



Analysis of the developmental functioning of early intervention and early childhood special education populations in Oregon



NATIONAL CENTER FOR
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Institute of Education Sciences
U.S. Department of Education



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August 2009

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August 2009

This report was prepared for the Institute of Education Sciences (IES) under Contract ED-06-CO-0016 by Regional Educational Laboratory (REL) Northwest administered by Northwest Regional Educational Laboratory. The content of the publication does not necessarily reflect the views or policies of IES or the U.S. Department of Education nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

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Nave, G., Nishioka, V., and Burke, A. (2009). *Analysis of the developmental functioning of early intervention and early childhood special education populations in Oregon* (Issues & Answers Report, REL 2009—No. 078). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Northwest. Retrieved from www.ies.ed.gov/ncee/edlabs.

This report is available on the regional educational laboratory web site at www.ies.ed.gov/ncee/edlabs.

Analysis of the developmental functioning of early intervention and early childhood special education populations in Oregon

This study reports on the developmental functioning levels of children from birth through age 2 in early intervention services and children ages 3–5 in early childhood special education services at the time of entry into services, using data from the Oregon Early Childhood Assessment System.

This report informs Oregon education policymakers about the developmental functioning levels of children from birth through age 2 in early intervention services and children ages 3–5 in early childhood special education services at the time of entry into services, using data from the Oregon Early Childhood Assessment System. The assessment system contains data on the assessed developmental functioning levels of children based on the 16 Oregon early childhood foundation areas and the three U.S. Office of Special Education Programs federal reporting child outcome areas.

The Oregon Department of Education sponsored the development of *Oregon Early Childhood Foundations* (Oregon Department of Education 2008a) to identify key developmental foundation areas or skills necessary for children to succeed in school. Aligned with the Oregon K–12 standards, these 16 early

childhood foundation areas identify developmental indicators critical for school readiness and academic success.

The study's findings will help the Oregon Department of Education understand the functioning levels of children from birth through age 5 with developmental needs and assist service providers in developing materials, training, and technical assistance for children enrolled in early intervention and early childhood special education services.

The study analyzes developmental functioning data and key demographic variables (primary disability, gender, race/ethnicity, and primary home language) for the entire population of children in early intervention and early childhood special education services who received services over a 13-month period during 2006/07. The study results show the percentage of children in early intervention and early childhood special education services assessed as functioning below age-expected skill levels on skills assessments using age-related criteria embedded in the Oregon Early Childhood Assessment System database.

With few exceptions, the developmental skills that were most often assessed as functioning

below age-expected skill levels among children across all demographic subgroups were those important to school readiness in literacy and mathematics. Additional findings include:

- Two primary disabilities—developmental delay and communication disorder—accounted for approximately 90 percent of disabilities in both early intervention and early childhood special education populations. Among children receiving early intervention services, higher percentages of children with developmental delays than of children with communication disorders were assessed as functioning below age-expected skill levels on 13 of the 16 foundation areas. Among children receiving early childhood special education services, this pattern was more pronounced, with higher percentages of children with developmental delays than of children with communication disorders assessed as functioning below age expected skill levels on all 16 foundation areas.
- For both age groups a higher percentage of boys than of girls were assessed as functioning below age-expected skill levels across all foundation areas except gross motor skills.
- The percentages of children in early intervention and early childhood special education services who were assessed as functioning below age-expected skill levels in each early childhood foundation area were generally consistent across race/ethnicity. The most problematic foundation areas for both age groups were phonological awareness and numbers and operations, followed closely by print awareness.
- For the early intervention group the percentage of children assessed as functioning below age-expected skill levels was similar for White and Hispanic children across all 16 foundation areas. Among the early childhood special education children, Hispanic children were more likely than White children to be assessed as functioning below age-expected skill levels on 14 of the 16 foundation areas.
- For Hispanic children enrolled in early intervention services the two foundation areas with the largest differences in the percentage of children assessed as functioning below age-expected skill levels between children from Spanish-speaking homes and children from English-speaking homes were patterns and measurement and speaking and communicating.
- For Hispanic children enrolled in early childhood special education services the percentage of children from Spanish-speaking homes who were assessed as functioning below age-expected skill levels was 1.10–1.31 times higher than that for Hispanic children from English-speaking homes across 9 of the 16 foundation areas. The two foundation areas with the largest discrepancies between Spanish- and English-speaking Hispanic children were speaking and communicating and listening and understanding.
- For early intervention services higher percentages of children were assessed as functioning below age-expected skill levels on the U.S. Office of Special Education Programs child outcome area of acquisition of

knowledge and skills than on the outcome areas of positive social-emotional skills or use of appropriate behaviors to meet their needs. For children in both early intervention services and early childhood special education services the appropriate

behaviors outcome area consistently had the lowest percentage of children assessed as functioning below age-expected skill levels.

August 2009

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This study reports on the developmental functioning levels of children from birth through age 2 in early intervention services and children ages 3–5 in early childhood special education services at the time of entry into services, using data from the Oregon Early Childhood Assessment System.

WHY THIS STUDY?

The past 20 years have been marked by increasing federal and state emphasis on accountability, standards-based reform, and measurement of child outcomes for all children, including infants, toddlers, and preschool children with disabilities. This emphasis is reflected in an array of federal

legislation, including the Goals 2000: Educate America Act of 1994, the Government Performance and Results Act of 1993, amendments to the Individuals with Disabilities Education Act (IDEA) in 1997, the No Child Left Behind (NCLB) Act of 2001, Good Start, Grow Smart (White House 2002), and reauthorization of the IDEA in 2004. Accountability systems that can monitor child outcomes across time are a strong priority at both state and federal levels (Council for Exceptional Children 2006; Hooks et al. 2006; National Association for the Education of Young Children and National Association of Early Childhood Specialists in State Departments of Education 2003).

The critical importance of children's early experiences to their later school success and adult outcomes is well documented (Parrish and Phillips 2003; Shonkoff and Phillips 2000). At-risk children from low-income families who receive high-quality early childhood services have lower rates of special education placement and grade retention and higher rates of high school completion than do children who do not receive early childhood education (Reynolds et al. 2002).

Children with disabilities who receive early intervention services also achieve better education and family outcomes (Hebbeler et al. 2007; Simeonsen, Cooper, and Scheiner 1982). The National Early Intervention Longitudinal Study found that 55 percent of the children who received early intervention stopped receiving services by age 3 because they were no longer eligible or their families reported that services were no longer needed (Hebbeler et al. 2007). Likewise, the Pre-Elementary Education Longitudinal Study found that preschool children (ages 3–5) with disabilities who received early childhood special education services significantly increased their literacy, math, and social skills (Carlson et al. 2008).

Standards-based accountability in early childhood education

Standards-based accountability systems for early childhood education have increased along with

policy maker requests for information about the effectiveness and quality of program services. A series of studies examining early childhood standards at the state level found that 49 states plus the District of Columbia have developed and adopted early learning outcome standards for preschool children that provide a common set of expectations for what children should know and be able to do before entering kindergarten (Kagan and Scott-Little 2004; National Child Care Information and Technical Assistance Center 2007; Scott-Little et al. 2007). North Dakota, the one state that has not adopted standards, is in the process of developing them.

All 42 states that responded to an online survey reported that their state intentionally aligned early childhood standards with K–12 education, and 35 reported using language that was inclusive of all children, including children with disabilities (Scott-Little et al. 2007). Early childhood policy makers identify several advantages of linking early childhood standards with K–12 standards-based accountability systems: efficient communication about student progress and academic skills between early childhood and K–12 teachers, consistent approaches to measuring student and program outcomes, and smoother transitions for children as they progress from early childhood services to kindergarten (Campbell and Anketell 2007; Kagan, Moore, and Bredekamp 1995; Rous et al. 2005).

Important issues associated with standards-based accountability systems for early childhood education include child assessment against standards, alignment with PreK and K–12 standards, and inclusion of children with and without disabilities (Petersen, Jones, and McGinley 2008; Ramey and Ramey 2004; Scott-Little, Kagan, and Frelow 2006).

Thirty-five states have implemented strategies to guide teachers in using early learning standards for children enrolled in early intervention and early childhood

special education services. These strategies include developing additional resources such as materials, training, and technical assistance. But despite these efforts on behalf of children with special needs, the support and degree of inclusion for young children with disabilities continue to vary by state (Scott-Little, Kagan, and Frelow 2003).

State early childhood guidelines must align with federally mandated child outcome requirements for children with disabilities (IDEA 2004). The federal Office of Special Education Programs requires that each state demonstrate alignment between assessment, curriculum, and three child outcome areas and report the progress of children receiving early intervention and early childhood special education services in these child outcome areas:

- Positive social-emotional skills.
- Acquisition and use of knowledge and skills (including early language and communication).
- Use of appropriate behaviors to meet their needs.

Oregon's early childhood foundation areas

In response to the need for additional information to support federal reporting and service decision-making, the Oregon Department of Education sponsored development of *Oregon Early Childhood Foundations* (Oregon Department of Education 2008a) to identify key developmental foundation areas or skills necessary for children to succeed when they enter school. Meetings were held throughout Oregon in 2004 and 2005 with a range of representatives from the private and public sectors to define developmental skills for young children.

The result was a group of 16 developmental foundation areas describing specific knowledge and skill areas within eight broader domains of healthy child development. The domains are aligned with Oregon K–12 standards (Oregon

Oregon Early Childhood Foundations identifies 16 key developmental foundation areas or skills necessary for children to succeed when they enter school

Department of Education 2009), where state standards exist, and the Head Start Child Outcomes Framework (Oregon Department of Education 2008a) and with the three federal Office of Special Education Programs child outcome areas required for state performance plans and annual performance reviews (table 1). The foundation areas are presented as a framework of building blocks that are important for school success and are intended to include all children—English language learner children, children with special health care needs, children with disabilities, and children who are developing without delays.

In 2005 the Oregon Department of Education contracted with Portland State University to develop

the Oregon Early Childhood Assessment System, an online assessment that collects and reports data on child functioning for both the Oregon foundation areas and the mandated U.S. Office of Special Education Programs child outcome areas. Item development began with an extensive review of research and research-based assessments on early childhood development and skills for children from birth through age 5. Psychometric tests were performed to establish the reliability, validity, and sensitivity to development for three populations: those served through early intervention and early childhood special education, children with no disabilities who were participating in child care programs, and children receiving Head Start services (Arick, Falco, and Young

TABLE 1

Oregon early childhood foundation areas and U.S. Office of Special Education Programs child outcome areas, from birth through age 5

Oregon early childhood domain and foundation area	1. Positive social emotional skills	2. Acquisition and use of knowledge and skills	3. Use of appropriate behaviors to meet their needs
<i>Approaches to learning</i>			
1. Engagement, persistence, initiative, and curiosity		✓	
2. Reasoning, problem solving, and inquiry		✓	
<i>Language and literacy development</i>			
3. Listening and understanding		✓	
4. Speaking and communicating		✓	
5. Phonological awareness		✓	
6. Print awareness		✓	
<i>Physical education and health</i>			
7. Fine motor			✓
8. Gross motor			✓
9. Hygiene, nutrition, and personal care			✓
<i>Social and emotional development</i>			
10. Cooperation and self-control	✓		
11. Social relationships	✓		
<i>The arts</i>			
12. Arts, movement, music, and dramatic play		✓	
<i>Mathematics</i>			
13. Numbers and operations		✓	
14. Patterns and measurement		✓	
<i>Science</i>			
15. Matter, force, energy, and dynamic earth		✓	
<i>Social science</i>			
16. Family roles and relationships/civics and government rules	✓		

Note: The ✓s indicate the alignment of the U.S. Office of Special Education Program child outcome areas with the 16 Oregon foundation areas.

Source: Oregon Department of Education 2008a.

2006). See appendix A for a full description of the assessment system.

This study responds to a request from the Oregon Department of Education Early Childhood Services for assistance in using statewide data from the Oregon Early Childhood Assessment System to describe the functioning levels of children receiving early intervention and early childhood special education services.

The study sought to answer the following research question:

- What are the levels of developmental functioning of children receiving early intervention and early childhood special education services in Oregon across the 16 Oregon foundation areas and the three federally defined Office of Special Education Programs child outcome areas, and how do levels differ for key demographic subgroups?

The study analyzed 2006/07 statewide data for children on entry into services to determine functioning levels of children from birth through age 2 who received early intervention services and children ages 3–5 who received early childhood special education services. The data from the Oregon Early Childhood Assessment System database were analyzed by primary disability, gender, race/ethnicity, and primary home language. The resulting profiles of the Oregon developmental foundation areas show where children are doing well and where additional support is needed. This information may be useful in developing materials, training, and technical

assistance to guide teachers in using early learning standards for children enrolled in early intervention and early childhood special education services. Finally, this study provides an example of how one state can use assessment data for state early childhood standards that link to school readiness language.

The profiles of the Oregon developmental foundation areas presented here show where children are doing well and where additional support is needed

OREGON'S EARLY INTERVENTION AND EARLY CHILDHOOD SPECIAL EDUCATION SERVICES

IDEA 2004 requires states to actively find, evaluate, and serve children with disabilities (see appendix B for research on enrollment in early intervention and early childhood special education services). The Oregon Department of Education is responsible for administering early intervention (from birth through age 2) and early childhood special education services (ages 3–5). While there are some eligibility differences between the two programs, the Oregon Department of Education's policies are intended to support continuity of services between the two, to ease transitions for families. The Oregon Department of Education is responsible for monitoring the compliance and timeliness of eligibility determination and service delivery procedures for state and federal legislation. Each county has an agency that screens and evaluates referrals for infants, toddlers, or preschoolers suspected of having a developmental delay, including problems related to how they talk, walk, see, hear, play, learn, respond to others, or cope with new situations.

Early intervention for children from birth through age 2

IDEA 1997 authorizes the provision of early intervention services to children with disabilities up to age 3. States can also extend these services to children at risk for developmental delays. Oregon provides early intervention services for children who have an existing developmental delay in one or more of the following areas: physical development, cognitive development, communication development, social or emotional development, or adaptive development (IDEA 2004; Oregon Department of Education 2008b,c).

Children are eligible for services if a multidisciplinary team that includes the parents and professionals in two or more disciplines agrees that the child meets the minimum requirement for one of the following disability categories: autism spectrum disorder, deaf-blindness, hearing

impairment, orthopedic impairment, traumatic brain injury, visual impairment, communication disorder, or developmental delay (Oregon Secretary of State 2008). Like 22 other states and the District of Columbia, Oregon does not extend early intervention services to children at risk for developmental delay but does allow state informed clinical opinion to be used as a basis for determining eligibility (Dunst and Hamby 2004).

The majority of children in early intervention services in Oregon during the 2006/07 school year fell under the disability categories of developmental delay (79 percent) and communication disorder (10 percent). A child is eligible for early intervention services under the disability category of developmental delay when he or she demonstrates a developmental delay of 2 standard deviations or more below the mean in one or more developmental areas or 1.5 standard deviations or more below the mean in two or more developmental areas and when the disability is determined to have an adverse impact on the child's developmental progress. A child is eligible for early intervention services under the disability category of communication disorder when he or she demonstrates a developmental delay of 2 standard deviations on a norm-referenced, standardized test of speech and language and when the disability is determined to have an adverse impact on the child's developmental progress.

Eligible children receive individualized services that address their specific education needs and related services such as transportation, assistive technology, or speech-language services that allow them to participate in typical education settings such as preschool, childcare, or their family home. In addition, states must provide early intervention services for the child's family, such as offering information about the child's developmental delay, ensuring that families understand their rights under IDEA, assisting families in developing support systems, facilitating family access to community resources, and coaching parents, family, and caregivers to help the child develop and learn (Bailey et al. 2006).

Early childhood special education for children ages 3–5

Preschool-age children (ages 3–5) with disabilities are eligible for early childhood special education services (IDEA 2004). In Oregon, children may be found eligible under 1 or more of 12 disability categories: autism spectrum disorder, communication disorder, deaf-blindness, developmental delay, emotional disturbance, hearing impairment, mental retardation, orthopedic impairment, other health impaired, specific learning disability, traumatic brain injury, and visual impairment (Oregon Secretary of State 2008).

Determining eligibility for services requires at least one norm-referenced, standardized test in each area of suspected delay, at least one additional procedure to confirm the child's level of functioning in each area of suspected delay, at least one 20-minute observation of the child, and review of previous testing, medical data, and parent reports. Eligibility for services is determined by a multidisciplinary team that includes the parents and at least two professionals, at least one of whom is a specialist in the evaluation and education of children with disabilities. A child may be found eligible for early childhood special education services if the team determines that he or she has a developmental delay in one or more of the following areas: physical development, cognitive development, communication development, social or emotional development, or adaptive development (IDEA 2004).

The majority of children in early childhood special education services in Oregon during the 2006/07 school year fell under the disability categories of communication disorder (56 percent) and developmental delay (34 percent). A child is eligible for early childhood special education services under the disability category of communication disorder when he

The majority of children in early intervention and early childhood special education services in Oregon during the 2006/07 school year fell under the disability categories of developmental delay and communication disorder

Two thirds of both population groups were male, and White children made up the largest share of both groups, followed by Hispanic children

or she demonstrates a developmental delay of 2 standard deviations on a norm-referenced, standardized test of speech and language and when the disability is determined to have an adverse impact on the child's developmental progress. A child is eligible for early childhood special education services under

the disability category of developmental delay when he or she demonstrates a developmental delay of 1.5 standard deviations or more below the mean in two or more developmental areas and when the disability is determined to have an adverse impact on the child's developmental progress.

Individualized family service plans

Early intervention and early childhood special education services for children with disabilities are individualized, based on the unique needs of the child and family. As required by federal law (IDEA 2004), the focus of Oregon's services is on building on the family's capabilities to meet the special needs of the child. Family members, preschool teachers, and caregivers use a team-based approach to develop an individualized family service plan for each child. These plans are intended for planning and monitoring the effectiveness of services that address the individualized needs and priorities for the child and family (Danaher and Armijo 2005; Turnbull et al. 2007). Although most states use an individualized education program to map out special education and related services for children in early childhood special education, Oregon uses the individualized family service plan (Oregon Secretary of State 2008). One difference between the two is that the individualized education program focuses on the child's needs, whereas the individualized family services plan addresses the needs of both the child and family (IDEA 2004).

STUDY FINDINGS

This section presents the results for the research question separately for children receiving early

intervention services and those receiving early childhood special education services (for details on data collection and analysis, see box 1 and appendix C). For each group, results on developmental functioning levels are presented first on the 16 Oregon foundation areas and then on the three U.S. Office of Special Education Programs child outcome areas. Within each subsection results are presented for all children and then for the four key demographic subgroups of primary disability (developmental delay and communication disorder), gender, race/ethnicity (White and Hispanic), and primary home language of Hispanic children (English and Spanish). For the analysis by demographic subgroup, ratios are also presented to indicate whether one subgroup is more often assessed as functioning below age-expected skill levels.

Before these results are discussed, a brief overview is presented of the distribution of children who received early intervention and early childhood special education services by the four key demographic subgroups.

Demographic characteristics of the study population

Data were examined for the distribution across the four key demographic subgroups of the 1,835 children who received early intervention services and the 2,508 children who received early childhood special education services (table 2).

Two primary disabilities (developmental delay and communication disorder) accounted for approximately 90 percent of disabilities in both child populations. In early intervention services 79 percent of children were classified as having developmental delay as their primary disability and 10 percent as having communication disorder as their primary disability. In early childhood special education services the frequency order of these two categories was reversed, with communication disorder the most common (56 percent) followed by developmental delay (34 percent).

Some two-thirds of both populations were male (65 percent for the early intervention group and 67

BOX 1

Data collection and analysis

The Oregon Early Childhood Assessment System is a web-based database that allows service providers to assess and enter data on individual children with whom they are familiar using a behavior checklist and an observational assessment conducted in a natural environment. The assessment system uses these data to create scale scores for each of the 16 Oregon foundation areas and the three U.S. Office of Special Education Programs child outcome areas (see table 1 in report). The database can be used to generate reports on an individual child, caseload, class, or program at the regional, state, or federal level (see appendix C for details). The database was developed for the Oregon Department of Education by Portland State University (Arick et al. 2006).

Data collection and analysis. The data used for this study were obtained in June 2008 from the Portland State University researchers, who exported child-level data for all children from birth through age 5 who received early intervention or early childhood special education services from April 1, 2006, through April 30, 2007. The variables in the dataset include developmental scores on entry into services on each of the 16 foundation areas in *Oregon Early Childhood Foundations* (Oregon Department of Education 2008a), which identify key developmental foundation areas or skills necessary for children to succeed in school, entry scores on the three child outcome areas specified by the U.S. Office of Special Education Programs, and the demographic variables primary

disability, gender, race/ethnicity, and primary home language.

To analyze the early childhood assessment data, a series of frequency tables were prepared. Analyses were conducted separately for the early intervention age group (from birth through age 2) and the early childhood special education age group (ages 3–6).

Child functioning levels were assessed by calculating the percentages of children who performed above, at, and below age-expected skill levels on the foundation and outcome areas (see appendix C for details on how proficiency categories were assigned). Differences across subgroups were assessed by calculating the ratio of the percentage of a group assessed as functioning below age-expected skill levels to the same percentage for the comparison group. Thus, if 80 percent of boys and 75 percent of girls were assessed as functioning below age-expected skill levels on a particular outcome variable, the boys would receive a ratio score of 1.07 (80 percent divided by 75 percent). For each demographic variable analysis the subgroups were compared on the Oregon foundation areas with the highest percentage of children assessed as functioning below age-expected skill levels. The same procedure is used for the federal Office of Special Education Programs child outcome areas. Care was taken to avoid reporting age group results by demographic categories small enough to potentially identify any of the children. The children's confidentiality was also protected because the dataset did not contain any names.

A comparison of the distribution of the two most prevalent disability categories (developmental delay and communication disorder) across the two primary ethnic groups (White and Hispanic children) found no disparity that might influence the interpretation of performance by disability for children in early childhood special education services. However, in the early intervention group a higher percentage of White children (11 percent) than Hispanic children (8.5 percent) were identified in the communication disorder category, while a higher percentage of Hispanic children (84 percent) than White children (77 percent) were identified in the developmental delay category. (See appendix C for more detail on data collection and analysis.)

Limitations. Data on each child's functioning levels came from Oregon Early Childhood Assessment System checklist ratings and observational assessments prepared by service providers familiar with the child under typical service or home settings. Thus, some variation in ratings could be due to subjective differences between raters, which could have systematically affected the results across subgroups. The validity of the proficiency levels for foundation and outcome areas used in this study depends on the content validity of the database and subsequent developmental validation analyses by the database developers. And while strengths and challenges have been identified for specific population subgroups on foundation and outcome areas, no causal inferences can be drawn because only descriptive analysis, using frequencies and ratios, was conducted.

TABLE 2

Demographic characteristics of early intervention (from birth through age 2) and early childhood special education (ages 3–5) populations

Demographic subgroup	Children in early intervention services (n = 1,835)		Children in early childhood special education services (n = 2,508)	
	Frequency	Percent	Frequency	Percent
Primary disability				
Developmental delay	1,448	78.8	846	33.7
Communication disorder	191	10.4	1,414	56.4
Autism	53	3.7	145	5.8
Hearing impaired	68	2.9	14	0.6
Visually impaired	16	0.9	1	0
Orthopedic impairment	34	1.9	28	1.1
Other health impairment	21	1.1	35	1.4
Emotional disturbance	0	0	10	0.4
Other	6	0.4	15	0.6
Gender				
Girls	648	35.3	829	33.1
Boys	1,187	64.7	1,679	66.9
Race/ethnicity^a				
White/Caucasian	1,208	65.8	1,718	68.5
Hispanic	365	19.9	463	18.5
Asian	73	4.0	91	3.6
Black	64	3.5	72	2.9
American Indian	47	2.6	60	2.4
Other	69	3.7	85	3.3
Missing	9	0.5	19	0.8
Primary language				
English	1,520	82.8	2,142	85.4
Spanish	238	14.5	305	12.2
Other	77	2.7	61	2.4

a. Black includes African American, Hispanic includes Latino, Asian includes Native Hawaiian or Other Pacific Islander, and American Indian includes Alaska Native.

Source: Authors' analysis based on the Oregon Early Childhood Assessment System dataset received June 2008; see text for details.

percent for the early childhood special education group). By race/ethnicity White children made up the largest share of both groups (66 percent for the early intervention group and 69 percent for the early childhood special education group), followed by Hispanic children (20 percent for the early intervention group and 19 percent for the early childhood special education group). By comparison, the race/ethnicity distribution in 2007 for the

Oregon general population was 81 percent White and 11 percent Hispanic (U.S. Census Bureau 2009); however, 16 percent of students enrolled in K–12 education were Hispanic, and 78 percent of Hispanic people age five or older spoke a language other than English at home (Pew Hispanic Center 2009). English was the primary home language for 83 percent of children in early intervention services and 85 percent of children in early childhood

special education services. Spanish was the primary home language for 15 percent of children in early intervention and 12 percent of children in early childhood special education.

Oregon early childhood foundation areas

This section presents the findings of the analysis of developmental functioning of children receiving early intervention and early childhood special education services as assessed against the 16 Oregon early childhood foundation areas, first for all children by service group and then for the four demographic subgroups assessed as functioning below age-expected skill levels.

All children

Early intervention group. The three foundation areas with the highest percentage (73–82 percent) of children in early intervention services assessed as functioning below age-expected skill levels fell into two of the five domains: language and literacy development and mathematics (table 3). The foundation area engagement, persistence, initiative, and curiosity, in the approaches to learning domain, had the lowest percentage (33 percent) of children in early intervention services assessed as functioning below age-expected skill levels. The next lowest percentages were in cooperation and self-control and in family roles and relationships/civics and government rules (both at 46 percent).

Early childhood special education group. The three foundation areas with the highest percentage of children in early childhood special education services assessed as functioning below age-expected skill levels were phonological awareness and print awareness in the language and literacy development domain and numbers and operations in the mathematics domain (see table 3). The two foundation areas with the lowest percentage of children assessed as functioning below age-expected skill levels were hygiene, nutrition, and personal care (25 percent), and gross motor (27 percent), both in the physical education and health domain. The foundation area with the next lowest percentage

was listening and understanding (41 percent) in the language and literacy development domain.

Primary disability

Early intervention group. In 13 of the 16 Oregon foundation areas a higher percentage of children in early intervention services identified as having developmental delays were assessed as functioning below age-expected skill levels than were children identified as having communication disorders (table 4). The two foundation areas with the highest ratios of children with developmental delays assessed as functioning below age-expected skill levels to children with communication disorders assessed as functioning below age-expected skill levels were gross motor (ratio of 2.55) and engagement, persistence, initiative, and curiosity (ratio of 2.13). That is, for these two foundation areas the percentage of children identified as having developmental delays was 2.55 times greater than for the children identified as having communication disorders. The two foundation areas in which children with developmental delays were assessed as functioning below age-expected skill levels less often than children with communication disorders were reasoning, problem solving, and inquiry (ratio of 0.81) and print awareness (ratio of 0.92).

Early childhood special education group. Across all 16 foundation areas children in early childhood special education services with developmental delays were more often assessed as functioning below age-expected skill levels than were children with communication disorders (see table 4). The two foundation areas with the largest differences between the two groups were hygiene, nutrition, and personal care (ratio of 2.27) and listening and understanding (ratio of 2.00). The two foundation areas with the smallest differences between the two groups were phonological awareness (ratio of 1.07) and print awareness (ratio of 1.09).

For both population groups the three foundation areas with the highest percentage of children assessed as functioning below age expected skill levels fell into language and literacy development and mathematics

TABLE 3

Foundation area analysis for early intervention (from birth through age 2) and early childhood special education (ages 3–5) children (percentage assessed as functioning above, at, or below age-expected skill levels)

Domain and foundation area	Children in early intervention services by functioning level (n = 1,835)			Children in early childhood special education services by functioning level (n = 2,508)		
	Above	At	Below	Above	At	Below
<i>Approaches to learning</i>						
Engagement, persistence, initiative, and curiosity	19	48	33	28	27	45
Reasoning, problem solving, and inquiry	9	31	60	16	18	66
<i>Language and literacy development</i>						
Listening and understanding	28	16	56	28	31	41
Speaking and communicating	20	7	73	25	24	51
Phonological awareness	16	3	82	5	9	86
Print awareness	21	2	76	5	12	83
<i>Physical education and health</i>						
Fine motor	40	12	48	13	35	52
Gross motor	26	25	49	29	44	27
Hygiene, nutrition, and personal care	30	12	58	32	43	25
<i>Social and emotional development</i>						
Cooperation and self-control	41	13	46	17	17	67
Social relationships	30	9	61	23	15	61
<i>The arts</i>						
Arts, movement, music, and dramatic play	28	11	61	17	32	51
<i>Mathematics</i>						
Numbers and operations	16	2	82	5	17	79
Patterns and measurement	20	4	76	9	31	60
<i>Science</i>						
Matter, force, energy, and dynamic earth	36	17	47	19	37	44
<i>Social science</i>						
Family roles and relationships/civics and government rules	44	10	46	17	19	64

Source: Authors' analysis based on the Oregon Early Childhood Assessment System dataset received June 2008; see text for details.

Gender

Early intervention group. The percentage of boys in early intervention services assessed as functioning below age-expected skill levels was greater than that of girls in all but two foundation areas, gross motor (ratio of boys to girls of 0.80) and matter, force, energy, and dynamic earth (ratio of 0.96; table 5). The foundation area with the highest ratio of boys to girls assessed as functioning below age-expected skill levels was family roles and relationships/civics and government rules (ratio of 1.28), meaning that boys were 1.28 times as likely as girls to be assessed as functioning below age-expected skill levels. Boys were 1.23

times as likely as girls to be assessed as functioning below age-expected skill levels for the arts, movement, music, and dramatic play foundation area.

Early childhood special education group. A smaller percentage of boys in early childhood special education services than of girls were assessed as functioning below age-expected skill levels in only one foundation area, gross motor (ratio of boys to girls of 0.90; see table 5). The two foundation areas with the highest ratios of boys to girls assessed as functioning below age-expected skill levels were arts, movement, music, and dramatic play (ratio of 1.37) and fine motor (ratio of 1.36).

TABLE 4

Foundation area analysis for early intervention (from birth through age 2) and early childhood special education (ages 3–5) children, by selected primary disability subgroup (percentage assessed as functioning below age-expected skill levels)

Domain and foundation area	Children in early intervention services (n = 1,835)			Children in early childhood special education services (n = 2,508)		
	Developmental delays (n = 1,446)	Communication disorders (n = 191)	Ratio of developmental delays to communication disorders	Developmental delays (n = 846)	Communication disorders (n = 1,414)	Ratio of developmental delays to communication disorders
<i>Approaches to learning</i>						
Engagement, persistence, initiative, and curiosity	34	16	2.13	60	33	1.82
Reasoning, problem solving, and inquiry	59	73	0.81	78	58	1.34
<i>Language and literacy development</i>						
Listening and understanding	59	29	2.03	56	28	2.00
Speaking and communicating	75	65	1.15	64	41	1.56
Phonological awareness	83	76	1.09	90	84	1.07
Print awareness	77	84	0.92	89	82	1.09
<i>Physical education and health</i>						
Fine motor	49	43	1.14	62	43	1.44
Gross motor	51	20	2.55	33	19	1.74
Hygiene, nutrition, and personal care	61	36	1.69	34	15	2.27
<i>Social and emotional development</i>						
Cooperation and self-control	46	48	0.96	82	55	1.49
Social relationships	62	58	1.07	77	48	1.60
<i>The arts</i>						
Arts, movement, music, and dramatic play	62	51	1.22	65	39	1.67
<i>Mathematics</i>						
Numbers and operations	84	73	1.15	87	73	1.19
Patterns and measurement	77	71	1.08	74	51	1.45
<i>Science</i>						
Matter, force, energy, and dynamic earth	48	37	1.30	57	33	1.73
<i>Social science</i>						
Family roles and relationships/ civics and government rules	47	38	1.24	78	52	1.50

Note: Results are presented only for developmental delays and communication disorders. Complete primary disability distributions are presented in table 2.

Source: Authors' analysis based on the Oregon Early Childhood Assessment System dataset received June 2008; see text for details.

Race/ethnicity

Early intervention group. Higher percentages of Hispanic than of White children in early intervention services were assessed as functioning below age-expected skill levels in 10 of the 16 foundation

areas (table 6). The two foundations with the largest discrepancy between the two groups were patterns and measurement (ratio of Hispanic to White children of 1.08) and listening and understanding (ratio of 1.07). The two foundation areas in which a smaller percentage of Hispanic children

TABLE 5

Foundation area analysis for early intervention (from birth through age 2) and early childhood special education (ages 3–5) children, by gender (percentage assessed as functioning below age-expected skill levels)

Domain and foundation area	Children in early intervention services (n = 1,835)			Children in early childhood special education services (n = 2,508)		
	Boys (n = 1,187)	Girls (n = 648)	Ratio of boys to girls	Boys (n = 1,677)	Girls (n = 829)	Ratio of boys to girls
<i>Approaches to learning</i>						
Engagement, persistence, initiative, and curiosity	34	32	1.06	48	39	1.23
Reasoning, problem solving, and inquiry	63	54	1.17	69	61	1.13
<i>Language and literacy development</i>						
Listening and understanding	59	52	1.13	44	35	1.26
Speaking and communicating	76	68	1.12	54	46	1.17
Phonological awareness	84	77	1.09	88	84	1.05
Print awareness	79	70	1.13	84	81	1.04
<i>Physical education and health</i>						
Fine motor	50	45	1.11	57	42	1.36
Gross motor	45	56	0.80	26	29	0.90
Hygiene, nutrition, and personal care	59	55	1.07	28	20	1.40
<i>Social and emotional development</i>						
Cooperation and self-control	49	41	1.19	70	60	1.18
Social relationships	64	56	1.14	66	53	1.24
<i>The arts</i>						
Arts, movement, music, and dramatic play	65	53	1.23	56	41	1.37
<i>Mathematics</i>						
Numbers and operations	83	80	1.04	80	76	1.05
Patterns and measurement	77	74	1.04	63	56	1.12
<i>Science</i>						
Matter, force, energy, and dynamic earth	46	48	0.96	46	40	1.15
<i>Social science</i>						
Family roles and relationships/civics and government rules	50	39	1.28	68	56	1.21

Source: Authors' analysis based on the Oregon Early Childhood Assessment System dataset received June 2008; see text for details.

than of White children were assessed as functioning below age-expected skill levels were hygiene, nutrition, and personal care (ratio of 0.93) and fine motor (ratio of 0.94).

Early childhood special education group. Higher percentages of Hispanic than of White children in early childhood special education services were assessed as functioning below age-expected skill levels in 14 of the 16 foundation areas (see table 6). The foundation areas with the highest ratios of Hispanic to White children assessed as functioning below age-expected skill levels were speaking and communicating (ratio of Hispanic to White children of

1.29) and reasoning, problem solving, and inquiry (ratio of 1.27). The two foundation areas in which smaller percentages of Hispanic children than of White children were assessed as functioning below age-expected skill levels were gross motor (ratio of 0.86) and fine motor (ratio of 0.96).

Primary home language

Early intervention group. The analysis by primary home language for the early intervention group was performed only for Hispanic children with either English or Spanish as the primary home language. The percentages of Hispanic children from

TABLE 6

Foundation area analysis for early intervention (from birth through age 2) and early childhood special education (ages 3–5) children, by selected race/ethnicity subgroups (percentage assessed as functioning below age-expected skill levels)

Domain and foundation area	Children in early intervention services (n = 1,835)			Children in early childhood special education services (n = 2,508)		
	Hispanic (n = 365)	White (n = 1,208)	Ratio of Hispanic to White	Hispanic (n = 463)	White (n = 1,718)	Ratio of Hispanic to White
<i>Approaches to learning</i>						
Engagement, persistence, initiative, and curiosity	32	33	0.97	50	43	1.16
Reasoning, problem solving, and inquiry	61	60	1.02	80	63	1.27
<i>Language and literacy development</i>						
Listening and understanding	59	55	1.07	48	39	1.23
Speaking and communicating	76	72	1.06	62	48	1.29
Phonological awareness	85	80	1.06	94	84	1.12
Print awareness	78	75	1.04	91	81	1.12
<i>Physical education and health</i>						
Fine motor	46	49	0.94	50	52	0.96
Gross motor	50	49	1.02	24	28	0.86
Hygiene, nutrition, and personal care	55	59	0.93	26	25	1.04
<i>Social and emotional development</i>						
Cooperation and self-control	46	46	1.00	74	64	1.16
Social relationships	62	61	1.02	64	61	1.05
<i>The arts</i>						
Arts, movement, music, and dramatic play	60	61	0.98	57	49	1.16
<i>Mathematics</i>						
Numbers and operations	83	82	1.01	88	76	1.16
Patterns and measurement	80	74	1.08	71	57	1.25
<i>Science</i>						
Matter, force, energy, and dynamic earth	47	46	1.02	52	42	1.24
<i>Social science</i>						
Family roles and relationships/ civics and government rules	45	46	0.98	72	61	1.18

Note: Results are presented only for White and Hispanic children. Complete race/ethnicity distributions are presented in table 2.

Source: Authors' analysis based on the Oregon Early Childhood Assessment System dataset received June 2008; see text for details.

English- and Spanish-speaking homes who were assessed as functioning below age-expected skill levels are based on 356 Hispanic children (table 7); 9 others were excluded from the analysis because both English and Spanish or another language was the primary home language.

Higher percentages of Hispanic children from Spanish-speaking than from English-speaking homes were assessed as functioning below age-expected skill levels in all 16 foundation areas (see table 7).

The two foundation areas with the highest ratios were fine motor (ratio of Hispanic children from Spanish-speaking homes to Hispanic children from English-speaking homes of 1.32) and matter, force, energy, and dynamic earth (ratio of 1.20). The three foundation areas with the lowest ratio were listening and understanding, gross motor, and numbers and operations (all with a ratio of 1.02).

Early childhood special education group. The analysis by primary home language for the

TABLE 7

Foundation area analysis for early intervention (from birth through age 2) and early childhood special education (ages 3–5) children, by primary home language of English and Spanish (percentage assessed as functioning below age-expected skill levels)

Domain and foundation area	Hispanic early intervention children (n = 356)			Hispanic early childhood special education children (n = 453)		
	Spanish (n = 263)	English (n = 93)	Ratio of Spanish to English	Spanish (n = 302)	English (n = 151)	Ratio of Spanish to English
<i>Approaches to learning</i>						
Engagement, persistence, initiative and curiosity	32	27	1.19	52	46	1.13
Reasoning, problem solving and inquiry	62	56	1.11	87	68	1.28
<i>Language and literacy development</i>						
Listening and understanding	59	58	1.02	52	40	1.30
Speaking and communicating	79	69	1.14	68	52	1.31
Phonological awareness	86	83	1.04	95	93	1.02
Print awareness	81	73	1.11	94	86	1.09
<i>Physical education and health</i>						
Fine motor	49	37	1.32	50	49	1.02
Gross motor	49	48	1.02	22	30	0.73
Hygiene, nutrition, and personal care	55	52	1.06	26	25	1.04
<i>Social and emotional development</i>						
Cooperation and self-control	48	42	1.14	76	69	1.10
Social relationships	63	60	1.05	64	63	1.02
<i>The arts</i>						
Arts, movement, music, and dramatic play	61	57	1.07	60	52	1.15
<i>Mathematics</i>						
Numbers and operations	83	81	1.02	90	86	1.05
Patterns and measurement	82	73	1.12	74	67	1.10
<i>Science</i>						
Matter, force, energy, and dynamic earth	49	41	1.20	56	44	1.27
<i>Social science</i>						
Family roles and relationships/ civics and government rules	46	44	1.05	75	66	1.14

Note: Results are presented only for Hispanic children from English- or Spanish-speaking homes. Complete home language distributions are presented in table 2.

Source: Authors' analysis based on the Oregon Early Childhood Assessment System dataset received June 2008; see text for details.

early childhood special education group was performed only for Hispanic children with either English or Spanish as the primary home language. The percentages of Hispanic children from English- and Spanish-speaking homes who were assessed as functioning below age-expected skill levels are based on 453 Hispanic children (see table 7); 10 others were excluded from the analysis because both English and Spanish or another language were the primary home languages.

Higher percentages of Hispanic children from Spanish-speaking than from English-speaking homes were assessed as functioning below age-expected skill levels in 15 of the 16 foundation areas (see table 7). The two foundation areas with the largest differences between the two groups were speaking and communicating (ratio of Hispanic children from Spanish-speaking homes to Hispanic children from English-speaking homes of 1.31) and listening and understanding (ratio of 1.30). The only foundation with a smaller ratio of

children from Spanish-speaking homes than those from English-speaking homes assessed as functioning below age-expected skill levels was gross motor (ratio of 0.73).

Summary

Early intervention group. Table 8 summarizes the results for the percentage of children in early intervention services assessed as functioning below age-expected skill levels in each foundation area by the demographic subgroups analyzed. Two foundation areas had the highest percentages of children assessed as functioning below age-expected skill levels across all demographic subgroups, regardless of primary disability, gender, race/ethnicity, and primary home language: phonological awareness and numbers and operations. Seventy percent or more of children in each subgroup were also functioning below age-expected skill levels on print awareness and patterns and measurement. These foundation areas represent skills important to critical areas of school readiness: language, communication, literacy, and mathematics.

Early childhood special education group. Table 9 summarizes the results for the percentage of children in early childhood special education services assessed as functioning below age-expected skill levels in each foundation area for each demographic subgroup analyzed. Three foundation areas had the highest percentages of children assessed as functioning below age-expected skill levels across all demographic subgroups: phonological awareness, print awareness, and numbers and operations. The next most problematic foundation areas across subgroups were cooperation and self-control and reasoning, problem solving, and inquiry. These foundation areas are in the domains of language and literacy development and mathematics.

U.S. Office of Special Education Programs child outcome areas

This section presents the findings of the analysis of developmental functioning of children receiving

early intervention and early childhood special education services as assessed against the three U.S. Office of Special Education Programs child outcome areas first for all children by service group and then for the four demographic subgroups.

All children

Early intervention group. Of the three U.S. Office of Special Education Programs child outcome areas, acquisition and use of knowledge and skills (including early language/communication) had the highest percentage of children in early intervention services (67 percent) assessed as functioning below age-expected skill levels (table 10). Use of appropriate behaviors to meet their needs had the lowest percentage of children (46 percent) assessed as functioning below age-expected skill levels.

Early childhood special education group. The outcome area positive social-emotional skills had the highest percentage of children in early childhood special education services assessed as functioning below age-expected skill levels (65 percent), and use of appropriate behaviors to meet their needs had the lowest percentage (33 percent; see table 10).

Primary disability

Early intervention group. The percentage of children in early intervention services classified with developmental delays and assessed as functioning below age-expected skill levels was 2.29 times greater than that of children classified with communication disorders for the child outcome area use of appropriate behaviors to meet their needs

Of the three U.S. Office of Special Education Programs child outcome areas, acquisition and use of knowledge and skills had the highest percentage of children in early intervention services assessed as functioning below age expected skill levels, and positive social emotional skills had the highest percentage of children in early childhood special education services assessed as functioning below age expected skill levels

TABLE 8
Summary of foundation area analysis for early intervention (from birth through age 2) children, by selected demographic subgroups (percentage assessed as functioning below age-expected skill levels)

Foundation area number ^a	Foundation area	Total population (n = 1,835)	Primary disability		Gender		Race/ethnicity			Primary home language for Hispanic children	
			Developmental delays (n = 1,446)	Communication disorders (n = 191)	Boys (n = 1,187)	Girls (n = 648)	Hispanic (n = 365)	White (n = 1,208)	Spanish (n = 263)	English (n = 93)	
5	Phonological awareness	82	83	76	84	77	85	80	86	83	
13	Numbers and operations	82	84	73	83	80	83	82	83	81	
6	Print awareness	76	77	84	79	70	78	75	81	73	
14	Patterns and measurement	76	77	71	77	74	80	74	82	73	
4	Speaking and communicating	73	75	65	76	68	76	72	79	69	
11	Social relationships	61	62	58	64	56	62	61	63	60	
12	Arts, movement, music, and dramatic play	61	62	51	65	53	60	61	61	57	
2	Reasoning, problem solving, and inquiry	60	59	73	63	54	61	60	62	56	
9	Hygiene, nutrition, and personal care	58	61	36	59	55	55	59	55	52	
3	Listening and understanding	56	59	29	59	52	59	55	59	58	
8	Gross motor	49	51	20	45	56	50	49	49	48	
7	Fine motor	48	49	43	50	45	46	49	49	37	
15	Matter, force, energy, and dynamic earth	47	48	37	46	48	47	46	49	41	
10	Cooperation and self-control	46	46	48	49	41	46	46	48	42	
16	Family roles and relationships/civics and government rules	46	47	38	50	39	45	46	46	44	
1	Engagement, persistence, initiative, and curiosity	33	34	16	34	32	32	33	32	27	

Note: Results are presented only for the demographic subgroups analyzed. Complete distributions are presented in table 2. Values in bold indicate the three (four in case of a tie) foundation areas with the highest percentages of children assessed as functioning below age-expected skill levels within each demographic subgroup.

a. See table 1 for domains for each foundation area.

Source: Authors' analysis based on the Oregon Early Childhood Assessment System dataset received June 2008; see text for details.

TABLE 9

Summary of foundation area analysis for early childhood special education (ages 3–5) children, by selected demographic subgroups (percentage assessed as functioning below age-expected skill levels)

Foundation area number ^a	Foundation area	Total population (n = 2,508)	Primary disability		Gender		Race/ethnicity			Primary home language for Hispanic children	
			Developmental delays (n = 846)	Communication disorders (n = 1,414)	Boys (n = 1,679)	Girls (n = 829)	Hispanic (n = 463)	White (n = 1,718)	Spanish (n = 302)	English (n = 151)	
5	Phonological awareness	86	90	85	88	84	94	84	95	93	
6	Print awareness	83	89	82	84	81	91	81	94	86	
13	Numbers and operations	79	87	73	80	76	88	76	90	86	
10	Cooperation and self-control	67	82	55	70	60	74	64	76	69	
2	Reasoning, problem solving, and inquiry	66	78	58	69	61	80	63	87	68	
16	Family roles and relationships/civics and government rules	64	78	52	68	56	72	61	75	66	
11	Social relationships	61	77	48	66	53	64	61	64	63	
14	Patterns and measurement	60	74	51	63	56	71	57	74	67	
7	Fine motor	52	62	43	57	42	50	52	50	49	
12	Arts, movement, music, and dramatic play	51	65	39	56	41	57	49	60	52	
4	Speaking and communicating	51	64	41	54	46	62	48	68	52	
1	Engagement, persistence, initiative, and curiosity	45	67	33	48	39	50	43	52	46	
15	Matter, force, energy, and dynamic earth	44	57	33	46	40	52	42	56	44	
3	Listening and understanding	41	56	28	44	35	48	39	52	40	
8	Gross motor	27	33	19	26	29	24	28	22	30	
9	Hygiene, nutrition, and personal care	25	34	15	28	20	26	25	26	25	

Note: Results are presented only for the demographic subgroups analyzed. Complete distributions are presented in table 2. Values in bold indicate the three foundation areas with the highest percentages of children assessed as functioning below age-expected skill levels within each demographic subgroup.

a. See table 1 for domains for each foundation area.

Source: Authors' analysis based on the Oregon Early Childhood Assessment System dataset received June 2008; see text for details.

TABLE 10

U.S. Office of Special Education Programs child outcome area analysis for early intervention (from birth through age 2) and early childhood special education (ages 3–5) children (percentage assessed as functioning above, at, or below age-expected skill levels)

Child outcome area	Children in early intervention services by functioning level (n = 1,835)			Children in early childhood special education services by functioning level (n = 2,508)		
	Above	At	Below	Above	At	Below
Positive social-emotional skills	10	39	51	18	17	65
Acquisition and use of knowledge and skills	4	29	67	8	28	64
Use of appropriate behaviors to meet their needs	14	40	46	21	46	33

Source: Authors' analysis based on the Oregon Early Childhood Assessment System dataset received June 2008; see text for details.

TABLE 11

U.S. Office of Special Education Programs child outcome area analysis for early intervention (from birth through age 2) and early childhood special education (ages 3–5) children, by selected disability subgroups (percentage assessed as functioning below age-expected skill levels)

Child outcome area	Children in early intervention services (n = 1,835)			Children in early childhood special education services (n = 2,508)		
	Developmental delays (n = 1,446)	Communication disorders (n = 191)	Ratio of developmental delays to communication disorders	Developmental delays (n = 846)	Communication disorders (n = 1,414)	Ratio of developmental delays to communication disorders
Positive social-emotional skills	51	52	0.98	82	51	1.61
Acquisition and use of knowledge and skills	69	64	1.08	78	54	1.44
Use of appropriate behaviors to meet their needs	48	21	2.29	43	22	1.95

Note: Results are presented only for developmental delays and communication disorders. Complete distributions are presented in table 2.

Source: Authors' analysis based on the Oregon Early Childhood Assessment System dataset received June 2008; see text for details.

(table 11). The percentages for the two groups were much closer on the other two child outcome areas. A smaller percentage of children with developmental delays than of children with communication disorders were assessed as functioning below age-expected skill levels on positive social-emotional skills (ratio of 0.98).

Early childhood special education group. Higher percentages of children in early childhood special education services classified with developmental delays than of those classified with communication disorders were assessed as functioning below age-expected skill levels for all three child

outcome areas (see table 11). The percentage of children with developmental delays functioning below age-expected skill levels was 1.95 times that of children with communication disorders for the outcome area use of appropriate behaviors to meet their needs.

Gender

Early intervention group. Higher percentages of boys in early intervention services than of girls were assessed as functioning below age-expected skill levels for two of the three child outcome areas (table 12). The largest discrepancy between

TABLE 12

U.S. Office of Special Education Programs child outcome area analysis for early intervention (from birth through age 2) and early childhood special education (ages 3–5) children, by gender (percentage assessed as functioning below age-expected skill levels)

Child outcome area	Children in early intervention services (n = 1,835)			Children in early childhood special education services (n = 2,508)		
	Boys (n = 1,187)	Girls (n = 648)	Ratio of boys to girls	Boys (n = 1,679)	Girls (n = 829)	Ratio of boys to girls
Positive social-emotional skills	55	44	1.25	69	56	1.23
Acquisition and use of knowledge and skills	70	62	1.13	67	58	1.16
Use of appropriate behaviors to meet their needs	45	48	0.94	35	28	1.25

Source: Authors' analysis based on the Oregon Early Childhood Assessment System dataset received June 2008; see text for details.

the two groups was for positive social-emotional skills (ratio of boys to girls of 1.25). A smaller percentage of boys than of girls were assessed as functioning below age-expected skill levels for use of appropriate behaviors to meet their needs (ratio of 0.94).

Early childhood special education group. Higher percentages of boys than of girls were assessed as functioning below age-expected skill levels across all three outcome areas (see table 12). The percentage of boys assessed as functioning below age-expected skill levels was 1.25 times that of girls for use of appropriate behaviors to meet their needs and 1.23 times greater for positive social-emotional skills.

Race/ethnicity

Early intervention group. Differences between the percentages of Hispanic and White children assessed as functioning below age-expected skill levels were small across the three child outcome areas (table 13). Both groups had exactly 51 percent of children assessed as functioning below age-expected skill levels on positive social-emotional skills. In addition, the largest difference between the two groups was for acquisition and use of knowledge and skills, with the percentage of Hispanic children 1.06 times that of White children.

Early childhood special education group. Higher percentages of Hispanic than of White children

TABLE 13

U.S. Office of Special Education Programs child outcome area analysis for early intervention (from birth through age 2) and early childhood special education (ages 3–5) children, by selected race/ethnicity subgroups (percentage assessed as functioning below age-expected skill levels)

Child outcome area	Children in early intervention services (n = 1,835)			Children in early childhood special education services (n = 2,508)		
	Hispanic (n = 365)	White (n = 1,208)	Ratio of Hispanic to White	Hispanic (n = 463)	White (n = 1,718)	Ratio of Hispanic to White
Positive social-emotional skills	51	51	1.00	70	63	1.11
Acquisition and use of knowledge and skills	70	66	1.06	76	61	1.25
Use of appropriate behaviors to meet their needs	44	46	0.96	30	34	0.88

Note: Results are presented only for White and Hispanic children. Complete distributions are presented in table 2.

Source: Authors' analysis based on the Oregon Early Childhood Assessment System dataset received June 2008; see text for details.

were assessed as functioning below age-expected skill levels for two of the three child outcome areas (see table 13). The largest discrepancy between the two groups was for acquisition and use of knowledge and skills, with the percentage of Hispanic children assessed as functioning below age-expected skill levels 1.25 times that of White children. However, a smaller percentage of Hispanic than of White children were assessed as functioning below age-expected skill levels for use of appropriate behaviors to meet their needs (ratio of 0.88).

Primary home language

Early intervention group. The analysis for primary home language for the early intervention group was performed only for Hispanic children with either English or Spanish as the primary home language. The percentages of Hispanic children from English- and Spanish-speaking homes who were assessed as functioning below age-expected skill levels are based on 356 Hispanic children; 9 others were excluded from the analysis because both English and Spanish or another language was the primary home language. Both groups had 51 percent of children assessed as functioning below age-expected skill levels on positive social-emotional skills (table 14). The percentage of Hispanic children from Spanish-speaking homes who were assessed as functioning below

age-expected skill levels was 1.09 times that of Hispanic children from English-speaking homes for acquisition and use of knowledge and skills but only 0.89 times for use of appropriate behaviors to meet their needs.

Early childhood special education group. The analysis for primary home language for the early childhood special education group was performed only for Hispanic children with either English or Spanish as the primary home language. The percentages of Hispanic children from English- and Spanish-speaking homes who were assessed as functioning below age-expected skill levels are based on 453 Hispanic children; 10 others were excluded from the analysis because both English and Spanish or another language was the primary home language. Higher percentages of Spanish-speaking than of English-speaking Hispanic children were assessed as functioning below age-expected skill levels in all three child outcome areas (see table 14). The largest discrepancy between the two groups was for acquisition and use of knowledge and skills (ratio of Spanish-speaking Hispanic children to English-speaking Hispanic children of 1.16). The percentage of Hispanic children from Spanish-speaking homes who were assessed as functioning below age-expected skill levels was only 1.03 times that for Hispanic children from English-speaking homes for use of appropriate behaviors to meet their needs.

TABLE 14
U.S. Office of Special Education Programs child outcome area analysis for early intervention (from birth through age 2) and early childhood special education (ages 3–5) children, by primary home language of English and Spanish (percentage assessed as functioning below age-expected skill levels)

Child outcome area	Hispanic early intervention children (n = 356)			Hispanic early childhood special education children (n = 453)		
	Spanish (n = 263)	English (n = 93)	Ratio of Spanish to English	Spanish (n = 302)	English (n = 151)	Ratio of Spanish to English
Positive social-emotional skills	51	51	1.00	71	66	1.08
Acquisition and use of knowledge and skills	71	65	1.09	80	69	1.16
Use of appropriate behaviors to meet their needs	42	47	0.89	30	29	1.03

Note: Results are presented only for Hispanic students from English- and Spanish-speaking homes. Complete distributions are presented in table 2.
Source: Authors' analysis based on the Oregon Early Childhood Assessment System dataset received June 2008; see text for details.

Summary

Children in early intervention services. Table 15 summarizes the results for the percentage of children in early intervention services assessed as functioning below age-expected skill levels on U.S. Office of Special Education Programs child outcome areas by total population, primary disability, gender, race/ethnicity, and primary home language. For all demographic subgroups, acquisition and use of knowledge and skills was the child outcome area with the highest percentage of children assessed as functioning below age-expected skill levels. All demographic subgroups except girls were least often assessed as functioning below age-expected skill levels in use of appropriate behaviors to meet their needs.

Children in early childhood special education services. Table 16 summarizes the percentage of children in early childhood special education services assessed as functioning below age-expected skill levels on U.S. Office of Special Education Programs child outcome areas by total population, primary disability, gender, race/ethnicity, and primary home language. For all demographic subgroups, use of appropriate behaviors to meet their needs was the child outcome area with the smallest percentage of children assessed as functioning below age-expected skill levels, with the share ranging from 22 percent to 43 percent. Four of the eight demographic subgroups (developmental delay, boys, White children, and English-speaking Hispanic children) were more often assessed as functioning below age-expected skill levels on positive social-emotional skills, and the remaining four groups (communication disorder, girls, Hispanic children, and Spanish-speaking Hispanic children) were more often assessed as functioning below age-expected skill levels on acquisition and use of knowledge and skills.

levels of major demographic subgroups of Oregon's early intervention and early childhood special education services at time of entry to services. The findings should not be interpreted as a reflection of the effectiveness of services provided. Based on assessments of developmental functioning reported in the Oregon Early Childhood Assessment System, the findings provide information about detailed and focused developmental areas that were intentionally defined to correspond to critical early childhood skills. The report also provides information about the U.S. Office of Special Education Programs child outcome areas that states are required to report on at the federal level for children enrolled in early intervention and early childhood special education services.

The two foundation areas and the one child outcome area with the highest percentages of children in early intervention and early childhood special education services assessed as functioning below age-expected skill levels were the same regardless of primary disability, gender, and ethnicity. The foundation areas were phonological awareness and numbers and operations. The child outcome area was acquisition and use of knowledge and skills.

Consistent with findings from national studies and referral patterns in K–12 education, higher percentages of boys than of girls were enrolled in Oregon early intervention and early childhood special education services (Hebbeler et al. 2007; Markowitz et al. 2006; Wagner and Blackorby 2002). Research indicates that the overrepresentation of boys in special education services may reflect developmental differences between boys and girls (Janus and Offord 2007). Girls tend to have higher skill levels across language, cognitive development, emotional expressivity,

The two foundation areas and the one child outcome area with the highest percentages of children in early intervention and early childhood special education services assessed as functioning below age expected skill levels were the same regardless of primary disability, gender, and ethnicity

SOME IMPLICATIONS OF THE FINDINGS

This report aimed to provide early childhood program administrators and service providers with information about the developmental functioning

TABLE 15

Summary of U.S. Office of Special Education Programs child outcome area analysis for early intervention (from birth through age 2) children, by total population and select demographic subgroups (percentage assessed as functioning below age-expected skill levels)

	Primary disability		Gender		Race/ethnicity		Primary home language for Hispanic children		
	Total population (n = 1,835)	Developmental delays (n = 1,446)	Communication disorders (n = 191)	Boys (n = 1,187)	Girls (n = 648)	Hispanic (n = 365)	White (n = 1,208)	Spanish (n = 263)	English (n = 93)
Child outcome area	67	69	64	70	62	70	66	71	65
Acquisition and use of knowledge and skills	51	51	52	55	44	51	51	51	51
Use of appropriate behaviors to meet their needs	46	48	21	45	48	44	46	42	47

Note: Results are presented only for the demographic subgroups analyzed. Complete distributions are presented in table 2. Values in bold indicate the child outcome area with the highest percentage of children assessed as functioning below age-expected skill levels within each demographic subgroup.

Source: Authors' analysis based on the Oregon Early Childhood Assessment System dataset received June 2008; see text for details.

TABLE 16

Summary of U.S. Office of Special Education Programs child outcome area analysis for early childhood special education (ages 3–5) children, by total population and select demographic subgroups (percentage assessed as functioning below age-expected skill levels)

	Primary disability		Gender		Race/ethnicity		Primary home language for Hispanic children		
	Total population (n = 2,508)	Developmental delays (n = 846)	Communication disorders (n = 1,414)	Boys (n = 1,679)	Girls (n = 829)	Hispanic (n = 463)	White (n = 1,718)	Spanish (n = 302)	English (n = 151)
Child outcome area	65	82	51	69	56	70	63	71	66
Positive social-emotional skills	64	78	54	67	58	76	61	80	69
Acquisition and use of knowledge and skills	33	43	22	35	28	30	34	30	29
Use of appropriate behaviors to meet their needs									

Note: Results are presented only for the demographic groups analyzed. Complete distributions are presented in table 2. Values in bold indicate the child outcome area with the highest percentage of children assessed as functioning below age-expected skill levels within each demographic subgroup.

Source: Authors' analysis based on the Oregon Early Childhood Assessment System dataset received June 2008; see text for details.

and social competence at young ages than boys do (Coley 2002; Janus and Offord 2007; Weinberg et al. 1999). Moreover, there is evidence that gender differences in special education identification rates may be related to bias in referral procedures and assessment instruments (Coutinho and Oswald 2005; Wehmeyer and Schwartz 2001).

Findings for Hispanic children must consider factors such as primary home language, socio-economic status, and family immigration history (Espinosa and López 2007). For example, for this study Spanish was the primary home language for 74 percent of Hispanic children in early intervention services and 65 percent in early childhood special education services. Thus, the differences in the percentages of Hispanic and White children assessed as functioning below age-expected skill levels may be related to language and communication issues. For early intervention services the discrepancy between the two groups was highest for listening and understanding (ratio of Spanish-speaking Hispanic children to English-speaking Hispanic children of 1.07) and speaking and communicating (ratio of 1.06). The percentage of Hispanic children in early intervention services under the disability category of developmental delays was 1.1 times that for White children. However, the ratio of Hispanic to White children in early intervention services under the disability category of communication disorders was 0.77. Thus, interpretation of results by race/ethnicity should also consider disability categories.

For children in early childhood special education services the foundation areas with the largest differences in the percentages of White and Hispanic children assessed as functioning below age-expected skill levels were for listening and

understanding, speaking and communicating, and reasoning, problem-solving, and inquiry. For these three foundation areas the ratio of Spanish- to English-speaking children ranged from 1.23 to 1.29. These data are consistent with Oregon foundation area differences between Hispanic children whose primary home language was Spanish and those whose primary home language was English.

The increase in cultural and linguistic diversity among children from birth through age 5 creates several challenges for identifying children for early intervention and early childhood special education services (Espinosa and Lopez 2007; Fry 2008). These challenges include lack of assessment instruments normed on representative samples of children whose primary home language is Spanish, inadequate professional development for service providers, and limited research knowledge (National Research Council 2008). Thus, the results for Hispanic children whose primary home language is Spanish may indicate real differences for these children: dual language learners who have disabilities may have more skill delays than White or Hispanic children whose primary home language is English. However, because the largest differences in the percentage of Hispanic children assessed as functioning below age-expected skill levels was in language and communication, the reported differences may be influenced by rater bias, insensitivity of the Oregon Early Childhood Assessment System ratings to primary home language, or differential item functioning.

The increase in cultural and linguistic diversity among children from birth through age 5 creates several challenges for identifying children for early intervention and early childhood special education services

APPENDIX A

THE OREGON EARLY CHILDHOOD ASSESSMENT SYSTEM

The Oregon Early Childhood Assessment System is a web-based database that allows service providers to assess and enter data individually for each child they serve. The system can be used to generate reports on an individual child, caseload, class, or program at the regional, state, or federal levels. Assessors enter scores into the online system, which are then submitted to a secure web site at Portland State University. University researchers aggregate the data and report them to the Oregon Department of Education.

The Oregon Early Childhood Assessment has two parts: a behavior checklist and an observational assessment conducted in a natural environment. An assessor who knows the child completes a 128-item behavior checklist, composed of eight developmentally ordered items for each of the 16 Oregon foundation areas, assessing early childhood functioning from birth to age 6. The scale for a given foundation area consists of one item representing a typical developmental skill or function at each of eight age categories (see appendix C).

The assessment system then creates an observation form consisting of the lowest age level developmental item for each foundation area that the child reportedly cannot perform independently (or the last item in a foundation area if the checklist indicates that the child can do all items). The assessor prints the observation form and notes the level of independence for each of the 16 functional items (foundation areas) while observing the child during typical activities (such as play and snack time) in natural settings (such as home, preschool, and classroom) during a typical day. The data from the observation form are then entered into the Oregon Early Childhood Assessment System.

Scoring

From the checklist and observation data the assessment system creates scores for each of the 16

Oregon foundation areas and the three U.S. Office of Special Education Programs child outcome areas. A child can receive a maximum checklist score of eight points for each foundation area skill (meaning that the child can perform all eight items independently). A final foundation area score is created by calculating an observation score for the lowest developmental item that the child was reported unable to perform independently and using that in place of the checklist score. The observation score is assessed on a scale of 0 to 1, based on the level of assistance required to complete the skill or behavior. Partial credit is assigned if the child is able to perform the item with assistance (0.25 for full physical assistance, 0.50 for partial assistance, and 0.75 for verbal or visual prompt assistance). Using the observation score—based on observing the child on an item closest to his or her developmental status according to the checklist—increases the sensitivity of the child’s foundation area score. The three U.S. Office of Special Education Programs child outcome area scores are calculated by summing the set of foundation area scores that correspond to each outcome area, as shown in table 1 in the main report.

Assessment item development and technical adequacy

The Oregon Department of Education contracted in 2005 with Portland State University and the University of Oregon to develop the Oregon Early Childhood Assessment System in alignment with the Oregon foundation areas. This assessment system was designed to link to existing standards for school-age children and to enable the monitoring of children’s progress from birth through age 5. In addition, the assessment system enables early childhood educators and service providers to monitor young children’s progress and outcomes against Oregon’s K–12 standards. The assessment system includes all children—English language learner children, children with special healthcare needs, children with disabilities, and children who are developing typically.

Item development began with an extensive review of research and research-based assessments

on early childhood development and skills for children from birth through age 5. The review included research and assessment tools on early childhood development and the important skills related to each of the foundation domains. Numerous research-based assessments were reviewed across stages of development. A team of experts reviewed the items to identify those that were observable, functional, and developmentally appropriate for different age categories. The foundation areas were also matched to the three U.S. Office of Special Education Programs child outcome areas, which were approved for federal reporting.

Federal funds from the Early Childhood Outcomes Measurement Project were used in collecting and analyzing extensive field-test data to determine the psychometric properties of the assessment with a sample of children in early intervention and early childhood special education services. In addition, a series of pilot tests examined the reliability and validity of the assessment tool (Arick, Falco, and Young 2006).

Results of a concurrent validity study indicated that domain scores from the Oregon Early Childhood Assessment System correlate well with

standardized assessments intended to measure similar content, such as the Bayley Scales of Infant Development (Bayley 1993) and the Woodcock-Johnson Psycho-Educational Battery–3rd Edition (Woodcock, McGrew, and Mather 2001). A state-wide sample of 487 children was used to determine whether the new assessment was sensitive to developmental functioning for three different populations: those served through early intervention and early childhood special education, children with no disabilities who were participating in childcare programs, and children receiving Head Start services. A Pearson correlation between age in months and a total score on 40 items from the assessment showed a strong association between age and developmental score ($r = 0.80, p < 0.01$). Reliability analyses with a sample of 422 children indicated that scores for the Oregon foundation domains are internally consistent, with coefficient alpha values from 0.75 to 0.89: language and literacy development (0.89), approaches to learning (0.85), the arts (0.80), social and emotional development (0.80), mathematics (0.79), physical education and health (0.78), science (0.77), and social sciences (0.75). Test-retest and interrater reliability analyses found correlations greater than 0.90 in all cases for each of the U.S. Office of Special Education Programs child outcome areas.

APPENDIX B RESEARCH ON EARLY INTERVENTION AND EARLY CHILDHOOD SPECIAL EDUCATION SERVICES

The U.S. Office of Special Education Programs commissioned two studies to learn more about early intervention and early childhood special education services for children from birth through age 5. In 1996 it commissioned the National Early Intervention Longitudinal Study (NEILS) to examine the characteristics of a nationally representative sample of children and families enrolled in early intervention and to longitudinally track the services they receive, the costs of these services, and the outcomes for participating children and families (Hebbeler et al. 2007; U.S. Department of Education 2005).

In 2003 it commissioned the Pre-Elementary Education Longitudinal Study (PEELS) to follow 3,000 preschool children with disabilities. That study collects data from parents, service providers, state agency administrators, and individual child assessments from 2003 to 2009. It seeks to learn more about the characteristics of children enrolled in early childhood special education: the services they receive over time; transition experiences between early intervention, preschool, and kindergarten; and child outcomes (Markowitz et al. 2006). PEELS data are weighted so that results can be generalized to U.S. children ages 3–5 with disabilities.

Characteristics of early intervention children and families

NEILS data indicate that 61 percent of the children enrolled in early intervention services were boys and 35 percent were girls (Hebbeler et al. 2007). This national study also found differences in the race/ethnicity of children in early intervention services: 21 percent were Black, considerably higher than their 14 percent share in the general population, while 55 percent were White, below their 61 percent share in the general population. The share of Hispanic children (16 percent) was consistent with their share in the general population (18 percent).

Some 27 percent of early intervention children and families lived in poverty, compared with 21 percent of the general population. As in the general population, Black children were more likely to live in poverty (49 percent). The importance of poverty as a predictor of poor outcomes for children is well documented. Children from low-income families are less likely to have access to healthcare, adequate nutrition, and stable housing in safe neighborhoods (Black, Hess, and Berenson-Howard 2000; Brooks-Gunn and Duncan 1997; Park, Turnbull, and Turnbull 2002). The NEILS data do not provide prevalence or outcome information for children in early intervention services whose primary home language is Spanish.

Early intervention eligibility determination

Dunst and Hamby (2004) examined how differences in state eligibility definitions for early intervention influence the percentage of children enrolled in such programs. They classified states into three categories based on their eligibility determination practices for early intervention:

- The restricted group included 18 states with eligibility definitions that did not allow at-risk conditions to be used for determining eligibility and that did not include any reference to clinical opinion.
- The narrow group included 22 states and the District of Columbia with eligibility definitions that did not allow at-risk conditions to be used for determining eligibility but that explicitly stated that clinical opinion could be used as the basis for determining eligibility. Oregon was assigned to this group.
- The liberal group included 10 states that provided early intervention services for children at risk for developmental delay due to biological or environmental risk factors. Six of these states said that clinical opinion could be used as the basis for eligibility decisions.

Dunst and Hamby (2004) found statistically significant increases in the percentages of children served from 1994 to 2002 across all groups regardless of eligibility procedures. There were no statistically significant differences in the percentages of children enrolled in states assigned to the restricted or narrow groups. Differences in early intervention enrollment were found between states in the liberal group, which enrolled students at risk for developmental delay, and states in the narrow or restricted groups, which did not enroll at-risk children. However, the conclusion that liberal states served a higher percentage of children in early intervention was not true in all cases. Further analysis found that variability in early intervention enrollment was highest among states within the liberal group, ranging from less than 2 percent to 9 percent.

Thus, eligibility definitions and procedures may not be the only factor influencing the higher percentage of children served in states in the liberal group. These factors could include differences in the specificity of disability definitions and criterion levels, system infrastructure, administration of early intervention services, and the accessibility of early intervention services to families (Hebbeler et al. 1999; Spiker et al. 2000).

Characteristics of early childhood special education children and their families

The PEELS study found that boys made up the largest share of children with disabilities ages 3–5 regardless of the racial/ethnic group or disability category (Markowitz et al. 2006). Overall, 70 percent of the children participating in the study were boys and 30 percent were girls. By racial/ethnic composition 67 percent of the children were White, 22 percent were Hispanic, and 11 percent were Black. The racial/ethnic composition of children in early childhood special education services was similar to that in the general population, with no group over- or underrepresented (Hebbeler et al. 2007; Wagner and Blackorby 2002). Black children were less likely (30 percent) to live with both biological parents than were White children

(73 percent) and were more likely to live in low-income households. PEELS data do not provide prevalence or outcome information for children whose primary home language is Spanish.

Some 75 percent of the children in early childhood special education services were identified as having speech or language impairments as their primary or secondary disability, 37 percent as having developmental delays, and 8 percent as autistic. Percentages of children identified with a speech or language impairment varied by race/ethnic group: 51 percent of White children, 42 percent of Hispanic children, and 27 percent of Black children. However, a higher percentage of Black children were identified with developmental delays (42 percent) than were Hispanic children (22 percent) and White children (27 percent).

Standards-based accountability in early childhood education

A series of studies examining the creation, adoption, and intended uses of early childhood standards at the state level found that 49 states plus the District of Columbia have developed and adopted early learning outcome standards for preschool children that provide a common set of expectations for what children should know and be able to do before entering kindergarten. North Dakota, the one state that has not adopted standards, is currently developing them (Kagan and Scott-Little 2004; National Child Care Information and Technical Assistance Center 2007; Scott-Little et al. 2007).

Representatives of all 42 states that responded to an online survey reported that their state aligned early childhood standards with K–12 education standards (Scott-Little et al. 2007). And 35 states reported using language that was inclusive of all children, including children with disabilities. Early childhood professionals and policymakers identify several advantages in linking early childhood standards and K–12 standards-based accountability systems: efficient communication about student progress and academic skill

between early childhood and K–12 teachers, use of consistent approaches to measuring student and program outcomes, and smoother transitions for children as they progress from early childhood services to kindergarten (Campbell and Anketell 2007; Kagan, Moore, and Bredekamp 1995; Rous et al. 2005).

Although adopting high-quality early childhood standards is an important first step toward these goals, the meaningful implementation and application of these standards play an equally important role in promoting effective early childhood education. Important issues associated with standards-based accountability systems for early childhood include child assessment on standards, alignment with PreK and K–12 standards, and inclusion of children with and without disabilities (Petersen, Jones, and McGinley 2008; Ramey and Ramey 2004; Scott-Little, Kagan, and Frelow 2006).

State efforts to ensure that early learning guidelines include children enrolled in early intervention and early childhood special education services have increased in recent years. To date, 35 states have implemented strategies to guide

teachers in using early learning standards for children enrolled in early intervention and early childhood special education services. These strategies include development of additional resources such as materials, training, and technical assistance. Despite these efforts on behalf of children with special needs, the support and level of inclusion for young children with disabilities continue to vary by state (Scott-Little, Kagan, and Frelow 2003).

An analysis of 21 sets of state early learning guidelines or standards for children from birth through age 2 indicates an emphasis on skills in four domains: physical development and motor skills, social and emotional development, language and communication development, and cognitive development and general knowledge (Scott-Little et al. 2009). In contrast, skills that address children's approaches to learning receive far less attention. Moreover, the content of early learning standards may overlook skill indicators that are important for tracking the progress of children with disabilities. For example, relationship with peers, self-control, cooperative approach, and alphabet awareness are indicators that were addressed least often by state early learning standards.

APPENDIX C STUDY METHODS AND LIMITATIONS

This appendix provides additional details on data collection and analysis and on study limitations.

Data collection

The data used for this study were obtained in June 2008 from the Portland State University researchers who developed the Oregon Early Childhood Assessment System (Arick et al. 2006) for the Oregon Department of Education. The researchers exported child-level data from the database for all children in early intervention and early childhood special education services from April 1, 2006, through April 30, 2007, into a dataset for analysis. The dataset included the universe of children from birth through age 5 who received either early intervention or early childhood special education services during that 13-month period. Variables included developmental scores on entry into services on each of the 16 Oregon foundation areas and the three U.S. Office of Special Education Programs child outcome areas and four demographic variables (primary disability, gender, race/ethnicity, and primary home language).

The database is a web-based system that collects information from early intervention and early childhood special education service providers on their assessments of the children with whom they work. Service providers are trained in the application and recording of assessment scores. The assessment system uses checklist and observation data to create scale scores for each of the 16 Oregon foundation areas and three U.S. Office of Special Education Programs child outcome areas listed in table 1 in the main report (see appendix A for details on the assessment system).

Portland State University researchers worked with the study team on a final data cleaning step to resolve some data issues related to how U.S. Office of Special Education Programs child outcome scores were generated. There were no missing data problems in the dataset. Confidentiality was preserved

during this study because the dataset contained no names. In addition, results were not reported for demographic categories that were small enough to enable any children to be identified. All data were received in electronic form and stored on a secure network directory accessible only to the study team.

Analysis

The dataset was used to analyze early childhood assessment data on the 16 Oregon foundation areas and three U.S. Office of Special Education Programs federal reporting child outcome areas. To answer the research question on child developmental functioning levels, a series of frequency tables were prepared and analyzed by foundation and child outcome areas. Analyses were conducted separately for the early intervention (from birth through age 2) and early childhood special education (ages 3–6) groups. No direct comparisons were made between the two groups.

Proficiency levels for Oregon foundation areas and U.S. Office of Special Education Programs child outcome areas. The scale for each of the 16 Oregon foundation areas consists of eight developmentally ordered items assessing early childhood functioning from birth to age 6. Key indicators for each foundation area represent critical developmental milestones at eight different age ranges from birth to age 6: 0–6 months, 7–12 months, 13–18 months, 19–24 months, 25–36 months, 37–48 months, 49–60 months, and 61–72 months. The first four groups each span a 6-month period, and the other four age groups span a 12-month period to reflect key stages of development based on research on early childhood (Arick et al. 2006). The age at which most typically developing children accomplish a specific milestone is thought to provide useful information about the scope and sequence of child development (Benner 2003).

For the current study the developmental structure of items within each foundation area was used to assess each child as functioning below, at, or above age-expected skill levels for each foundation area based on the score on that foundation area and the

child's developmental age group. The assessment items within each foundation area are observable behaviors that demonstrate a continuum of growth toward the foundation area knowledge and skills. For example children ages 13–18 months would be in the third age range. A child that age whose development is typical of that of most children on a specific foundation should be able to perform the first three items of that foundation's scale, but not the last five, and would therefore have a score of 3.0. Based on the developmental nature of the items and the results of sensitivity analyses across typically developing and special needs populations, a child whose score ranges from 2.5 to 3.5 is considered at age level. A score below 2.5, which is closer to the expected score for the younger 7–12 months age group (2.0), is considered to be below age level, and a score that is above 3.5 is considered to be above age level for the foundation area.

Similar age-level determinations were made for the U.S. Office of Special Education Programs child outcome areas based on summing the foundation area scores that aggregate to define each outcome (see table 1 in the main report). Thus, a score for the outcome area use of appropriate behaviors to meet their needs was created by summing the three foundation area scores that comprise that outcome: fine motor, gross motor, and hygiene, nutrition, and personal care. A child ages 13–18 months with a score of 7.5 (3 items times 2.5) or lower was assessed as functioning below age-expected skill levels, and one with a score of 10.5 (3 items times 3.5) or higher was assessed as functioning above age-expected skill levels. Children with scores in between were assessed as functioning at age-expected skill levels.

Answering the research questions. The research question was answered by analyzing the percentage of children assessed as functioning above, at, and below age-expected skill levels on the foundation and outcome areas, a common approach in developmental assessments of early childhood skills. Subgroups were compared by calculating the ratio of one group's percentage of children

assessed as functioning below age-expected skill levels on all foundation and outcome areas to the comparison subgroup's percentage of children. Thus, if 80 percent of boys and 75 percent of girls were assessed as functioning below age-expected skill levels on a given foundation or outcome area, the boys' ratio score would be 1.07 (80 divided by 75), meaning that boys were 1.07 times more likely than girls to be assessed as functioning below age-expected skill levels. The same procedure is used for the U.S. Office of Special Education Programs child outcome areas.

Only subgroups with substantial populations in the dataset were analyzed. Thus, developmental delay and communication disorder subgroups were the only primary disability groups analyzed, since all other groups constituted 5.8 percent or less of the population. Only White and Hispanic children were included in the analysis of race/ethnicity, since all other groups constituted 4 percent or less of both early intervention and early childhood special education populations (see table 2 in the main report). To explore the potential effect of home language on performance English and Spanish as the primary home language were compared for all Hispanic children in the dataset.

For children in early childhood special education services no disparity that might influence the interpretation of performance by disability was found in a comparison of the distribution of the two most prevalent disability categories across the two primary ethnic groups. For children in early intervention services communication disorder was the primary disability for 8.5 percent of Hispanic and 11 percent of White children, and developmental delay was the primary disability for 84.1 percent of Hispanic and 76.8 percent of White children. For children in early childhood special education services communication disorder was the primary disability for 57.9 percent of Hispanic and 57.7 percent of White children, and developmental delay was the primary disability for 34.1 percent of Hispanic and 32.2 percent of White children.

Study limitations

Data for this study on each child's functioning levels came from Oregon Early Childhood Assessment System checklist ratings and observational assessments prepared by service providers familiar with the child under typical service or home settings. While the providers were trained to collect and enter the data into the database, some variation in ratings could be due to subjective differences between raters that could have systematically affected the results across subgroups. The validity of proficiency levels for foundation and

outcome areas used in this study are based on the content validity of the database and subsequent developmental validation analyses conducted by the database developers. Also, the limited size of the dataset did not support detailed analysis of any demographic subgroups other than the two largest for primary disability, race/ethnicity, and primary home language. Finally, while strengths and challenges have been identified for specific population subgroups on foundation and child outcome areas, no causal inferences can be drawn from these results due to the descriptive nature of the analysis using only frequencies and ratio data.

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