics (2001).

<sup>35</sup> RAND Health (2001).

<sup>36</sup> Kelleher et al. (2000).

<sup>37</sup> Glascoe and Shapiro (2004).

<sup>38</sup> Glascoe and Macias (2003).

<sup>39</sup> Steinberg, Gadomski, and Wilson (2000).

<sup>40</sup> RAND Health (2001).

<sup>41</sup> Sices et al. (2004). This study reported on a survey sent out to physicians that utilized vignettes of children with a developmental problem. The survey asked the physicians how they would respond and listed possible answers in multiple choice. Seeing the possible answers and the prevalence of referrals could have biased responses towards the “proper” answer.

clinical vignettes of children with a demonstrable developmental problem failed to make any referral whatsoever, despite the fact that answers were multiple choice.<sup>43</sup>

That so many doctors are unable to identify children with or at risk for problems emphasizes the critical need to ensure that screening tools are administered to every child, not just those already suspected of having a problem, and that the screening take place in the context of developmental surveillance.

The problem of referrals is further exacerbated by the absence of clear follow-up protocols for providers and their concerns about the capacity of the health care system to treat children with identified needs. Data from 1994 and 1997 reveal that only 16.2% of children identified as having a psychosocial problem were actually given a referral for follow-up. Furthermore, physicians expressed concern that referrals may be denied by a managed care health plan.<sup>44</sup> At the same time, many children who do receive referrals continue to fall through the cracks. As few as 61 percent of children who received a referral from primary pediatric or family care providers actually saw a mental health specialist. Of this number, only 30.5 percent saw the specialist more than once.<sup>45</sup> The low referral rate only emphasizes the need to involve various stakeholders in implementing change, and the poor rate of uptake for those receiving a referral suggests that states must also address systemic barriers, for example, through more clearly defined follow-up and follow-along services.

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<sup>43</sup> Sices et al. (2004).

<sup>44</sup> Steinberg, Gadomski, and Wilson (2000).

<sup>45</sup> Jerry Rushton, MD, MPH; David Bruckman, MS; Kelly Kelleher, MD, MPH; "Primary Care Referral of Children with Psychosocial Problems," *Archives of Pediatric and Adolescent Medicine* 156 (June 2002): 592-598.

<sup>46</sup> RAND Health (2001).

## CURRENT PRACTICE

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Historically, training for pediatricians has focused more on neurological development. Only in the last ten years has it begun to formally incorporate behavioral development. As a result, today's practicing pediatricians may have a greater awareness of neurological developmental issues. While there is a shared understanding among experts that pediatricians are better at identifying neurological developmental issues than they are at identifying behavioral developmental issues,<sup>47</sup> this should not be construed as either an endorsement or a critique of current practice concerning neurological development. In any event, it is clear that care for the behavioral development of children lags behind that provided for other preventive and developmental services recommended by the American Academy of Pediatrics.<sup>48</sup>

The most commonly used general developmental screening tool, the Denver Developmental Screening Test-II (DDST-II or Denver-II), is relatively lengthy to administer in the context of a pediatric well-child visit (approximately 10-20 minutes) and produces results<sup>49</sup> that do not meet current accuracy guidelines for screening tools as established by the American Academy of Pediatrics.<sup>51</sup> There is some speculation that the Denver II is widely used because it was among the first developmental screening tools and was specifically mentioned in federal (and in turn some states') EPSDT guidance language. In order to comply with the law and to avoid the potential liability created by using an alternative, many pediatricians simply use the Denver II. States can play a role in changing this particular physician behavior by producing a list of screening tools that meet the EPSDT guidance standard and by providing guidance on their use.

## Barriers

Current practice regarding healthy mental development is in need of improvement, in part because the system of care presents a number of barriers for practitioners. Even assuming a tool is being used and that pediatric practices are adequately trained to administer the tool and identify behavioral developmental problems, there are still three structural barriers that may impede the use of screening tools in pediatric practice. These are: 1) time constraints, 2) the diagnostic framework, and 3) billing.

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<sup>47</sup> William B. Carey, MD "Rapid, Competent, and Inexpensive Developmental-Behavioral Screening is Possible" *Pediatrics* 109(2) (February 2002): 316-17.

<sup>48</sup> Christina Bethell et al. *Partnering with Parents to Promote the Healthy Development of Young Children Enrolled in Medicaid: Results from a Survey Assessing the Quality of Preventive and Developmental Services for Young Children Enrolled in Medicaid in Three States* (New York, NY: The Commonwealth Fund, September 2002): X.

<sup>49</sup> Center for Community Child Health, Royal Children's Hospital, *Child Health Screening and Surveillance: A Critical Review of the Evidence* (Melbourne, Australia: National Health and Medical Research Council, March, 2002): 181.

<sup>51</sup> American Academy of Pediatrics (2001).

## Time constraints

Pediatricians are busy and are already called upon to do many things during well-child visits. There is a fear that additional developmental screening, particularly for behavioral problems, will be too much of a burden on physicians. The time constraint can, however, be ameliorated. By design, many of the screening tools do not require administration by a pediatrician or a medical specialist, and some are designed to be filled out by parents. Integrating these tools into a creatively designed practice can minimize the time required of doctors to administer developmental screens.

Furthermore, practitioners are already seeing many children with or at risk of developmental delays. Many of these children, despite practitioners' best efforts, have needs that are not identified. As with other developmental and mental concerns, these children frequently require additional time in a given pediatric visit, and may, indeed, come for additional sick-child visits. In this way, the time required to screen children—when the screening is integrated into developmental surveillance and an established follow-up protocol—will likely be at least partially offset through the speedier identification of children's needs.

### Barriers

Screening for early childhood mental development is impeded by:

- lack of training among pediatric primary care providers,
- concerns screening will take up too much time,
- lack of office or clinic strategies to integrate screening into routine well-child visits,
- limited knowledge about which screening tools to use,
- beliefs among parents and professionals that young children should not be labeled with mental health diagnoses,
- difficulty in billing for services provided to children who are at risk but without a mental health diagnosis,
- lack of or no knowledge of referral resources available in the community,
- divides between mental health and physical health care systems that leave gaps for young children, and
- unclear Medicaid guidance about screening versus assessment.

### The diagnostic framework: identifying appropriate codes and categories

Developmental screening tools were created, in part, because developmental issues in children can be difficult to detect. Children develop in spurts and lulls, and often in a non-linear fashion. All too often, there is a wide variation in “normal” development, whether in growth, cognitive, motor, or mental development. Furthermore, although there is a considerable degree of agreement on the definition of a developmental problem, there is less agreement concerning the severity at which an intervention is necessary or even what the intervention should be.<sup>52</sup> (This is in part due to financial concerns and in part do to lack of professional consensus.) Thus, pediatric providers may tend to accept or under-identify minor behavioral developmental problems.

Lack of appropriate diagnostic categories for young children is another perceived barrier. Currently, the Diagnostic and Statistical

<sup>52</sup> American Academy of Pediatrics (2001).

Manual of Mental Disorders, 4<sup>th</sup> Edition (DSM-IV) is the primary tool for diagnosing psychiatric issues, but diagnosis requires that the personality being assessed is “mature.” The Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood (DC:0-3) is considered by many to be a more appropriate framework for diagnosing behavioral developmental problems in young children.<sup>53</sup> Some areas have begun efforts to “crosswalk” these two systems to simplify billing and administration.<sup>54</sup>

The lack of appropriate mental health diagnoses for young children has also led to billing problems. Proper billing requires both a diagnosis and a procedural code. Yet, because of the problem mentioned above, the commonly used DSM-IV may make a diagnosis difficult. Although the American Medical Association’s Current Procedural Terminology includes a code for developmental screening (CPT: 96110), as well as assessment (CPT: 96111), the lack of a specific diagnosis could well prevent billing for interventions.<sup>55</sup> However, since a developmental screen is assumed as part of an EPSDT visit, Medicaid will not pay separately for the 96110 code.

### **Billing: the need for clearer state Medicaid guidance**

Because of the significant role Medicaid plays in the identification of behavioral developmental needs in young children—not to mention the role it plays in funding needed services—barriers in the Medicaid system can impact a large portion of the target population. Consequently, addressing these barriers can produce changes that affect

#### **Strategies that address Medicaid barriers**

- Craft Medicaid policy guidance that:
  - Clearly defines coverage of early childhood mental health services and qualified providers,
  - Permits and/or encourages the use of developmental screening and diagnostic tools appropriate for young children,
  - Distinguishes between screening and diagnostic assessment,
  - Recognizes the important role that families play in a child’s healthy mental development, including clarifying the coverage of family, even when only the child is a Medicaid beneficiary.
- Adopt Medicaid billing codes that can be efficiently used by providers of early health services and supports.
- Modify Medicaid managed care contracts to more clearly specify the responsibilities and opportunities of managed care contractors, primary care physicians, and mental health providers.
- Use funds more effectively by obtaining approval to use funding from other state programs (maternal and child health, public health, Early Intervention, etc.) and the state general fund as Medicaid matching funds in programs serving young children.

<sup>53</sup> DC:0-3 is a diagnostic classification system that was developed by experts over a period of many years. Children often require a longer period of observation to determine a mental health problem because they do not have the established personalities that adults do. DC:0-3 was developed in order to serve the diagnostic needs of professionals, while being sensitive to the needs and developmental idiosyncrasies of children.

<sup>54</sup> For more information on these efforts, see <http://www.zerotothree.org/imh/crosswalk.html>.

<sup>55</sup> Glascoe and Macias (2003).

the way primary pediatric and family practitioners serve all children. This can be done, for example, by permitting—either through a crosswalk or through adoption—the more appropriate procedural codes noted above.

Although state Medicaid plans permit screening and services for children with behavioral developmental problems—indeed this was the intent of EPSDT—many state plans are not sufficiently specific in identifying the services and the provider responsibilities. This is especially true in states that use managed care and carve out mental health services. However, this barrier can be overcome through better coordination and communication with the relevant stakeholder groups. In addition, guidance on these issues should be provided in Medicaid rules and contract language.<sup>56</sup>

Medicaid also funds services through IDEA Part C and/or through the individual services plan (ISP) under mental health programs. These plans, while rich in services, are not often coordinated, in part because they are likely to be located in different agencies.<sup>57</sup> Better coordination and communication among these services and programs could have a significant impact on the care delivered to young children who have or are at risk of behavioral developmental problems.

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<sup>56</sup> For examples of EPSDT contract language, see:  
[http://www.gwu.edu/~chsrf/Fourth\\_Edition/GSA/Subheads/gsa102.html](http://www.gwu.edu/~chsrf/Fourth_Edition/GSA/Subheads/gsa102.html).

<sup>57</sup> Johnson and Kaye (2003), 17.

## CONCLUSION

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Identifying children with or at risk of behavioral developmental delays has been likened to finding needles in haystacks. Even though there is no definitive study on prevalence rates for young children, it is clear that between 10 and 20 percent of children—far more than are currently identified—could benefit from some form of developmental intervention. The problem, of course, is identifying the children. An appropriately used, psychometrically valid screening tool is akin to a powerful metal detector that will help physicians find those needles, especially when done in the context of developmental surveillance and appropriate referral protocols.

This primer on screening tools is intended to provide a broad background on the need for screening, current practice, and barriers to implementation. It also provides a framework for evaluating the utility of different screening tools. It is our hope that by using the information here, states and stakeholder groups will be able to come to a consensus on the most appropriate tools for their communities. Many tools will clearly “do the job;” how well they fit, however, is best determined locally.

## **Appendix A**

### **Strategies for Selecting a Tool**



## STRATEGIES FOR SELECTING A TOOL

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States have a number of different options to consider when investigating screening tools. Identifying selection criteria, which should be done in conjunction with stakeholders, can help to make the decision easier. Even so, states continue to have many different options. A state could adopt and recommend the use of a single tool; another might compile a list of “recommended tools;” still another could recommend a “tool cocktail,” in which different screens are administered at different ages. What follows is an example of how one state (State A) might establish its priorities and determine which screening tool would serve it best. Following this example is another one that outlines State B’s implementation strategy for a screening tool cocktail.

### Implementation Strategies: Selecting a tool

#### Priorities for a screening tool in State A

- 1. Parent-completed:** In order to minimize the impact of the tool on physician time, the stakeholder committee decided that the tool should be completed by the parent. To make a final decision, the committee must also ensure that the literacy level of the tool is compatible with the literacy level of the parents completing the tool. Furthermore, if the tool is available in electronic form, it may intimidate parents unfamiliar with the technology, require regular maintenance and updating, or cause other difficulties.
- 2. Time required to complete and score the tool:** The stakeholder committee was concerned that a tool that was too time intensive would not be adequately completed by parents, jeopardizing the process. Furthermore, scoring the tool can potentially divert staff away from other important tasks. The committee decided to focus on shorter tools that could be completed by parents without intensive supervision
- 3. Tool should cover several domains:** Because developmental concerns can manifest themselves in many different domains, the stakeholder committee opted to pursue broad-based tools that cover several domains.
- 4. Cost and sustainability:** The committee decided that cost should be as low as possible. As a result, they narrowed their search to tools that are in the public domain or that permit unlimited photocopying after an initial charge.
- 5. Utility of measure for follow-up:** The committee also determined that the tool should clearly inform follow-up decisions, surveillance, and intervention. Accordingly, it should be easily integrated into existing and proposed changes to the system.

Armed with these five criteria, State A can now start looking at and evaluating screening.

## Implementation Strategies for The “Tool Cocktail”

### State B

The stakeholder committee in State B felt that no one screening tool adequately addressed all of the state’s needs and concerns. Because the group recognized that creating a new tool by cutting and pasting from different tools would not produce valid results, it decided to explore a “tool cocktail,” a combination of tools that would allow it to benefit from the strengths of a number of tools. State B opted to recommend the following cocktail and a protocol for its administration.

<b>Tools<sup>58</sup></b>	<b>Ages to be Used</b>
Bayley Infant Neurodevelopmental Screen (BINS)	Once per year for the first two years
Early Language Milestone Scale (ELM-Scale-2)	Every 6 months beginning with the first 6-month visit
Family Psychosocial Screening	Once a year
Behavioral Assessment of Baby’s Emotional and Social Style (BABES)	At one year and at 18 months
Center for Epidemiological Studies Depression Scale (CES-D)	Once for all mothers (at the 2-week visit)

The theory behind the use of this “tool cocktail” is that no one tool is capable of capturing information on enough of the factors that may contribute to a developmental problem. The state hopes that by using different validated tools at different times, the likelihood of identifying a problem will be increased.

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<sup>58</sup> Example 3 in Table 2 of Deborah Dobrez, PhD., et al. "Estimating the Cost of Developmental and Behavioral Screening of Preschool Children in General Pediatric Practice" *Pediatrics* 108:4 (October 2001).

## **Appendix B**

### **Screening Tool Matrix**



## SCREENING TOOL MATRIX

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The information reported in the following chart was compiled primarily from three different sources. Every effort was made to track all tools on the basis of the ten criteria established in the body of this report, but this was not always possible. Three categories—Strength vs. Deficit, Who Administers the Tool, and Scoring Requirements—were dropped from the chart due to lack of reliable or widely available information.

Information was incomplete for many of the tools listed below, or was reported differently in the various sources. For example, Huffman and Nichols often report sensitivity and specificity descriptively (as, for example, “good”) while Glascoe and Royal Children’s Hospital used reported values. Although a poor proxy, the number of items in the tool was reported under the “Time” column when the number of minutes was not available.

In instances where information from different sources conflicted, both values were reported. Notably, this occurred when PEDS was identified, alternatively, as a general developmental tool and as a behavioral developmental tool. Discrepancies were typically minor, but the information could not reasonably be ranked according to merit, so all reported values were used.

The information listed in the “Domains” columns is consistent with the terms used in the body of this paper: general developmental tools (which include a behavioral developmental component) and behavioral developmental tools (which focus specifically on behavioral development). There was some difficulty in making this distinction, as tools inconsistently reported the domains they cover, often including the term “emotional” and, occasionally, “social.” The one notable exception to this is the Infant-Toddler Social and Emotional Assessment, which was listed as addressing specific aspects of behavior.

The “RBRVS Cost” column reports values from a single source. Dobrez et al. endeavored to establish a cost methodology appropriate for screening tools. The reported values are based on the Resource-Based Relative Value Scale (RBRVS) which was first utilized in Medicare cost methodologies. The values reported in this column are inclusive of staff time, photocopying, and scoring, but they do not include the cost of the tool itself, as the report considered this a negligible cost when averaged across all patients over time. As is evident from the “Materials Cost” column, however, this may not be the case.

In some respects the values reported are incomplete as they reflect the cost each time the tool is administered. This complicates cross-tool comparison, because different tools should be administered with different degrees of frequency based on manufacturer instructions. If pediatricians utilize the tools faithfully, then the costs will vary even further than reported.

The model used to calculate the cost forecasted some variables which produced cost ranges. These variables include percentage of positive screens, and, for parent reported tools, an estimated value for the number of parents that will require assistance to complete the tool.

	<b>Tool</b>	<b>Domains</b>	<b>Elicitation</b>	<b>Age Range</b>	<b>Time</b>	<b>Materials Cost</b>
1	<b>Ages and Stages Questionnaire (ASQ)</b> <sup>2,4,5</sup>	General Developmental	Parent	0-60 months	15 minutes (if interview needed)	\$190 for complete kit; \$165 for CD-ROM; \$165 questionnaires (or may be photocopied).
				4-60 months	11-22 minutes 5 minutes	
2	<b>Ages and States Questionnaire--Social-Emotional (ASQ-SE)</b> <sup>2</sup>	Behavioral	Parent	6-60 months	10-15 minutes (if interview needed)	\$125 for complete kit; \$100 for questionnaires (or may be photocopied)
3	<b>Battelle Developmental Inventory Screening Test (BDIST)</b> <sup>2</sup>	General Developmental	Direct	12-96 months	15-35 minutes	\$371 for entire kit; \$156 for replacement tests
4	<b>Bayley Infant Neurodevelopmental Screen (BINS)</b> <sup>2,4</sup>	General Developmental	Direct	3-24 months	10-15 minutes	
5	<b>Behavior Assessment System for Children (BASC)</b> <sup>3</sup>	Behavioral	Parent or Teacher	30-60 months	10-20 minutes	\$330 for starter set; (\$410 for computer based starter); \$39 for replacement tests
6	<b>Brigance Screens</b> <sup>2,4</sup>	General Developmental	Parent and/or Direct	0-90 months or	10-15 minutes	\$110 for manual; \$31 for test packets
7	<b>Burks' Behavior Rating Scales, Preschool and Kindergarten Edition (Burks)</b> <sup>3</sup>	Behavioral/Emotional	Parent or Teacher	3-6 years	(105 items)	\$71 for complete preschool and kindergarten kit; \$34 replacement tests
8	<b>Caregiver-Teacher Report Forms-Revised</b> <sup>3</sup>	Behavioral/Emotional	Caregiver (Parent) or Teacher	18-60 months	(99 items)	\$170 for complete module; \$25 for replacement tests
9	<b>Child Behavior Checklist-Revised (CBCL-R)</b> <sup>3</sup>	Behavioral/Emotional/Social	Parent	18-60 months	(99 items)	
10a	<b>Child Development Inventories (CDI)</b> <sup>2-5</sup>	General Developmental	Parent or Direct	3-72 months		\$65 for starter kit; replacement materials \$11.
				4-16 years	12 minutes	

	Tool	RBRVS Cost <sup>1</sup>	Utility		Cultural Considerations	Comments
			Sensitivity	Specificity		
1	Ages and Stages Questionnaire (ASQ) <sup>2,4,5</sup>	\$12.41-\$16.86	70-90%	76-91%	Spanish and French versions available.	Reading level varies per question from 4th grade to 12th grade.
2	Ages and States Questionnaire--Social-Emotional (ASQ-SE) <sup>2</sup>		71-85%	90-98%		
3	Battelle Developmental Inventory Screening Test (BDIST) <sup>2</sup>					
4	Bayley Infant Neurodevelopmental Screen (BINS) <sup>2,4</sup>	\$22.22-\$26.67	75-86% or 63-80%	75-86%		
5	Behavior Assessment System for Children (BASC) <sup>3</sup>				Differentiated norms for age, sex, and SES to match 1988 census data. Available in Spanish.	
6	Brigance Screens <sup>2,4</sup>		70-82% or 75%	70-82% or 80%		
7	Burks' Behavior Rating Scales, Preschool and Kindergarten Edition (Burks) <sup>3</sup>				Cross cultural information unavailable from test population.	Conceptual model may be outdated.
8	Caregiver-Teacher Report Forms-Revised <sup>3</sup>				Same test population as for CBCL. Available in Spanish.	
9	Child Behavior Checklist-Revised (CBCL-R) <sup>3</sup>		Good	Good	Normative sample includes 4 ethnic groups, all SES groups, 40 states, and maternal/paternal responses. Available in Spanish.	
10a	Child Development Inventories (CDI) <sup>2-5</sup>	\$11.78-\$16.22			Questionable cross-cultural validity, test population was 95% Caucasian. A recently revised version utilized a more representative test population. Available in Spanish.	Limited number of infant items. 6-8th grade reading level. Lacks "scoring criteria for the items assessing behavioral and mental health issues."

	<b>Tool</b>	<b>Domains</b>	<b>Elicitation</b>	<b>Age Range</b>	<b>Time</b>	<b>Materials Cost</b>
10b	<b>Early Child Development Inventory (EDC)<sup>3</sup></b>	General Developmental	Parent	15-36 months	(84 items in two sections)	\$65 for starter kit; replacement materials \$11.
10c	<b>Infant Development Inventory (IDI)<sup>3</sup></b>	General Developmental	Parent	0-18 months	(one page, two sides)	\$65 for starter kit; replacement materials \$11.
10d	<b>Preschool Development Inventory (PDI)<sup>3</sup></b>	General Developmental	Parent	3-5 years	(84 items in two sections)	\$65 for starter kit; replacement materials \$11.
10e	<b>Child Development Review (CDR)<sup>3</sup></b>	General Developmental	Parent	18-60 months	(6 questions and a 25-item checklist)	\$65 for starter kit; replacement materials \$11.
11	<b>Eyeberg Behavior Inventory<sup>2,3</sup></b>	Behavioral	Parent	2-16 years	7 minutes (36 items)	\$147 for complete kit; \$29 for additional tests.
		Behavioral/Emotional				
12	<b>Infant-Toddler Checklist for Language and Communication<sup>2</sup></b>		Parent	6-24 months	5-10 minutes	
13a	<b>Infant-Toddler Social and Emotional Assessment (ITSEA)<sup>3</sup></b>	Externalizing, Internalizing, Dysregulation, Competencies			(139 items)	Free with permission from authors (ITSEA@yale.edu.).
13b	<b>Brief Infant-Toddler Social-Emotional Assessment (BITSEA)<sup>3</sup></b>	Behavioral	Parent	12-36 months	(60 items)	Free with permission from authors (ITSEA@yale.edu.).
14	<b>Pediatric Symptom Checklist (PSCL)<sup>2,3,5</sup></b>	Behavioral/Emotional	Parent	4-16 years	9-12 minutes, if interview needed (35 items)	Free (http://psc.partners.org).
		General Developmental				
15	<b>Parents' Evaluation of Developmental Status (PEDS)<sup>2-4</sup></b>	Behavioral	Parent	0-9 years	2 minutes (10 questions)	\$30 for kit; \$30 for supplemental materials; \$69.95 for PEDS manual.
		General Developmental		0-8 years		
16	<b>Temperament and Atypical Behavior Scales (TABS)<sup>2</sup></b>	Behavioral	Parent	11-71 months	5 minutes	\$80 for kit; \$20 for additional tests.
17	<b>Toddler Behavior Screening Inventory (TBSI)<sup>2</sup></b>	Behavioral	Parent	12-41 months	(40 items)	

		RBRVS Cost	Utility		Cultural Considerations	Comments
			Sensitivity	Specificity		
10b	Early Child Development Inventory (EDC) <sup>3</sup>		good	fair		Accuracy has not been studied for identifying problem items.
10c	Infant Development Inventory (IDI) <sup>3</sup>		good	good	(see CDI)	
10d	Preschool Development Inventory (PDI) <sup>3</sup>		68%	88%	(see CDI)	Accuracy has not been studied for identifying problem items.
10e	Child Development Review (CDR) <sup>3</sup>					IDI and CDR compliment each other.
11	Eyeberg Behavior Inventory <sup>2-3</sup>		80%	86%		
			good discriminant validity			
12	Infant-Toddler Checklist for Language and Communication <sup>2</sup>		78%	84%		
13a	Infant-Toddler Social and Emotional Assessment (ITSEA) <sup>3</sup>				Normed on an ethnically and socially diverse population.	Longer measure intended for second - stage screening of problem behaviors. (See BITSEA.)
13b	Brief Infant-Toddler Social-Emotional Assessment (BITSEA) <sup>3</sup>		Fair to Good	Fair to Good	Normed on an ethnically and socially diverse population.	Shorter measure intended for first-stage screening of problem behavior. (See ITSEA.)
14	Pediatric Symptom Checklist (PSCL) <sup>2,3,5</sup>	\$11.43- \$15.98	Good	Good	Test population was a large, representative sample. Available in Spanish and Chinese.	6-8th grade reading level.
			80-95%	68-100%		
15	Parents' Evaluation of Developmental Status (PEDS) <sup>2-4</sup>	\$11.43- \$15.98	74-79%	70-80%	Normed on a diverse background. Available in Spanish and Vietnamese.	Concurrent validity correlations are high, but not always in the expected domain.
			Discriminant validity is high			
16	Temperament and Atypical Behavior Scales (TABs) <sup>2</sup>		72%	83%	Available in Spanish.	
17	Toddler Behavior Screening Inventory (TBSI) <sup>2</sup>				Concerns about cross-cultural validity based on homogeneity of test population.	

<sup>1</sup> Values are based on the Resource-Based Relative Value Scale (RBRVS) which is used to calculate Medicare rates. As reported in Deborah Dobrez, PhD, et al. "Estimating the Cost of Developmental and Behavioral Screening of Preschool Children in General Pediatric Practice" *Pediatrics* 108:4 (October 2001).

<sup>2</sup> "Improved Developmental Screening Practices for Young Children," Frances Page Glascoe (at [www.firstsigns.org](http://www.firstsigns.org)).

<sup>3</sup> Lynne C. Huffman and Mary Nichols, "Early Detection of Young Children's Mental Health Problems in Primary Care Settings" in *Handbook of Infant, Toddler, and Preschool Mental Health Assessment*, ed. Rebecca DelCarmen-Wiggins, PhD, and Alice Carter (Oxford University Press, 2004).

<sup>4</sup> Center for Community Child Health, Royal Children's Hospital, *Child Health Screening and Surveillance: A Critical Review of the Evidence* (Melbourne, Australia: National Health and Medical Research Council, March, 2002).

<sup>5</sup> Frances P. Glascoe, PhD, and Michelle M. Macias, MD, "How You Can Implement the AAP's New Policy on Developmental and Behavioral Screening" *Contemporary Pediatrics* 20(4):2003 85-102.