



An Overview of Developmental Screening: Implications for Practice

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Abstract

The current article provides an overview of developmental screening tools and their usefulness for early intervention and early childhood special education. Research shows that systematic screening can lead to earlier identification of children in need of services. Early identification and intervention leads to better outcomes for young children at risk for a developmental delay or disorder. Appropriate screening tools are reliable, valid, and practical for use by classroom teachers and families. Input from parents is especially important for considering screening results. Follow-up actions to screening may include rescreening, targeted assessments, or initiated service coordination. Screening has additional value for program and classroom planning. Further research is needed to allow for the implementation of screening practices in countries currently without systematic screening.

Keywords: Developmental screening, early intervention, screening tools, child development

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1. Introduction

The early years of life are a period of remarkable growth and set the stage for a lifetime of development (Shonkoff & Phillips, 2000). Policymakers, researchers, and educators increasingly recognize the importance of early screening for young children. Early and systematic screening is used to identify potential delays in all aspects of development, including social/emotional behavior, vision and hearing, motor skills and coordination, cognitive abilities, and language and speech. According to the American Academy of Pediatrics (AAP), early identification of developmental disorders is critical to the well being of children and their families (2006). Moreover, the AAP (2006) suggests that standardized developmental screening tests be administered regularly at the 9-, 18-, 24-, and 30-month well-child visits. Using the results from the screening tests, professionals can refer children for comprehensive evaluations to rule out or differentially diagnose delays or developmental disorders. This process can lead to initiation of intervention services for children and their families (Bethell, Reuland, Schor, Abrahms, & Halfon, 2011; Pizur-Barnekow, Erickson, Johnston, Bass, Lucinski, & Blueuel, 2010).

This manuscript provides a summary of the literature on developmental screening and aims to identify the distinguishing characteristics of screening tools and to examine standard screening procedures. Additionally, this summary is presented to illustrate how to select effective and accurate screening tools, and to discuss implications for practice in nations where systematic screening services are emerging.

1.1. Purpose of Developmental Screening

An operational definition of developmental screening is important to consider particularly in the context of early childhood education. The Division for Early Childhood (DEC) Recommended Practices (2006) defines screening as “a rapid process for identifying individuals who require closer examination for possible disabilities or special needs” (p.62). According to the joint position statement of the National Association for

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the Education of Young Children (NAEYC) and the National Association of Early Childhood Specialists in State Departments of Education (NAECS/SDE) screening is only used to determine whether to refer the child for further assessment, not for diagnosis, labelling, early intervention planning, or placement (NAEYC, 2003).

Screening and assessment have fundamentally different purposes. Screening tools have an ultimate goal of identifying immediate concerns and the potential need for further evaluation. Screening tools do not diagnose or determine severity of a developmental delay or disability but can indicate when a child is at heightened risk for a delay. Appropriate developmental screeners provide an initial “snapshot” of a child’s development. In general, the results illustrate the child’s current developmental status when compared with children of the same age. Many tools provide a cut off score to determine which children are at risk for developmental delay or disorder, and which children are typically developing. Children scoring at or beyond the cut off score are generally referred for a developmental assessment in a timely manner. In contrast, the purpose of an assessment or evaluation is to diagnose and potentially describe the nature and extent of a developmental delay or disorder. Similar to a developmental screener, results from the assessment measure will ideally be considered in the context of a child’s natural environment and information provided by primary caregivers or early childhood professionals.

1.2. Scope

Child development is rapid and differentiated. Children learn to hop, tell stories, solve puzzles, apologize, snip with scissors, and perform countless other tasks which enable and promote continued development and growth. Because the developmental progress is so differentiated, developmental screening tools need to target a range of developmental domains. Common domains include motor (fine and gross), language (receptive and expressive), cognitive, problem solving, social-emotional, and adaptive.

1.3. Screening Tools Selection

Selecting an appropriate developmental screening tool is an important decision. Researchers recommend that the developmental screening tools be brief, norm-referenced, reliable, valid, low-cost, standardized in procedural and scoring phases, and comprehensively inclusive of all developmental domains (Kauffman, 2005). Several questions may guide the selection process:

- Was the tool normed on a representative sample of the population?
- How old is the test? Do test takers have access to the most recent version of the test?
- Does the test include all of the targeted developmental domains?
- What is the technical adequacy of the test?
- Who can administer the test (i.e., preschool teachers, parents, or pediatricians)?

Beyond these considerations, characteristics of the normative group should be considered (Bailey, 2004; Salvia, Ysseldyke, & Bolt, 2007). For instance, a tool’s normative sample should proportionally represent culture, gender, socio-economic status, urban-rural distribution, and children who are developing typically and atypically. In addition to the composition of the normative sample, the date of norming should be considered (Bailey, 2004; Salvia, Ysseldyke, & Bolt, 2007). Rapid changes in society, technology and advancement in medical and educational knowledge affect child development and parental expectations. As a result, there is a need for frequent norming of developmental screening tools on a regular basis.

Developmental screening tools need to be both reliable and valid (Salvia et al., 2007; Zeanah, 2009). Reliability refers to the consistency of test performance. Failure to report information about reliability critically limits the quality of a tool. Validity refers to the extent to which a test measures the constructs it is intended to measure; i.e., does a developmental screening test measures a child’s development? (Salvia et al., 2007; Zeanah, 2009). Table 1 provides a summary of reliability and validity types.

Two additional important technical aspects of screening tools are specificity and sensitivity, which are often important elements in determining a cutoff score when tests are developed. In regard to developmental screening results, specificity is defined as the ability of the test to correctly identify children who do not have a disability or developmental delay and should be in the range of 70-80% or higher (AAP, 2006). Sensitivity is the ability of the test to correctly identify children who are indeed developmentally delayed or have a disability and should also be in the range of 70-80% or higher (Salvia et al., 2007; Zeanah, 2009).

Another primary consideration is that the tools be appropriate for use in the context of the programs and services of the country-wide early learning system. The tool should be able to be administered in multiple early

childhood settings, (e.g., nursery school, preschool, and kindergarten) and in healthcare and medical settings. Test-users such as preschool teachers, healthcare professionals, and early interventionists must determine if a tool will result in accurate and appropriate results for the individual children who will be screened. Screening results are only useful when a tool has been appropriately normed and studies demonstrate evidence for reliability and validity. If evidence for any of the aforementioned aspects is lacking or not reported, the user cannot be confident in the tool's ability to demonstrate accurate results.

2. Administration of the Screening Tool

Young children can be notoriously difficult to observe. They may tire or be easily distracted. They may not feel comfortable with unfamiliar adults and may refuse to follow adult's directions. Children may behave differently in novel environments, whereas they may feel secure and safe in their natural environment(s) such as their home and classroom. Dual language learners may not demonstrate their actual abilities, if they are screened in a language that they are still learning. Children's cultural and socio-economic backgrounds can also affect their performance. Therefore, careful attention should be given to the screening procedures to obtain the child's best possible performance.

2.1. The Role of Parents

Parents play an important role in the development and learning of their children regardless of child's developmental status. Additionally, parents observe their child's behaviors outside of the educational and clinical settings. Parents know their child's likes, interests, strengths, as well as needs, fears, and past experiences. The partnership between parents and professionals is important as evidenced by research and reflected in legal, medical, and educational fields (Blue-Banning, Summers, Frankland, Nelson, & Beegle, 2004; Committee on Hospital Care, 2003). Accurate developmental screening needs to consider valuable information from parents about their child's skills and difficulties.

Involving families in the screening process often brings rich and extensive information about the child, which may be otherwise unavailable (Neisworth & Bagnato, 2005). In other words, without the information from caregivers, the picture of a child's development may be incomplete. Furthermore, results from parent-completed screening tools have been found to be as valid as those completed by professionals (Knobloch, Stevens, Malone, Ellison, & Risemberg, 1979).

Dinnebeil & Rule (1994) provide a review that examines the congruence between parent and professional assessments of the abilities of children with disabilities, and note the strong positive correlations of their judgments. In addition, parental concern has been reported as valid when used with standard measures in identifying young children with developmental delays (Diamond, 1987). Bricker & Squires (1989) also point out that parents are able to provide useful information for making decisions for referral. Furthermore, many parent-completed developmental screening tools provide a format to assist families in organizing daily observations in a systematic way and provide a means for comparing the results with the appropriate norm in order to determine if children are at risk for delays.

2.2. The Role of Teachers

Early childhood educators who are involved in selecting and administering a developmental screening tool must use caution about the test's technical adequacy and its appropriateness for the population of children being tested. Educators should ask themselves, "Is the test representative of children who have varying language, socio-economic, and developmental backgrounds? Do test items call for skills that children are unlikely to have in their culture? Does the scoring allow for parental concerns? Does the tool contain all of the developmental areas needed? Are the expected skills measurable and observable?" If the test seems technically or culturally inappropriate, test administrators should acknowledge the limitations of the tool and should be able to select a more appropriate tool. Commonly used and well-designed tools are summarized in Table 2.

Teachers can provide valuable insight into a child's functional abilities. On a daily basis, preschool teachers carefully observe children and monitor their progress. For instance, they may take anecdotal notes, video record children's behaviors, and collect children's work samples. This evidence can be used to examine a child's overall skillset including interests and emerging abilities. For preschool teachers, observation and documentation have become integral and useful components of each day. Teachers may have unique and informed opinions about child development based on training and experience.

Including teachers in the screening process is a recommended practice (Bordignon & Lam, 2004), which enhances the validity of the screening (Lamberty & Crnic, 1994; Meisels, Henderson, Liaw, Browning, & Have, 1993; Williams, Gridley, & Treloar, 1989). Similarly, Meisels (1993) has suggested that any assessment might be incomplete if the information is not from a familiar and comfortable context where young children can naturally demonstrate their abilities. In addition, systematic screening is recommended for teachers to use in the assessment of development across domains (Bordignon & Lam, 2004). With a systematic screening tool to focus their observations, teachers can identify children with suspected learning problems efficiently and cost-effectively (Satz & Fletcher, 1988).

3. Follow-up

Developmental screening allows for effective and targeted follow-up assessment and support from pediatricians, specialists and early interventionists. Children who are identified by a developmental screener as at risk for developmental delay often receive appropriate services earlier. There is a fundamental link between valid and reliable developmental screeners and timely referral to early intervention services (Guevara et al., 2012; Hix-Small et al., 2007).

Screening results should be discussed with parents and caregivers. Conversations about screening results provide an opportunity for parents to ask questions and gain understanding of the developmental expectations for their child; and an open discussion may help to alleviate or validate parental concerns. Follow-up to screening results can provide favorable action for all children and aid in increased identification of young children with disabilities (Earls & Hay, 2006). Figure I provides a flowchart of typical screening results. For children in a monitoring range, parents receive information about how to support their child's development in the areas of concern. Input from parents about concerns or observations of their child's behavior have been shown to be a valid and reliable source of information about children's development (Glascoe, 2000), which is why each result includes a conversation with the child's parents.

For children whose screening results indicate a risk of developmental delay or disorder, immediate action is needed in order to coordinate appropriate services for that child. Children whose screening results indicate considerable concern are referred for further, more targeted diagnostic assessments. Results from these assessments can be used to qualify a child for early intervention services.

While comprehensive assessment of young children can be costly and require close professional observation, parents often initially complete screening tools (Glascoe, 2000; Squires, 1996). Effective screening tools allow for targeted follow-up and remove the necessity for in-depth assessment of all children in all domains. Because any tool's sensitivity will be less than 100%, a screening tool will miss some children with developmental delay. A lack of efficiency in screening administration can also result in children who are not referred for services (King et al., 2010). The conclusion is that children can be better reached by regular and systematic use of a developmental screening tool (King et al., 2010).

3.1. Program Planning and Developmental Screeners

Screening tools are brief, global and not designed to be used as intervention planning tools (Bricker, Squires, & Clifford, 2010); however, they are helpful in beginning to individualize classroom activities for children who may need support in specific areas. Furthermore, consistent screening of the classroom population can provide opportunity for new experiences for children, allowing for different learning styles to be supported (Greenspan & Meisels, 1996). For systematic programs, like Head Start, screening is an initial step for any child entering the program. The Head Start Program Performance Standards (2012) state that "ongoing assessment is required for each child to identify his strengths and needs, to help tailor learning experiences and other services, and to support staff in communicating and working with parents and families" (pp.122). Systematic use of screeners allows for program development and appropriate individuation.

Program planning can be influenced by the additional information about child goals and strengths provided by consistent use of a developmental screener in the classroom environment. Screening tools are generally user-friendly and brief enough to be administered across an entire classroom or program (Fox et al., 2010). The use of developmental screeners program-wide can allow for successful monitoring of children as well as the creation of appropriate opportunities to master emergent developmental tasks.

4. Implications for Practice in Developing Countries

Developmental screening can have substantive short- and long-term effects on child development and learning. Having access to individualized and coordinated early intervention services can change a child's and his/her parents' lives. These changes are quite robust with respect to social and economic contexts. Early screening can improve the development and intervention success of disadvantaged children in developing countries as well as in advanced communities. The potential return to societies that have systematic child screening and early intervention services is high and large numbers of children in developing countries could benefit from such investments (Barnett & Masse, 2007, Heckman, 2006) Yet, not every country has established universal screening programs and early intervention services. Development may vary between and within countries. The following recommendations would be beneficial for all countries that are lacking developmental screening services.

1. Policies about systematic developmental screening may not be sufficient to change the status quo. The process requires interdisciplinary coordinated support from national governments, non-governmental organizations, local authorities, spokes persons, organizations regarding early childhood education/early intervention/early childhood special education, and parent advocacy groups. Moreover, international organizations and research groups may share their experiences with initiatives in developing countries.
2. The principles of equal access to health and education services should be reflected in policy and need to be accompanied by efforts to establish and maintain awareness of developmental screening among the general public. Some of the examples are as follows: a) health care and education services may provide information to families on how to monitor their child's development, b) mobile services may reach families who live in urban areas, and c) public programs may broadcast the importance of developmental screening on television and radio.
3. Early childhood education programs, early intervention agencies, health care clinics, and welfare agencies should collaborate to provide timely services to children and their families. In the long run, interdisciplinary collaboration may also improve services to children and their families.
4. Reliable and objective data are necessary to assist in planning, resource allocation (including budget and required workforce), progress monitoring, and goal setting in developing countries. Although establishing a statistical infrastructure may take time and effort, it would guide future agenda on universal screening.
5. Early childhood teacher training programs can improve their curricula by providing courses on screening and assessment. A systematic national reform on the early childhood teacher training and public early childhood education programs may result in greatly improved child development. Relatively few studies inform early intervention policy and practice in developing countries. There is a need for more research in areas such as in-service teacher training programs and early childhood special education.
6. Well-trained professionals such as preschool teachers, health care staff, and early interventionists should have easy access to low-cost, user-friendly, and reliable and valid developmental screening tools. They can administer the tool or be able to respond to parents' administration of a tool. They should assist children and their families before, during, and after the screening process.

Table 1.

<i>Summary of Reliability and Validity Types</i>	
Term	Description
Reliability	
Procedural reliability	The extent to which the examiner follows administrative procedures and scoring processes required by a particular test.
Scoring reliability	The extent to which the score calculations and score summaries are accurate.
Test-retest reliability	Requires administering the same test to sample population on two different occasions and assessing if the scores are stable over time.
Internal consistency*	Addresses an individual's responses in a given administration of a test are consistent with each other.
Validity	
Content validity	Refers to how well the content of the test represents the domain tested.
Convergent and discriminant validity (construct validity)	Refers to how well a test correlates with other tests that measure similar and different constructs.
Criterion validity (concurrent & predictive)	Assesses the extent to which a test corresponds to some other independent measure.
Instructional utility	Refers to the extent to which an instrument provides useful information for planning intervention programs for children.
Social validity	Describes the extent to which consumers find the information from measures or results of research to be meaningful or relevant.

Note. *Internal consistency reliability defines the consistency of the results, ensuring that the various items measuring the different constructs (i.e., language or physical domain) deliver consistent scores.

Table 2.

Screening Tools for Young Children

Name	Developmental Domains	Age Range	Time Frame	May be administered by
Ages and Stages Questionnaire (ASQ) – 3 rd Ed.	Communication, personal-social, fine and gross motor, and problem solving.	Birth - 60 months	15-20 minutes	Parents, educators, and health care professionals.
Battelle Developmental Inventory Screening Test (BDIST)	Attention, self- help, interactions, fine and gross motor, memory, reasoning, and expressive and receptive language skills.	12 months-96 months	10-30 minutes	Educators, requires direct interaction with child and parent interview.
Brigance Screens, 2 nd Ed.	Gross motor, fine motor, self-help, social-emotional, receptive and expressive language, visual-graphomotor, articulation & fluency, quantitative concepts, pre-reading skills, and ability to give personal information as appropriate for child's age.	Birth-90 months	15-20 minutes	Educators, requires parent report for infant and toddler form; others direct interaction with child.
Child Development Inventories (CDI)	Gross motor, fine motor, language, comprehension, and person-social.	3 - 72 months	10 minutes	Educators, requires direct interaction with child and parent interview.
Developmental Activities Screening Inventory-II (DASI- II)	Tasks are organized in 15 skill categories including sensory intactness, means-end relationships, causality, memory, and reasoning.	1 month-60 months	25-30 minutes to administer	Educators.
Early Screening Inventory-Revised (ESI-R)	Developmental, sensory, and behavioral concerns in the child's visual motor/adaptive, language cognitive, and gross motor functioning.	ESI-P: 3 years - 54 months; ESI-K: 55 months - 72 months	15-20 minutes	Educators, requires direct interaction with child and parent report.
Parents' Evaluations of Developmental Status (PEDS)	Global/cognitive, expressive language and articulation, receptive language, fine motor, gross motor, behavior, social-emotional, self-help, and school.	Birth-8 years	2-5 minutes	Educators, requires direct interaction with child and parent interview.

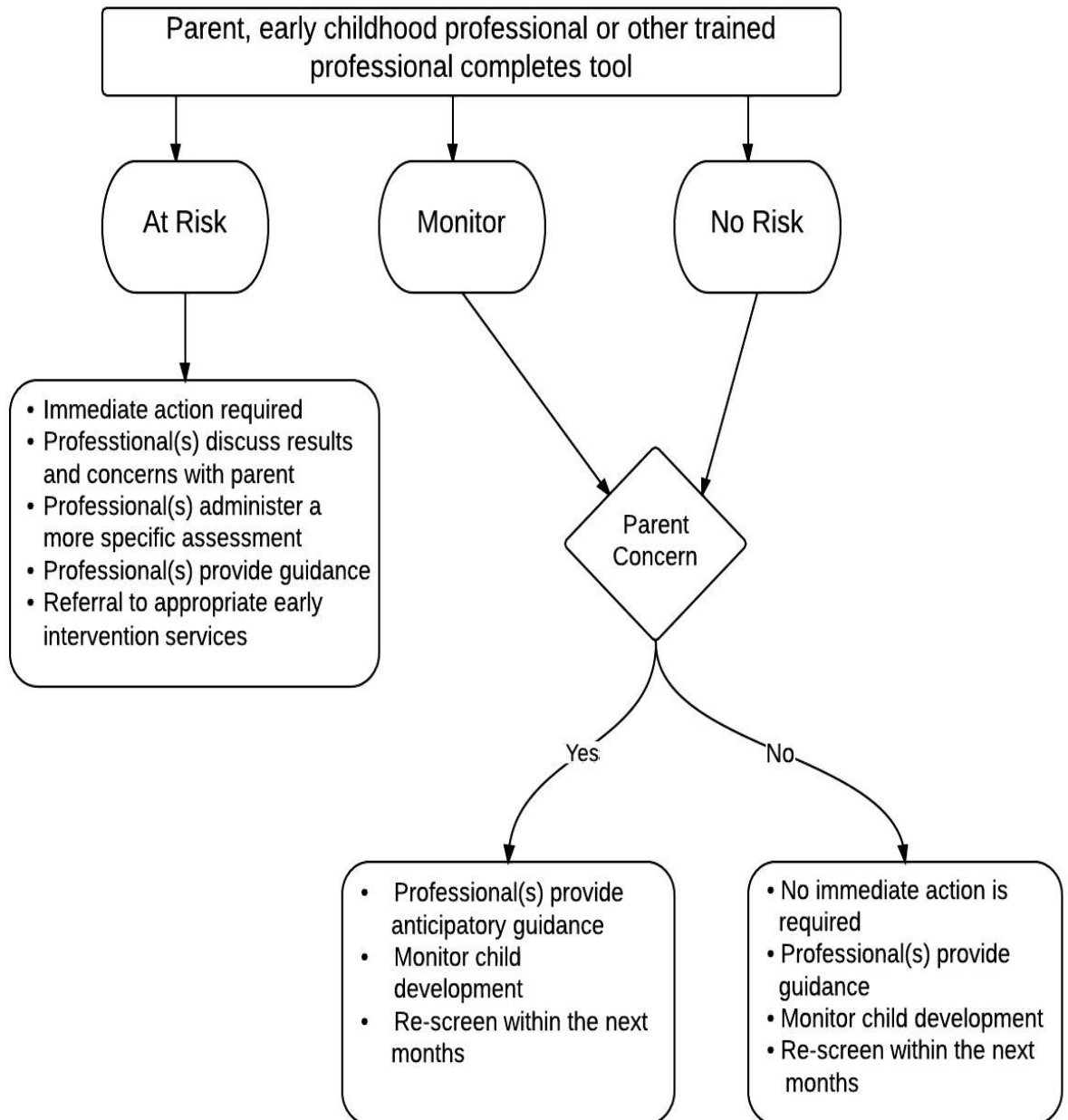


Figure I.

The flowchart for screening results.

References

- American Academy of Pediatrics [AAP]. (2006). Identifying infants and young children with developmental disorders in the medical home: An algorithm for developmental surveillance and screening. *Pediatrics*, 118, 405–420.
- Bailey, D. B., Jr. (2004). Test and test development. In M. McLean, M. Wolery, & D. B. Bailey, Jr. (Eds.), *Assessing infants and preschoolers with special needs* (pp. 22–44). Upper Saddle River, NJ: Pearson Education, Inc.
- Barnett, W., & Masse, L. (2007). Comparative benefit–cost analysis of the Abecedarian program and its policy implications. *Economics of Education Review*, 26, 1, 113–125.
- Bethell, C., Reuland, C., Schor, E., Abrahms, M., & Halfon, N. (2011). Rates of parent-centered developmental screening: disparities and links to services access. *Pediatrics*, 128, 1, 146–55.
- Blue-Banning, M., Summers, J. A., Frankland, H. C., Nelson, L. L., & Beegle, G. (2004). Dimensions of family and professional partnerships: Constructive guidelines for collaboration. *Exceptional Children*, 70(2), 167–184.
- Bordignon, C. M., & Lam, T. C. M. (2004). The early assessment conundrum: Lessons from the past, implications for the future. *Psychology in the Schools*, 41, 737–749.
- Bricker, D., Squires, J. (1989). The effectiveness of screening at-risk infants: Infant Monitoring Questionnaire. *Topics in Early Childhood Special Education*, 9(3), 67–85.
- Bricker, D., Squires, J., & Clifford, J. (2010). Developmental screening measures stretching the use of the ASQ for other assessment purposes. *Infants and Young Children*, 23(1), 14–22.
- Committee on Hospital Care. American Academy of Pediatrics. (2003). Family-centered care and the pediatrician's role. *Pediatrics*, 112, 3, 691–7.
- Diamond, K. (1987). Predicting school problems from preschool developmental screening: A four-year follow-up of the Revised Denver Developmental Screening Test and the role of parent report. *Journal of Early Intervention*, 11, 247–253.
- Dinnebeil, L.A., & Rule, S. (1994). Congruence between parents' and professionals' judgments about the development of young children with disabilities: A review of the literature. *Topics in Early Childhood Special Education*, 14(1), 1–25.
- Earls, M. F., & Hay, S. S. (2006). Setting the stage for success: implementation of developmental and behavioral screening and surveillance in primary care practice--the North Carolina Assuring Better Child Health and Development (ABCD) Project. *Pediatrics*, 118(1), 183–8.
- Glascie, F. P. (2000). Early detection of developmental and behavioral problems. *Pediatrics in Review*, 21(8), 272–280.
- Greenspan, S. I., Meisels, S. J. (1996). Toward a new vision of developmental assessment of infants and young children. In S. J. Meisels & E. Fenichel (Eds.), *New visions for the developmental assessment of infants and young children* (pp. 11–26). Washington, DC: ZERO TO THREE.
- Guevara, J. P., Gerdes, M., Localio, R., Huang, Y. V., Pinto-Martin, J., Minkovitz, C. S., Hsu, D., ... Pati, S. (2013). Effectiveness of developmental screening in an urban setting. *Pediatrics*, 131(1), 30–7.
- Heckman, J. J. (2006). Skill formation and the economics of investing in disadvantaged children. *Science*, 312(5782), 1900–1902.
- Hix-Small, H., Marks, K., Squires, J., & Nickel, R. (2007). Impact of implementing developmental screening at 12 and 24 months in a pediatric practice. *Pediatrics*, 120, 2, 381–9.
- King, T. M., Tandon, S. D., Macias, M. M., Healy, J. A., Duncan, P. M., Swigonski, N. L., Skipper, S. M., & Lipkin, P. H. (2010). Implementing developmental screening and referrals: lessons learned from a national project. *Pediatrics*, 125(2), 350–60.
- Knobloch, H., Stevens, F., Malone, A.F., Ellison, P., & Risemberg, H. (1979). The validity of parental reporting of infant development. *Pediatrics*, 63(6), 872–878.
- Lamberty, G., & Crnic, K. (1994). School readiness conference: Recommendations. *Early Education and Development*, 5, 165–176.
- Meisels, S.J. (1993). Remaking classroom assessment with the Work Sampling System. *Young Children*, 48, 34–40.
- Meisels, S.J., Henderson, L., Liaw, F., Browning, K., & Have, T.T. (1993). New evidence for the effectiveness of the Early Screening Inventory. *Early Childhood Research Quarterly*, 8, 327–346.
- Neisworth, J. T., & Bagnato, S. J. (2005). DEC recommended practices: Assessment. In S. Sandall, M. L. Hemmeter, B. J. Smith, & M. E. McLean (Eds.), *DEC recommended practices: A comprehensive guide for*

practical application in early intervention/early childhood special education (pp. 45–69). Missoula, MT: Division for Early Childhood.

Pizur-Barnekow, K.P., Erickson, S., Johnston, M., Bass, T., Lucinski, L., Blueuel, D. (2010). Early identification of developmental delays through surveillance, screening, and diagnostic evaluation. *Infants and Young Children*, 23(4), 323-330.

Salvia, J., Ysseldyke, J. E., & Bolt, S. (2007). *Assessment in special and inclusive education*. (10th ed.) Boston: Houghton-Mifflin.

Satz, P., & Fletcher, J. M. (1988). Early identification of learning disabled children: An old problem revisited. *Journal of Consulting and Clinical Psychology*, 56, 824-829.

Shonkoff, J. P., Phillips, D., & National Research Council (U.S.). (2000). *From neurons to neighborhoods: The science of early child development*. Washington, D.C: National Academy Press.

Shonkoff, J. P. (2010). Building a New Biodevelopmental Framework to Guide the Future of Early Childhood Policy. *Child Development*, 81(1), 357-367.

Squires, J. (1996). Parent-Completed Developmental Questionnaires: A Low-Cost Strategy for Child-Find and Screening. *Infants and Young Children*, 9(1), 16-28.

U.S. Department of Health and Human Services, Administration on Children, Youth and Families/Head Start Bureau. *The Head Start Path to Positive Child Outcomes*. Washington, D.C.

Williams, K.T., Gridley, B.E., & Treloar, J.H. (1989). Using the parents' input in preschool screening. *Journal of Reading, Writing and Learning Disabilities International*, 5, 345–352.