

Kindergarten **E**ssential **S**kills **A**ssessment

KESA

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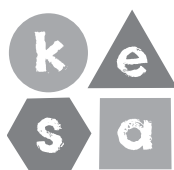


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Section 1:
INTRODUCTION TO THE *KESA*

The *Kindergarten Essential Skills Assessment (KESA)* is an individually administered assessment designed to measure the critical skills that predict end-of-year kindergarten success. The *KESA* is a revision and expansion of the *Pre-Kindergarten Screen (PKS)* (Webster & Matthews, 2000). The *KESA* supports the early identification of children who are at risk for kindergarten retention and special education referral. This instrument also provides data about a child's proficiency in important areas identified by research as being related to early school success.

At various points in the last five decades, kindergarten screening has been a regular practice to determine a child's readiness and eligibility for kindergarten. This practice has come under criticism as an inaccurate and potentially discriminatory use of screening tools (Snow, 2011). Children approach school entry with a wide variety of skills, experiences, supports, and knowledge (Ackerman & Barnett, 2005). Maxwell and Clifford (2004) assert that "it is a school's responsibility to educate all children who are old enough to legally attend school, regardless of their skills" (p. 8). In line with these arguments, most states and the District of Columbia have moved away from using developmental screenings to determine kindergarten eligibility and now have clearly established kindergarten entrance criteria based on a child's date of birth relative to entrance cutoff dates (U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, n.d.)

Increasing numbers of schools have developed kindergarten readiness assessments to improve the early identification of children at risk, to document children's educational progress, and to make informed policy and curricular decisions (Prakash, West, & Denton, 2003; Rhode Island Kids Count, 2005; Snow, 2011). However, assessments are designed for specific purposes. One tool may not be able to match all of the requirements for a state's early childhood/kindergarten assessment program (Ackerman & Barnett, 2005; Graue, 2006; Maxwell & Clifford, 2004; Snow, 2006). For example, assessments designed for accountability, policy,

and curricular purposes should be linked specifically with a school's educational goals and curriculum. Conversely, screening tools designed to identify children at risk should cover multiple areas of physical, academic, and emotional development and should not be specifically linked to the curriculum (Maxwell & Clifford, 2004; Snow, 2006).

Although the Goals 2000: Educate America Act (1994) proposed that by the year 2000 "all children in America will start school ready to learn" there remains no clear federal definition of what skills, knowledge, and abilities constitute school readiness (Graue, 2006; Lin, Lawrence, & Gorrell, 2003; Snow, 2006, 2011). However, most authors agree that school readiness and success include factors related to the individual child (ready student), school (ready school), and community (ready community). Student readiness factors describe a multidimensional cluster of characteristics that include how the child learns, proficiency in language development, range of general knowledge, motor development, and social and emotional development (Diamond, Justice, Siegler, & Snyder, 2013; Le, Kirby, Barney, Setodji, & Gershwin, 2006). The National School Readiness Indicators Initiative (Rhode Island Kids Count, 2005) outlined five broad domains of student readiness:

1. Physical well-being and motor development
2. Social and emotional development
3. Approaches to learning
4. Language development
5. Cognition and general knowledge

While research on how these domains interact with each other is evolving, there is substantial research evidence from education, psychology, and child development about the individual cognitive, motor, and familial variables that predict early and later school success. The ability to accurately assess the readiness skills of young children is critical, because early achievement gaps continue to widen throughout the course of a student's career (Diamond et al., 2013; Hamre & Pianta, 2005; Le et al., 2006). "Children who have well-developed language, literacy, mathematics, cognitive, and social skills at entrance to primary schooling are on a positive trajectory for short- and long-term success as compared to children with under-developed skills" (Diamond et al., 2013, p. 2).

With appropriate intervention and support at-risk students can perform at levels that are consistent with those of their non-at-risk peers (Hamre & Pianta, 2005). However, many at-risk students are not identified early in their schooling experiences and do not receive appropriate early interventions (Bergren, 2003; Montes, Lotyczewski, Halterman, & Hightower, 2012). Ready schools have the ability to accurately identify those children in need of educational interventions before they enter kindergarten. Ready schools are also able to provide appropriate and effective interventions to enhance the probability of the child's success in school (Rhode Island Kids Count, 2005)

The *KESA* is designed specifically to identify children who are at risk for academic failure. The specific skills and competencies assessed by the *KESA* are based on well-validated empirical research evidence that has consistently identified key developmental characteristics associated with early and later school performance and achievement.

The following section provides a synthesis of research findings that support the specific sets of tasks used in the *KESA*. The section is organized according to the five domains identified in the National School Readiness Indicators Initiative report (Rhode Island Kids Count, 2005). The *KESA* skill areas that address each domain are identified, along with relevant research, to show the relationship between performance in the skill areas and early and later school and academic success.

MOTOR DEVELOPMENT

The *KESA* includes items that assess gross motor, fine motor, visual-motor integration, and fine motor planning skills. Gross motor skills involve the coordination of large muscle groups for sitting, standing, walking and running, maintaining balance, throwing a ball, and changing body position. Fine motor skills involve movements of the hands, wrists, toes, fingers, feet, and lips. Motor skills are required for a variety of essential and basic learning activities that influence a child's functioning and later success in school. Impairments in motor development can present significant obstacles to the child's success in subjects that implicitly and explicitly require fine and gross motor coordination. These include art, music, math, science, English, language arts, and physical education.

Fine motor skills are used in such academically necessary tasks as handwriting, drawing, erasing, cutting with scissors, and controlling a computer mouse. There is a substantial increase in the percentage of the school day that children spend in fine motor activities, and specifically teacher-directed paper-and-pencil tasks, when they transition from preschool to kindergarten (Marr, Cermak, Cohn, & Henderson, 2003). Many academic tasks have a fine motor component. In school settings "most activities that build or display cognitive skills also involve the use of fine motor skills" (Grissmer, Grimm, Aiyer, Murrah, & Steele, 2010, p. 1013). Deficits in fine motor coordination and control can also interfere with a child's ability to transfer information from one medium to another. For example, a child with fine motor challenges might have difficulty when taking a test where the questions are presented in a booklet and the child must respond by filling in a circle on a corresponding answer sheet.

Gross motor skills support fine motor performance. Miyahara, Piek, and Barrett (2008) reported that postural stability was positively related to accuracy on a drawing task. They postulated that problems with gross motor development, such as poor postural stability, interfere with performance on school-based fine motor tasks.

In addition to the direct contribution of motor skills to success with academic tasks, there is a small but growing body of longitudinal research documenting

a positive relationship between early gross motor skills on the one hand, and cognitive functions and academic skills in the elementary school years on the other (Piek, Dawson, Smith, & Gasson, 2008; Sullivan & McGrath, 2003; Westendorp, Hartman, Howen, Smith, & Visscher, 2011). In particular, gross motor abilities may predict later working memory efficiency and processing speed, each of which is essential to new learning and school achievement (Piek et al., 2008).

Cross-sectional studies have identified a positive relationship between gross motor abilities and reading. Children who have poor reading skills often also have an increased likelihood of having co-morbid gross motor problems: the greater the reading delay, the poorer the performance on gross motor tasks (Westendorp et al., 2011). Children with other types of academic risk factors, such as ADHD, learning disabilities, language delays, and emotional disturbance, also appear to be at higher risk for motor difficulties than their typically developing peers (Hill, 2001; Pagani & Messier, 2012; Westendorp et al., 2011).

Researchers suggest three possible underlying mechanisms to explain the relationship between motor and cognitive skills. Some authors believe that the relationship is anatomically based. For example, neuroimaging research suggests that the prefrontal cortex (which is responsible for aspects of attention and executive function) and the cerebellum (which is responsible for aspects of motor function) are linked. Both brain areas are activated during cognitive processing and motor tasks (Cameron et al., 2012; Carlson, Rowe, & Curby, 2013).

Other research suggests that the apparent relationship between these variables is due to similar developmental timetables for emerging motor and cognitive skills. Delays in motor skills could then impact the emergence of other concurrently developing skills. (Pagani & Messier, 2012). Finally, there is growing research investigating the theory that common underlying general processes or mechanisms contribute to multiple domains of development (Rhemtulla & Tucker-Drob, 2011; Westendorp et al., 2011).

A number of recent cross-sectional and longitudinal studies have also linked fine motor competence with reading, math, and overall academic achievement (Cameron et al., 2012; Carlson et al., 2013; Grissmer et al., 2010; Le et al., 2006; Pagani, Fitzpatrick, Archambault, & Janosz, 2010; Pagani & Messier, 2012). Pagani and Messier (2012) hypothesized that “the relationship (of math skills) with fine motor ability is likely influenced by the fact that early informal knowledge of numbers is generated by manipulating objects and exploring their properties” (p. 101). However, the exact nature of the relationship between fine motor and academic skills is not entirely clear, as many of the fine motor tasks in these studies had a strong visual-motor component and were not pure tests of fine motor control. Visual-motor skills in kindergarten are highly predictive of first grade reading and math achievement (Son & Meisels, 2006). So, while fine motor tasks are clearly an important component of school activities, and there is a documented link between motor and cognitive skills, further research is needed into the exact relationship between early fine motor development and later academic performance.

SOCIAL AND EMOTIONAL DEVELOPMENT

The *KESA* includes items that address aspects of self-regulatory skills, particularly behavioral inhibition. Self-regulation involves the “capability of controlling or directing one’s attention, thoughts, emotions, and actions” (McClelland & Cameron, 2012, p. 136) and includes both emotional and cognitive components. Self-regulatory skills are necessary for tasks such as sharing, taking turns, managing frustration, persisting at tasks, and participating in group activities. Children with strong self-regulatory skills may transition more easily into kindergarten, as they are better able to meet the social, emotional, and cognitive demands of the classroom than their less well-regulated peers (Graziano, Reavis, Keane, & Calkins, 2007; McClelland & Cameron, 2012; McClelland et al., 2007).

There is increasing interest in the impact of social-emotional skills on academic outcomes. A growing body of research suggests that behavioral regulation skills at kindergarten entry may predict end-of-year kindergarten and first grade math ability, literacy, and vocabulary skills, even when controlling for other demographic, experiential, and academic factors (Blair & Razza, 2007; Brock, Rimm-Kaufman, Nathanson, & Grimm, 2009; Hair, Halle, Terry-Humen, Lavelle, & Calkins, 2006; Matthews, Ponitz, & Morrison, 2009; Morris et al., 2013; Ponitz, McClelland, Matthews, & Morrison, 2009; Raver et al., 2011). Children with disabilities, including ADHD, specific learning disabilities, emotional-behavioral disorders, and speech and language impairments, may be at increased risk for impaired social-emotional skills (Blackman, Ostrander, & Herman, 2005; Diamantopoulou, Rydell, Thorell, & Bohlin, 2007; Hair et al., 2006; Larson, Russ, Kahn, & Halfon, 2011). Additionally, children from lower socioeconomic status (SES) and minority backgrounds are more likely to be described as having difficulties with self-regulatory skills in the classroom (Blair & Razza, 2007; Hair et al., 2006; Rimm-Kaufman, Pianta, & Cox, 2000).

Children who have better behavioral regulation are less easily distracted and less impulsive. They are more likely to pay attention, remember directions, and persist with tasks. Researchers suggest that these skills contribute to better ability to learn from teachers and peers, which leads to increased content acquisition and more positive academic outcomes (McClelland et al., 2007; Raver et al., 2011).

A substantial number of children start kindergarten without the social-emotional skills needed to be successful in the classroom (Hair et al., 2006; Rimm-Kaufman et al., 2000). Hair et al. (2006) described four school readiness profiles developed from items on the Early Childhood Longitudinal Survey–Kindergarten that assessed skills in four of the National School Readiness Indicators (Rhode Island Kids Count, 2005) domains: physical well-being and motor development, social and emotional development, language development, and cognition and general knowledge. Between 13% and 27% of children (depending on whether cutoffs were set at 1 or 2 standard deviations below the mean for social-emotional skills) were categorized as being in the social/emotional risk category. Children in this category had some of the poorest academic outcomes at the end of first grade, including lower reading and math scores and lower levels of self-control

than children in the two school readiness “strength” categories (comprehensive positive development and social/emotional and health strengths).

Social-emotional skills can be taught in the classroom. Research on socio-emotional learning curricula in a variety of contexts (such as general in-class instruction, and specific interventions for at-risk children) demonstrates that children receiving such interventions demonstrate improved social-emotional and academic skills, underscoring the importance of early identification and treatment (Payton et al., 2008; Raver et al., 2011).

APPROACHES TO LEARNING

The *KESA* includes items to assess a child’s persistence, attention, and ability to follow directions. These types of tasks fall under a broader category some researchers describe as “work-related” or “learning-related” skills (McClelland, Acock, & Morrison, 2006; McClelland, Morrison, & Holmes, 2000). These skills are required for effective classroom participation and include the ability to listen and follow directions, stay on task, and organize work materials. Both teachers and parents identify these learning-related skills as critical components of school readiness (Grace & Brandt, 2005; Kim, Murdock, & Choi, 2005; Lane, Givner, & Pierson, 2004).

Learning-related skills predict academic achievement in reading and math through sixth grade, even after controlling for IQ, kindergarten performance, and demographic factors. (Fitzpatrick & Pagani, 2013; McClelland et al., 2006; McClelland et al., 2000). Of particular note is that children who had lower levels of learning-related skills showed slower rates of growth in reading and math through second grade than their more skilled peers. In other words, children who entered kindergarten with poor learning-related skills fell progressively further behind their peers during the first few years of schooling. This is of concern, because substantial numbers of children enter kindergarten with difficulty following directions, paying attention, and working independently (McIntyre, Eckert, Fiese, DiGennaro, & Wildenger, 2007; Rimm-Kaufman, et al., 2000).

In particular, attention may be one of the most critical skills for ongoing school success and achievement (Pagani, Fitzpatrick, & Parent, 2012). “The intact function of memory and attention is essential for children to cope with the high scholastic demands of today” (Aronen, Vuontela, Steenari, Salmi, & Carlson, 2005, p. 33). Attention processes include the ability to select and focus on relevant information while ignoring other stimuli, to sustain attention over time, and to easily shift attention on demand (Mirsky, Anthony, Duncan, Ahearn, & Kellam, 1991). As noted in the previous section, children who have difficulty paying attention are less able to take advantage of learning opportunities in the classroom (Raver et al., 2011).

Numerous studies have shown that early attention skills predict later social and academic outcomes. Children who have better attentional skills in preschool and kindergarten demonstrate higher levels of classroom engagement, better math and literacy skills, and stronger social skills (Blair & Razza, 2007; Bussing, Mason,

Bell, Porter, & Garvan, 2011; Dice & Schwanenflugel, 2012; Duncan et al., 2007; Grimm, Steele, Mashburn, Burchinal, & Pianta, 2010; National Institute of Child Health and Human Development Early Child Care Research Network, 2003; Pagani et al., 2012; Raver et al., 2011; Romano, Babchishin, Pagani, & Kohen, 2010).

In particular, difficulties with auditory selective attention and with visual attention span have been implicated in the development of reading challenges. Children who are at risk for academic difficulties (including children from lower SES households, with specific language impairment, and with lower literacy skills at the start of kindergarten) do more poorly on neurophysiological measures of auditory selective attention (Stevens et al., 2013; Stevens, Lauinger, & Neville, 2009; Stevens, Sanders, & Neville, 2006). However, when children with poor early literacy skills received an intensive reading intervention, both their reading and attentional skills improved (Stevens et al., 2013). The authors of that study concluded that “one interpretation of these results is that many children at risk for school failure experience difficulty directing their attention and are unable to discriminate between relevant and irrelevant information, which could have profound implications for reading and academic development” (Stevens et al., 2013, p. 75).

Similarly, multiple cross-sectional and longitudinal studies have found a relationship between visual attention span and reading skills in both typically developing children and those with dyslexia (Bosse, Tainturier, & Valdois, 2007; Bosse & Valdois, 2009; Franceschini, Gori, Ruffino, Pedrolli, & Facoetti, 2012; Vidyasagar & Pammer, 2010). Visual attention span contributes uniquely to first grade reading skills, including both accuracy and rate, even after controlling for IQ and phonemic awareness.

LANGUAGE DEVELOPMENT

The *KESA* includes items that assess expressive vocabulary and phonological awareness skills, both of which are aspects of speech and language development that are critical to reading. Phonological awareness is “the ability to focus on the sounds of speech as distinct from its meaning: on its intonation or rhythm, on the fact that certain words rhyme, and on the separate sounds” (Konza, 2011, p.1). Phonological awareness includes the more specific skill of phonemic awareness, “the ability to focus on the separate individual sounds in words” (Konza, 2011, p.1). The smallest units of sound when speaking are called phonemes. English has 40-44 (depending on the source) phonemes that are used to form the syllables that make up words.

There is a substantial body of research documenting that vocabulary and phonological awareness skills in preschool and at the start of kindergarten each independently predict concurrent and later reading skills, including word identification and reading comprehension (Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003; Hogan, Catts, & Little, 2005; Muter, Hulme, Snowling, & Stevenson, 2004; Plaza & Cohen, 2007; Romano et al., 2010;

Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004). Children with diagnosed speech and language impairments, including speech-sound disorders and specific language impairments, are at increased risk for developing reading problems (Catts, Bridges, Little, & Tomblin, 2008; Lindgren, Folstein, Tomblin, & Tager-Flusberg, 2009; Raitano, Pennington, Tunick, Boada, & Shriberg, 2004; Rvachew, 2007; Sices, Taylor, Freebairn, Hansen, & Lewis, 2007). Stevens et al. (2006) suggested that up to 50% of children with a specific language impairment will develop reading difficulties. Of particular concern is that children who have a language impairment in kindergarten and subsequently develop reading difficulties continue to show poorer reading performance than their typically developing peers through high school (Catts et al., 2008).

The influence of language skills on reading development remains, even when other factors such as SES and IQ are controlled for. However, children from low SES environments may be at particular risk for low vocabulary development and may be less responsive to explicit vocabulary instruction (and therefore less likely to catch up to grade-appropriate levels) than higher SES children (Marulis & Neuman, 2010).

Additionally, cross-sectional studies of elementary-school-aged children document a relationship between language skills and reading in both typically developing children and children with reading disabilities (Bogliotti, Serniclaes, Messaoud-Galusi, & Sprenger-Charolles, 2008; Bosse et al., 2007; Catts, Adolf, & Weismer, 2006; Ouellette, 2006; Vellutino, Tunmer, Jaccard, & Chen, 2007; Wise, Sevcik, Morris, Lovett, & Wolf, 2007). There is general agreement in the literature that some forms of reading disabilities are due to difficulty with phonological processing. Not only do children with some types of reading disabilities show poorer performance on behavioral measures of phonological processing, but they also frequently display structural and functional differences in areas of the brain related to phonological processing (Krafnick, Flowers, Napoliello, & Eden, 2011; Odegard, Ring, Smith, Biggan, & Black, 2008; Shaywitz et al., 2004; Simos et al., 2002). However, research on students receiving reading interventions that include intensive work on phonological processing has consistently found improvements in reading and normalized brain activation patterns.

COGNITION AND GENERAL KNOWLEDGE

The *KESA* includes items that address various aspects of cognition and pre-academic skills, including number competence, letter naming, color naming, and visual memory. Level of reading and mathematics skill development at school entry are two of the strongest predictors of later academic performance and success (Duncan et al., 2007).

Mastery of basic mathematic concepts prepares children to learn more complicated mathematics algorithms and problem-solving strategies (Baroody & Dowker, 2003). Numerous studies confirm that the development of basic number skills such as counting, ordering, and magnitude judgments and comparisons at the

start of kindergarten predict the rate of growth in mathematic skills and mathematic achievement through at least fifth grade (Byrnes & Wasik, 2009; Duncan et al., 2007; Le et al., 2006; Jordan, Kaplan, Ramineni, & Locuniak, 2009; Mazzocco & Thompson, 2005; Morgan, Farkas, & Wu, 2009).

Interestingly, early mathematics skills also predict later reading skills. Children who have problems with early mathematics skills are also at increased risk of early reading challenges (Duncan et al., 2007; Morgan et al., 2009; Romano et al., 2010). A child's early familial and academic experiences, as well as demographic characteristics appear to influence math knowledge. Children from lower SES and minority backgrounds may be at increased risk for delayed development of math skills at kindergarten entry (Burnett & Farcas, 2009; Morgan et al., 2009).

Early literacy skills are also predictive of later reading abilities. As noted in the previous section, vocabulary and phonological awareness are important contributors to the development of reading proficiency. Additionally, alphabetic skills, including letter identification and letter naming accuracy, predict reading achievement levels and may influence the development of phonological skills (Blaklock, 2004; Evans, Bell, Shaw, Moretti, & Page, 2006; Foulin, 2005; Smith, Scott, Roberts, & Locke, 2008; Torppa, Poikkeus, Laakso, Eklund, & Lyytinen, 2006). Children with a family history of reading disabilities are at higher risk for delays in letter naming than children with no family history of reading disabilities, although it is not clear if the risk is due to genetic factors, environmental factors, or both (Torppa et al., 2006). Letter naming is a time-sensitive skill that is predictive in preschool and at the start of kindergarten of later reading proficiency. However, children who demonstrate delayed letter naming knowledge, including those who do develop a reading disability, typically develop letter naming skills by the start of first grade. Letter naming accuracy beyond kindergarten does not differentiate children who are at risk, but remains an important risk factor before that point (Smith et al., 2008).

Finally, visual memory skills predict literacy skills, such as word decoding, and math ability (Bull, Espy, & Wiebe, 2008; Krajewski & Schneider, 2009; Kulp, Edwards, & Mitchell, 2002; Richman, Wilgenbusch, & Hall, 2005). Identifying printed symbols accurately means that the child must be able to recognize letters, numbers, symbols, and words automatically. Difficulties storing or retrieving visual information can interfere with critical academic tasks.

PARENT QUESTIONNAIRE

School readiness is a complex process that involves the experiences, skills, and knowledge a child develops before entering kindergarten. Transactional and ecological models defining the essential characteristics of school readiness emphasize the important role of family context and home environment to encourage early learning and provide opportunities for growth and development (Graue, 2006; Keating, 2007; Snow, 2006; Rhode Island Kids Count, 2005). "Ready families" are a critical component of the process leading to school readiness (Rhode Island Kids

Count, 2005). Boethel et al. (2004) asserted that for young children “the home environment ... is strongly associated with their relative skills and abilities upon entry to kindergarten” (p. vi).

Family members have a number of important roles in preparing children for school, including nurturing and supporting, teaching, and advocating on behalf of their child (Boethel et al., 2004). Factors that can impact a family’s readiness and that can place a child at increased risk for experiencing challenges in kindergarten include socioeconomic status, family structure, child health, parent health, language use and involvement in literacy development, and disciplinary strategies (Brooks-Gunn & Markman, 2005; Chazan-Cohen et al., 2009; Janus & Duku, 2007; Sheridan, Knoche, Edwards, Bovaird, & Kupzyk, 2010; Waldfogel, 2006).

Numerous studies about parenting interventions that foster parent engagement, positive behavioral support, and literacy skills in at-risk families confirm the importance of the family context in school readiness and success in the primary grades (Boethel et al., 2004; Brooks-Gunn & Markman, 2005; Chazan-Cohen et al., 2009; Lunkenheimer et al., 2008; Sheridan et al., 2010). Parenting skills and styles predict many critical school readiness skills. Parenting differences may explain a substantial portion of the school readiness gap associated with different SES, cultural, and ethnic groups (Brooks-Gunn & Markman, 2005).

The *KESA* Parent Questionnaire is a supplemental tool that can assist the examiner to collect information about family readiness factors (see Appendix A for a sample copy of the Questionnaire). The Parent Questionnaire is available as a free printable form that can be downloaded from Academic Therapy Publications’ website. It includes 13 short-answer questions that address variables related to family readiness, along with space to include additional, customized questions. The Parent Questionnaire can be administered to parents through a personal interview or can be given to the parent to complete before or during the *KESA* screening. The information in the Parent Questionnaire may help kindergarten teachers and other education professionals to identify children and families who may require additional educational support services.

CONCLUSION

The *KESA* results provide objective data on a child’s kindergarten readiness and risk for poor kindergarten achievement. While the *KESA* evaluates many types of skills, it does not provide separate subscale scores, and the results do not identify the cause of skill deficits. Numerous developmental, physiological, medical, and psychological factors can influence a child’s performance on the *KESA*. Specialized assessments that are beyond the scope of the *KESA* will be needed to determine the cause of any identified motor, regulatory, language, and cognitive skills deficits. The *KESA* serves as an important first step in the evaluation of kindergarten readiness skills and need for additional services. Those responsible for interpretation of the test must keep its limitations in mind.