

5

**RESEARCH ON THE FEAS: TEST DEVELOPMENT,
RELIABILITY, AND VALIDITY STUDIES**

Georgia A. DeGangi, Ph.D., OTR
Stanley I. Greenspan, M.D.

TEST DEVELOPMENT

The Functional Emotional Assessment Scale (FEAS) was developed as a criterion-referenced instrument for children ranging in age from 7 months through 4 years of age. It was designed to measure emotional functioning in children with constitutional- and maturation-based problems (e.g., regulatory disorders), children with interactional problems leading to a variety of symptoms such as anxiety, impulsivity, depression, etc., and children with pervasive developmental difficulties. This includes children who experience constitutional or developmental maturational problems, such as those with regulatory disorders or pervasive developmental disorder, as well as caregivers and children with relational problems, such as attachment disorders, or children from multi-problem families with a variety of interactional difficulties (e.g., anxiety, depression, impulsivity, etc.). The FEAS provides a systematic assessment of the child and caregiver's functional emotional capacities. For infants and young children, these capacities include the child's ability to organize play interactions with objects and persons, to self-regulate mood and organize attention, to form an attachment with the caregiver, to engage in reciprocal emotional interactions and communications, and to represent feelings and ideas and engage in emotional thinking through play interactions. Caregiver behaviors are evaluated in relation to their capacity to support their child's development in each of these areas.

The FEAS is intended for use to profile social-emotional functioning in infants and young children. As will be seen in this chapter, it distinguishes between the child with a high-risk profile of emotional functioning and those without problems, as well as between different types of problems. When used in conjunction with other instruments as part of a comprehensive evaluation, the FEAS provides data on the child and caregiver's social and emotional capacities using a developmental framework that integrates observations of a number of variables. These include constitutional variables, such as self-regulatory, sensory, and attentional capacities. They also include developmental levels of emotional functioning as well as interactive components that form the basis for attachment, mood regulation, emotional functioning, and social communication. Findings from the FEAS do not lead to a formal diagnosis of specific disorders, such as autism, anxiety disorder, attachment disorder, or regulatory disorder; however, data from the FEAS, combined with other diagnostic information (e.g., clinical interview of parent and child, parent report measures, and other formal testing) may help to provide a profile of emotional functioning. (See Chapters 8 and 9 for further discussions of a comprehensive clinical evaluation.)

A collection of 46 items for the caregiver version and 79 items for the child version of the FEAS were generated systematically from a list of domain specifications. These are presented in Table 5-1. This strategy assures that the items are representative of each domain. Several items were constructed for each of the functions to be measured. The first version of the FEAS was developed in 1992 by Stanley I. Greenspan, M.D. and was piloted by Georgia A. DeGangi, Ph.D. on a sample of 45 infants, 30 of whom were typically developing and 15 with regulatory disorders. In collaboration with Dr. Greenspan, Dr. DeGangi revised test items, then collected

data over the course of five years. The research version of the FEAS appears in Appendix B. This was the version from which the specific age-versions of the FEAS were derived.

[Insert Table 5-1 here]

Observable behaviors were selected and operationalized for test items within each domain. Below is a description of behaviors which were chosen for each domain. These behaviors cover both the child's and parents' capacities. In the actual scoring protocol in Appendix C, the parent and child behaviors will be presented separately. In addition, each age range will have a separate protocol covering the relevant items for that age range.

Self-Regulation and Interest In the World

Test items were developed to depict the various ways in which a parent and child self-regulate and show a balanced interest in the world. Specific behaviors tapped by this domain include the following:

- Both parent and child show interest in toys through facial or verbal expressions of interest or by handling and touching toys, but not so absorbed by the toys that, for the caregiver, she or he play with toys by themselves, ignoring their child.
- The caregiver shows sustained interest in their child, focusing on child's signals (gestures, vocalizations), keeping child involved in play while the child explores objects freely without caution.
- Parent and child show their capacity to self-regulate by remaining calm and focused. The parent interacts calmly with their child, able to wait for their child's responses and the child

remains calm for the play period with no signs of distress (crying or whining), showing only appropriate frustration.

- Affective display is measured by the type of expression shown (e.g., pleasant or animated, happy affect throughout play; neutral and content; somber or depressed).
- Comfort at exploring textured toys or in touching one another in appropriate ways (e.g., pat on back or hug) are observed by the parent's sensitivity and responsiveness to their child's need for touch by stroking or touching their child in pleasurable ways and/or encouraging their child to explore textured toys while noting the child's comfort at touching textured toys or in being touched by their caregiver.
- Ease in using movement in play is measured by the caregiver's ability to provide pleasurable movement experiences to the child or encouraging movement exploration and the child's pleasure at moving on equipment or engaging in rough-house play.
- Vigilant behavior in the child is noted which may reflect sensory defensiveness, attentional problems, or trauma and neglect.
- The child's activity level, whether underreactive (e.g., sluggish or withdrawn), or overreactive (e.g., overaroused by toys and environment) is observed.

Forming Relationships, Attachment, and Engagement

Items within this domain focus on the parent's and child's ability to show an emotional investment in the animate world. Specific behaviors measured include the following:

- The caregiver is relaxed during the interchange with their child, not overly attentive to their child's every action as might be seen in an anxious parent.
- The parent looks at their child with affection, showing a warm connection.

- The parent and child clearly enjoy being with one another, playing together, showing their warmth through smiles, vocalizing, or a joyful look or by each emoting a sense of warmth by providing inviting gestures to one another. It is important to keep in mind cultural differences in how this may be expressed.
- Anxious attachment of the parent to the child is observed by the parent overwhelming their child with affectionate touching; ambivalent attachment is further observed by the parent's appearing uncomfortable in showing feelings or relating warmly and intimately with their child, appearing overly vigilant towards their child.
- The caregiver maintains a verbal or visual connection with their child, showing clear availability and interest in the child. The child may move away from the caregiver to explore the room, yet the caregiver maintains connected to the child across space through gestures, vocalizations, and facial expressions. Different levels of connectedness are observed in the child. The child may anticipate with curiosity or excitement when their caregiver presents an interesting object or game. They may initiate physical closeness to their caregiver by moving close to them but without becoming clingy. If the child is active and moves away from their caregiver, they maintain a visual or verbal connection with the caregiver through glances, gestures, or vocalizations.
- Disorganized, ambivalent, or anxious attachment in the child can be observed in the child's turning their head away, averting gaze, moving away, or sitting facing away from caregiver without social referencing the caregiver. They may appear indifferent, aloof, withdrawn, or avoidant of their caregiver. It is important to recognize, however, that these same behaviors may reflect a child who is unable to organize face-to-face interactions because of the

challenge it presents (e.g., organizing affective, gestural and vocal cues with another person while organizing intentional actions with objects).

- Security of attachment may be observed in the child's general sense of security and/or comfort when near the caregiver. The child may initiate physical closeness to the caregiver but is not clingy. If the child is active and moves away from caregiver, he or she references their caregiver from across space, maintaining a connection with their caregiver through looking, gestures, or vocalizations.
- Lastly, attachment behaviors in the child may be observed in the child's display of signs of discomfort, displeasure, or sadness during interactive play if their caregiver should become unresponsive or engage in anticontingent behaviors.

Two-Way, Purposeful Communication (Somatopsychological Differentiation)

This domain reflects the parent's and child's capacity to engage in flexible, contingent interactions with one another. This is measured in a variety of ways:

- The parent and child's capacity to "open circles of communication," that is, to initiate interactions with one another through vocalizations or gestures to create interactive opportunities with one another, is observed.
- Contingent responses are measured by the parent responding to the child's wishes, intentions, and actions, building on how the child wishes to play and by the child responding to the parent's actions or requests. For example, the child may hand a toy to the parent, and the parent responds by taking it and saying something about the toy, then gives the child an opportunity to respond to what they just did. Scoring reflects problems that may arise in organizing contingent responses including anticontingent responses (e.g., opposite to what

child seeks), misreading the child's cues, or changing the activity from what the child wants to do to something else. In our studies of regulatory disordered children and their parents, we found that anticontingent responses were commonly observed.

- Noncontingent responses are noted when the parent plays with the toys in a parallel play fashion, removing attention from playing with the child, a behavior that was frequently observed in the sample of multi-problem children.
- The parent's capacity to plays with their child at a developmentally appropriate level is observed (e.g., caregiver plays slightly above child's level of skill, modeling new ways to do things or labeling what child does or describing the functions of objects).
- The parent's capacity to stimulate their child at a pace that allows him or her to respond, waiting for their child's responses. Many parents of regulatory disordered children tend to overstimulate their child with language or actions, not allowing their child the time to process information or organize interactions.
- The parent's capacity to relinquish control and allow their child to decide on the play topic, to initiate play and explore toys in ways that the child seeks or needs is also observed.
- The child's ability to motor-plan, organize or execute play interactions by initiating purposeful and intentional actions in play with objects is observed. Scoring includes observations of children who engage in stereotypic actions; i.e., lining toys up, mouthing toys for long periods of time, banging toys without engaging in any other actions with the same toy or initiates play but actions appear aimless or disorganized, behaviors that are common in children with developmental dyspraxia (e.g., motor planning problems) and pervasive developmental delay.

- Disorganized behaviors in the child may be observed by them showing anger, frustration, aggression, or protest repeatedly. This behavior reflects not only the child's difficulties in sustaining reciprocal interactions, but also how they deregulate in the process.
- The child's use of language is also observed since language emerges as the child learns to organize reciprocal interactions (e.g., sounds, words, and/or gestures).

Behavioral Organization, Problem-Solving, and Internalization (A Complex Sense Of Self)

Items in this domain demonstrate complex, organized and integrated behavioral and emotional patterns and include the following:

- The parent and child respond and initiate reciprocal back and forth chains of interactions with one another, stringing together connected circles of communication or units of interaction. For example, caregiver introduces baby doll, child touches doll's face, mother touches doll's hair, child pats the doll, mother says "baby," and child glances between mother and doll. The caregiver may imitate the child (i.e., pushing car alongside child), then interject her turn by an action or verbalization related to the child's actions (i.e., "Oh, a bump!" then bumps her car into child's car).
- The various ways in which the caregiver organizes circles of communication with their child are coded (e.g., through gestures and facial expressions; touch or rough-house play) because of the importance of using different modalities in organizing the child's behaviors.
- The caregiver's ability to sustain multiple circles of communication while also showing pleasure and excitement in playing with their child in whatever way the child wishes to play is coded.

- One of the items measures the parent's ability to set appropriate limits on the child (e.g., redirecting child not to leave room, or not throw toy).
- The parent's ability to elaborate on and add complexity into the child's play behaviors while engaged in interactive sequences between one another is observed. The parent expands on what the child is doing, thus creating a problem solving opportunity for the child, while remaining on the child's play topic (e.g., the parent does not introduce a completely new play idea). At the same time, the child's ability to imitate or copy something new that the caregiver introduces, then incorporate the idea into their own play is observed (i.e., caregiver feeds doll; child copies this).
- The parent's capacity to support behavioral organization in the child is observed through the parent's allowing the child to assert him- or herself in play and supporting the child's needs for dependency and closeness, assertiveness and curiosity, aggression, autonomy, or pleasure and excitement by admiring, showing interest, and/or by joining the child's play in whatever way the child seeks. Problems that may interfere with caregiver's capacity to support this area might be intrusiveness, withdrawal, overprotectiveness, or playing at level far above child's level of competence.

Representational Capacity and Elaboration of Symbolic Thinking

The formation and elaboration of internal representations (e.g., symbolic thinking) are measured by the following:

- The caregiver encourages the child to engage in symbolic play by modeling or combining materials in ways that facilitate representational actions (i.e., mother holds spoon near baby doll's mouth and says, "Feed baby?").

- The caregiver elaborates on the child's pretend play idea by building on the child's ideas and adding some complexity to them.
- The caregiver allows the child to express different pretend play themes involving closeness or dependency, pleasure, and excitement, and assertiveness.
- The child engages in symbolic play with the various toys or equipment, going beyond simple concrete actions.
- The child engages in pretend play patterns of at least one idea in collaboration with caregiver.
- The child uses language or pretend play (e.g., playing out with doll figures) to communicate needs, wishes, intentions, or feelings.
- The child constructs pretend play to express themes around closeness or dependency, pleasure and excitement, and assertiveness.
- The child creates pretend drama with two or more ideas that are not related or logically connected.

Emotional Thinking or Development and Expression of Thematic Play

Within this domain, the parent and child's capacity to organize representational concepts and emotional ideas within elaborated play sequences are demonstrated. Test items focus on the following:

- The caregiver elaborates on their child's pretend play, creating opportunities to logically connect ideas in play. The caregiver accomplishes this by asking questions to give depth to the drama such as "how," "why," or "when." If the child strays off the topic, the caregiver asks questions to bridge the circle of communication back to the pretend play theme.

- The caregiver incorporates causality into pretend play by helping their child to logically connect three or more ideas into a reality-based story sequence.
- The caregiver helps child to elaborate on a wide range of emotional themes, whatever they might be—assertiveness, pleasure and excitement, fearfulness, anger, or separation and loss. The caregiver is accepting of the child’s expressions of different feelings and themes through play and shows no discomfort at the expression of different ideas from the child.
- The child constructs pretend play, however unrealistic, involving two or more ideas which are logically tied to one another.
- The child elaborates on a pretend play sequence of two or more ideas which are logically connected and grounded in reality. There is a planned quality and child can elaborate to “how,” “why,” or “when” questions, giving depth to the drama.
- The child uses pretend play or language to communicate themes containing two or more ideas dealing with closeness or dependency, pleasure and excitement, or assertiveness.

VALIDITY STUDIES

The FEAS was validated on four samples of infants and children ranging in age from 7 to 48 months (197 normal, 190 infants and children with regulatory disorders, 41 children with pervasive developmental disorders, and 40 children from multi-problem families and with drug exposure in utero). The children in this study participated in a larger validation study of qualitative measures of sustained attention, parent-child interactions, and sensory processing. The sample sizes and characteristics of the subjects within each sample are shown in Table 5-2. The majority of the infants were white, middle class with only 6% from Hispanic, Black, or Asian populations. All subjects except those with pervasive developmental disorders fell within normal limits on developmental testing (e.g., Bayley Scales of Infant Development, Mental

Scales (Bayley, 1969)). Statistical analyses yielded no differences in the normal and regulatory disordered samples in their performance on the Mental Bayley.

The criteria for selection of infants in the regulatory disordered sample was based on symptomatology. The infants had to have at least two of the following difficulties:

- Sleep disturbance consisting of repeated awakenings in the night and taking over 20 minutes to fall asleep.
- Difficulties self-consoling with an inability to self-calm, and requiring extensive help from the parent to console (e.g., parents spends from two to four hours a day attempting to console the infant)
- Distress around feeding with regurgitation, refusal to eat, and other feeding problems not related to allergies or food intolerance
- Hyperarousal with high distractibility.

The diagnostic criteria presented in DSM-IV (American Psychiatric Association, 1994) were used to classify children with pervasive developmental disorders. In general, children had to show qualitative impairments in social interactions, communication, and symbolic or imaginative play, and had to show restricted repetitive and stereotypic behaviors such as ritualistic or perseverative behaviors.

Children in the multi-problem family group came from single parent families with low socio-economic status. All of the children in the sample had been exposed to drugs in utero. At the time of testing, mothers of children in this sample were participating in a residential drug treatment program.

Table 5-2 presents the characteristics and sample size of the subjects for the validity study.

[Insert Table 5.2 here]

Construct Validity Study

A criterion-group validation model was used to investigate the validity of the FEAS. In this model, evidence of construct validity was obtained at three levels—item, subscale, and total for the caregiver and child scale. The effectiveness or validity of each item was determined by computing its mean score for the normal and clinical groups for each age range (e.g., 7 to 9, 10 to 12, 13 to 18, 19 to 24, 25 to 30 months, and 3 to 4 years). Mean scores were only computed for the 25 to 30 month and 3 year level for the PDD group and at the 3 to 4 year level for children in the multi-problem group. Because there were fewer subjects in the different age categories for the children in the multi-problem sample under 3 years, the mean scores for individual items and subscales are not reported, but were used as a guide in determining which items may have particular relevance for that population.

A discrimination index reflecting the difference between group item performance was calculated for normal and regulatory disorder (RD) and for normal and PDD groups. The magnitude of the discrimination index was computed and the effect size of this index estimated {Cohen 1977 85 /id}. The effect sizes for items ranged from small (.2 to .39), medium (.4 to .59) to large differences (.60+) in means. Tables A-1 through A-6 in Appendix A provide information on the item means, mean differences (e.g., discrimination index) for each of the age ranges.

A t-test analysis was conducted to determine if differences in the two samples reached the level of significance for items at the various age ranges. The means and standard deviations were computed for the collection of items comprising each category. Of special interest was the statistical significance of the difference between means for the normal and regulatory disordered

infants. This was assessed with the t-test between samples drawn from independent populations. Results from these analyses are presented in Appendix A, Tables A-1 through A-6. In addition, analyses of variance were conducted on subtest and total test scores for each of the age ranges. These results are presented in Appendix A, Tables B-1 through B-6. The vast majority of the subtests discriminated between the normative and clinical samples for each of the age ranges.

Optimal cutting scores were located to determine the best points of group discrimination for each category (Berk, 1976). Infants scoring at or above a cutoff score in any category would be considered “at risk” and should be referred for further testing. The cutoff scores are presented in Tables 5-3 through 5-8.

[Insert Tables 5-3 through 5-8 here]

Decision Validity

False normal and false delayed error rates were calculated in the decision validity study. The cutting scores for each subtest were chosen to minimize the false normal error rate, judged to be the more serious of the two types of error from the perspective of screening and diagnostic decision making. As presented in Tables 5-3 through 5-8, the false normal error rates ranged from 5 to 28% for the total scale for the various age ranges, between 5 and 32% for the child scale, and between 5 and 25% for the caregiver’s scale. The false delayed error rates were substantially higher, ranging from 26 to 63% for the total scale. Thus, this test had a lower error rate (i.e., fewer misclassifications) for delayed children than for normal children. However, given the serious consequences of false normal errors, the error rates for false delayed are tolerable.

The overall classification accuracy for delayed and normal children for the caregiver scale, child scale, and total test ranged from 56 to 76%. These figures are deflated because the test is much better at discriminating delayed children with social emotional problems than normal children. Because the FEAS is designed for children who are at risk for problems in social emotional functioning, it is recommended that results from the FEAS be combined with other clinical information obtained through a comprehensive intake interview and other diagnostic information as described in this book.

From the standpoint of diagnostic decision making, the FEAS shows better sensitivity (probability of correctly identifying a delayed child in a sample of delayed children) for the majority of subscales at the different age ranges. Specificity rates (probability of correctly identifying a normal child in a sample of normal children) were quite low for most of the subscales at the different age ranges. However, between 7 and 18 months, specificity for the child scales ranged from 63 to 81% suggesting that the FEAS is more useful in screening normal children at these ages.

Based upon the sensitivity calculations, the FEAS appears to be well suited for children with regulatory disorders, particularly between 7 and 24 months. At 25 to 35 months and at 3 to 4 years, there appear to be certain subscales that are better for children with regulatory disorders, although the total caregiver and child scale scores show good discrimination for this group of children. For example, at 3 to 4 years, only 2 of the 6 caregiver subscales and 4 of the 6 child subscales showed good discrimination for the RD sample. It appears that the FEAS is effective in screening and diagnosing children from multi-problem families at 13 to 18 months, however, conclusions cannot be drawn about the general applicability of the FEAS on children from multi-

problem families until more data are obtained. The FEAS appears to be very effective in assessing children with pervasive developmental disorders at the 2 to 4 year age ranges.

Concurrent Validity

Intercorrelations between FEAS scores during symbolic and tactile play situations, the Test of Sensory Functions in Infants (DeGangi & Greenspan, 1989), and the Test of Attention in Infants (DeGangi, Poisson, Sickel, & Wiener, 1995) were examined for a subsample of 84 children with regulatory disorders evaluated between 7 and 18 months of age. None of the intercorrelations were significant for the regulatory disordered sample. These findings suggest that, for the most part, the FEAS provides information that is distinct from that obtained by diagnostic measures (e.g., sensory processing, attention).

RELIABILITY STUDY

An interobserver reliability study was conducted on 46 children between 5 different observers. The subjects for the study are presented in Table 5-9. Videotaped observations of subjects was used for this study. The raters for this study included three psychologists, one of whom was also an occupational therapist, and a nurse practitioner. Observers 1 and 2 coded all 46 children. Observers 3 through 4 coded 20 videotapes and observer 5 coded only 15 videotapes. Alpha reliability coefficients were calculated between observers. Results of the reliability study showed that for the caregiver scale, reliability ranged from .8961 to .9196 for the total caregiver score. Reliability coefficients ranged from .9119 to .9786 for the total child scores. In addition to the above reliability studies, reliability was calculated for 15 subjects between two observers, one coding the play interaction live, the other coding the videotape. The two observers were two of the psychologists listed above, one of whom was also the occupational therapist. This reliability

coefficient was .83 for the caregiver scale, .89 for the child scale, and .88 for the total child scores. Results of the reliability study are presented in Table 5-10.

[Insert Tables 5-9 and 5-10 here]

The results from the reliability studies suggest that the FEAS can be administered using either videotapes or observations of live interactions. The FEAS can be administered under either condition (e.g., videotape or live observation), however, it is strongly recommended that professionals scoring the FEAS under either circumstance practice scoring with another rater and obtain at least an 80% inter-observer agreement before considering their scores reliable and valid.

SUMMARY OF PSYCHOMETRIC EVIDENCE:

The FEAS is designed as an assessment tool of emotional functioning in children from 7 months through 4 years who are at risk for developing emotional and behavioral problems. These include children experiencing regulatory disorders, pervasive developmental disorders, or are at risk for relational disturbances including children from multi-problem families and other types of emotional challenges. There are six versions of the checklist which are age specific (e.g., 7 to 9, 10 to 12, 13 to 18, 19 to 24, 25 to 35 months, and 3 to 4 years). The versions of the FEAS presented in this manual is the product of extensive revisions over a period of 5 years.

The FEAS is intended for use in creating a profile of social-emotional functioning in infants and young children and their caregivers. Test items and subtests were developed to provide information about the child and caregiver's social and emotional capacities using a developmental framework that integrates information and a number of variables. These include

observations of constitutional variables, such as self-regulatory, sensory, and attentional capacities. It also includes specific data regarding developmental levels of emotional functioning for both the child and caregiver. It also integrates information about interactive components that form the basis for attachment, mood regulation, emotional functioning, and social communication.

Although the FEAS is designed as an observational tool, it is important to note that findings from the FEAS alone do not lead to a formal diagnosis of specific disorders, such as autism, anxiety disorder, attachment disorder, or regulatory disorder. However, data from the FEAS, when combined with other diagnostic information (e.g., clinical interview of parent and child, parent report measures, and other formal testing) may help to profile emotional functioning in a variety of problems. Also, the FEAS should be helpful in distinguishing between children with disorders of regulation, pervasive developmental disorder, and children from multi-problem families with a variety of symptoms because the FEAS was validated on these samples. Further research is needed on children with other mental health disorders, such as problems related to attachment, anxiety, depression, or conduct disorders. In the following section, the psychometric properties of the FEAS will be summarized.

The FEAS was validated on 197 normal infants, 190 infants with regulatory disorders, 41 with pervasive developmental disorders, and 40 children from multi-problem families. Evidence pertaining to construct validity was obtained from an analysis of item discrimination indexes. Items with small to large discrimination indices were included in the final version of the FEAS. Some items were included because of their face validity or to provide a developmental continuum across ages. From the standpoint of diagnosis, the FEAS is accurate in differentiating the performance of children who are from clinical samples including regulatory disordered and

pervasive developmental delay. The FEAS also appears to have promise for children from multi-problem families. The false normal error rate, deemed to be more serious type of error, ranged from 5 to 32%.

Conceptually the FEAS measures the dimensions of behavior that we and other researchers (see Chapters 4 and 7) have described as important in the assessment of social-emotional functioning in young children. The items are sensitive and discriminate behaviors in the following areas: regulatory components of emotional development (e.g., self-regulation), relational aspects (e.g., attachment), social communication including pre-verbal communication, representational capacities, emotional thinking, and social interactions between parent and child.

Concurrent validity studies examining intercorrelations between the FEAS and other diagnostic tests (e.g., Test of Sensory Functions in Infants and the Test of Attention in Infants) showed that there was no relationship between performance on the FEAS and sensory processing and attention skills for children with regulatory disorders between the ages of 7 and 18 months. This evidence suggests that the FEAS is examining behaviors that are uniquely different than those tested by available diagnostic tools.

An interobserver reliability study was conducted between 5 different observers on 53 subjects from the normal, regulatory disorder, and pervasive developmental disorder samples. Reliability coefficients ranged from .896 to .919 for the caregiver scale and .911 to .978 for the child scale for videotape recordings and from .83 to .89 between live and videotape observations. The high level of reliability of the FEAS shows that it can be reliably administered by trained early intervention and mental health professionals.

Overall, this psychometric evidence on the quality of the FEAS suggests that the score can be used validly and reliably for diagnostic decisions. When coupled with other test

information (e.g., observations of sensory processing, attention, and cognitive development), the FEAS is a valid and reliable tool for assessing children, including children at risk for relational, social-emotional, regulatory, and communication problems. Table 5-11 presents the strengths and weaknesses of the FEAS..

[Insert Table 5-11 here]

DIRECTIONS FOR FUTURE RESEARCH:

These recommendations are couched in the context of a need for cross-validation studies. We welcome collaborators who are interested in conducting research on the FEAS. Further research with more extended samples of delayed infants must be conducted before use of the instrument with a variety of populations is justified. In particular, further validation is needed on children with a range of emotional problems (e.g., anxiety, depression) and with children from multiproblem families. Differential performance in terms of ethnicity should be explored, particularly because the sample was predominately Caucasian. Additional research is needed to determine how the FEAS correlates with parent report scales such as the Child Behavior Checklist.

Social-emotional scales are difficult to develop because of the problems in operationalizing reliable and valid behaviors relevant to dynamic interactions and emotional development. The research is time consuming, expensive, and challenging, however, considering the limited funding available for the development of the FEAS, the validity and reliability studies are impressive. The information this kind of assessment approach can provide will contribute toward identifying infants with regulatory disorders and relational disturbances including

pervasive developmental disorders as early as possible and promoting the use of appropriate intervention programs for those infants.

REFERENCES

American Psychiatric Association (1994). DSM-IV: Diagnostic and statistical manual of mental disorders. Washington, DC: American Psychiatric Press.

Bayley, N. (1969). Bayley Scales of Infant Development. New York: Psychological Corp.

Berk, R. A. (1976). Determination of optimal cutting scores in criterion-referenced measurement. Journal of Experimental Education, 45, 4-9.

Cohen, J. (1977). Statistical power analysis for the behavioral sciences. (Revised edition) New York: Academic Press.

DeGangi, G. A. & Greenspan, S. I. (1989). The test of sensory functions in infants. Los Angeles: Western Psychological Services.

DeGangi, G. A., Poisson, S., Sickel, R. Z., & Wiener, A. S. (1995). Infant-toddler symptom checklist. Tucson, AZ: Therapy Skill Builders.

Table 5-1. Domain Specifications for the FEAS.

Domain	Description of Domain
Regulation and interest in the world (0 to 3 months)	Internal regulation (harmony and balanced interest in the world)
Forming relationships or attachment (2 to 7 months)	Rich, deep, multisensory emotional investment in animate world (especially with primary caregivers)
Intentional two-way communication (3 to 10 months)	Flexible, wide-ranging, affective, multisystem contingent (reciprocal interactions (especially with primary) caregivers)
Development of a complex sense of self (e.g., behavioral organization and elaboration) (9 to 24 months)	Complex, organized, assertive, innovative, integrated behavioral and emotional patterns
Representational capacity and elaboration of symbolic thinking (1½ to 4 years)	Formation and elaboration of internal representations (imagery); organization and differentiation of imagery pertaining to self and nonself, emergence of cognitive insight; stabilization of mood and gradual emergence of basic personality functions
Emotional thinking or the development and expression of thematic play (3 to 5 years)	Enhanced and eventually optimal flexibility to conserve and transform complex and organized representations or experience in the context of expanded relationship patterns and phase-expected developmental tasks

Table 5-2. Characteristics of Subjects for the Validity Study.

Variable	Normal (N=197)	Regulatory Disorder (N=190)	Pervasive Developmental Disorder (N=41)	Multi- problem (N=40)
Sex:				
Male	116	116	31	29
Female	81	74	10	11
Age:				
7 to 9 mos.	36	19	0	6
10 to 12 mos.	28	21	0	2
13 to 18 mos.	36	35	0	9
19 to 24 mos.	44	41	2	4
25 to 35 mos.	19	16	20	3
36 to 48 mos.	34	58	19	16

Table 5-3. Cutoff Scores, Total Accuracy, and Error Rates for Various Classification Decisions for 7 to 9 Months Olds

Subtest	Cutoff Score ^a	Performance ^b Standard	Total Accuracy Normal & Delayed	Error Rates			
				False Delayed	False Normal	Specificity ^c (Normal)	Sensitivity ^d (Delayed)
Caregiver:							
Regulation	6/10	60%	64%	79%	3%	21%	97%
Attachment	6/6	100%	69%	42%	19%	58%	81%
Two-way communication	8/10	80%	60%	53%	25%	47%	75%
<i>Total Caregiver</i>	<i>20/26</i>	<i>77%</i>	<i>69%</i>	<i>74%</i>	<i>8%</i>	<i>26%</i>	<i>94%</i>
Child:							
Regulation	14/16	87.5%	69%	37%	28%	53%	72%
Attachment	8/10	80%	69%	42%	19%	58%	81%
<i>Total Child</i>	<i>22/26</i>	<i>85%</i>	<i>71%</i>	<i>31%</i>	<i>17%</i>	<i>69%</i>	<i>83%</i>
Total Scale	41/52	79%	76%	37%	17%	63%	83%

^a The number to the left of the slash mark represents the actual cutoff score for that subtest or total test; the number to the right of the slash mark represents the total number of points available on the subtest or total test.

^b Percentage of items that the child must perform correctly to have mastered that domain.

^c Probability of correctly identifying a normal child in a sample of actual normal children.

^d Probability of correctly identifying a delayed child in a sample of actual delayed children.

Table 5-4. Cutoff Scores, Total Accuracy and Error Rates for Various Classification Decisions for 10 to 12 Month Olds

Subtest	Cutoff Score ^e	Performance ^f Standard	Total Accuracy Normal & Delayed	Error Rates			
				False Delayed	False Normal	Specificity ^g (Normal)	Sensitivity ^h (Delayed)
Caregiver:							
Regulation	8/10	80%	55%	61%	25%	39%	75%
Attachment	8/8	100%	69%	52%	14%	48%	86%
Two-way communication	9/10	90%	59%	61%	25%	39%	75%
Behavioral organization	4/6	66.6%	61%	61%	21%	39%	79%
<i>Total Caregiver</i>	<i>27/34</i>	<i>79%</i>	<i>67%</i>	<i>52%</i>	<i>18%</i>	<i>48%</i>	<i>82%</i>
Child:							
Regulation	14/16	87.5%	67%	52%	18%	48%	82%
Attachment	10/10	100%	58%	61%	25%	39%	75%
Two-way communication	7/8	87.5%	69%	35%	28%	65%	72%
<i>Total Child</i>	<i>31/34</i>	<i>91%</i>	<i>73%</i>	<i>19%</i>	<i>32%</i>	<i>81%</i>	<i>68%</i>
Total Scale	61/68	90%	74%	26%	25%	74%	75%

^e The number to the left of the slash mark represents the actual cutoff score for that subtest or total test; the number to the right of the slash mark represents the total number of points available on the subtest or total test.

^f Percentage of items that the child must perform correctly to have mastered that domain.

^g Probability of correctly identifying a normal child in a sample of actual normal children.

^h Probability of correctly identifying a delayed child in a sample of actual delayed children.

Table 5-5. Cutoff Scores, Total Accuracy, and Error Rates for Various Classification Decisions for 13 to 18 Month Olds

Subtest	Cutoff Score ⁱ	Performance ^j Standard	Total Accuracy Normal & Delayed	Error Rates				
				False Delayed	False Normal		Specificity ^k (Normal)	Sensitivity ^l (Delayed)
					RD	Multi-Problem		
Caregiver:								
Regulation	6/8	75%	60%	74%	0%	17%	36%	83-100%
Attachment	7/8	87.5%	59%	68%	67%	8%	32%	33-92%
Two-way communication	9/10	90%	64%	66%	22%	11%	34%	78-89%
Behavioral organization	7/10	70%	63%	51%	22%	22%	49%	78%
<i>Total caregiver</i>	<i>30/36</i>	<i>83%</i>	<i>66%</i>	<i>54%</i>	<i>11%</i>	<i>19%</i>	<i>46%</i>	<i>81-89%</i>
Child:								
Regulation	13/14	93%	73%	26%	66%	28%	98%	34-72%
Attachment	9/10	90%	73%	26%	11%	25%	74%	75-89%
Two-way communication	7/8	87.5%	83%	17%	33%	14%	83%	67-86%
<i>Total Child</i>	<i>29/32</i>	<i>91%</i>	<i>73%</i>	<i>37%</i>	<i>11%</i>	<i>25%</i>	<i>63%</i>	<i>75-89%</i>
Total Scale	60/68	88%	68%	43%	11%	28%	57%	74-89%

ⁱ The number to the left of the slash mark represents the actual cutoff score for that subtest or total test; the number to the right of the slash mark represents the total number of points available on the subtest or total test.

^j Percentage of items that the child must perform correctly to have mastered that domain.

^k Probability of correctly identifying a normal child in a sample of actual normal children.

^l Probability of correctly identifying a delayed child in a sample of actual delayed children.

Table 5-6. Cutoff Scores, Total Accuracy, and Error Rates for Various Classification Decisions for 19 to 24 Month Olds

Subtest	Cutoff Score ^m	Performance ⁿ Standard	Total Accuracy Normal & Delayed	Error Rates			
				False Delayed	False Normal	Specificity ^o (Normal)	Sensitivity ^p (Delayed)
Caregiver:							
Regulation	3/6	50%	56%	62%	25%	38%	75%
Attachment	6/6	100%	58%	72%	9%	38%	91%
Two-way communication	9/10	90%	53%	70%	23%	30%	77%
Behavioral organization	11/14	78.5%	50%	60%	39%	40%	61%
<i>Total caregiver</i>	<i>28/36</i>	<i>78%</i>	<i>56%</i>	<i>62%</i>	<i>25%</i>	<i>38%</i>	<i>75%</i>
Child:							
Regulation	13/16	87.5%	64%	51%	20%	49%	80%
Attachment	12/14	86%	60%	60%	18%	40%	82%
Two-way communication	9/10	90%	60%	57%	20%	43%	80%
Behavioral organization	3/4	75%	61%	45%	32%	55%	68%
<i>Total Child</i>	<i>36/44</i>	<i>82%</i>	<i>64%</i>	<i>53%</i>	<i>16%</i>	<i>47%</i>	<i>84%</i>
Total Scale	64/80	82.5%	65%	51%	18%	49%	82%

^m The number to the left of the slash mark represents the actual cutoff score for that subtest or total test; the number to the right of the slash mark represents the total number of points available on the subtest or total test.

ⁿ Percentage of items that the child must perform correctly to have mastered that domain.

^o Probability of correctly identifying a normal child in a sample of actual normal children.

^p Probability of correctly identifying a delayed child in a sample of actual delayed children.

Table 5-7. Cutoff Scores, Total Accuracy, and Error Rates for Various Classification Decisions for 25 to 35 Month Olds

Subtest	Cutoff Score ^q	Performance ^r Standard	Total Accuracy Normal & Delayed	Error Rates				
				False Delayed	False Normal		Specificity ^s (Normal)	Sensitivity ^t (Delayed)
					R.D.	Multi-Problem		
Caregiver:								
Regulation	6/8	75%	52%	69%	45%	26%	31%	55-74%
Attachment	7/8	87.5%	55%	75%	50%	5%	25%	40-95%
Two-way communication	9/10	90%	55%	62.5%	60%	10.5%	37.5%	40-89%
Behavioral organization	12/14	86%	67%	44%	25%	21%	56%	75-79%
Representational elaboration	4/12	33%	65.5%	69%	5%	26%	31%	74-95%
<i>Total caregiver</i>	<i>38/51</i>	<i>73%</i>	<i>67%</i>	<i>62.5%</i>	<i>15%</i>	<i>16%</i>	<i>37.5%</i>	<i>84-85%</i>
Child:								
Regulation	15/18	83%	58%	81%	30%	11%	39%	70-89%
Attachment	14/18	78%	60%	75%	25%	16%	25%	75-84%
Two-way communication	8/10	80%	57%	81%	30%	16%	19%	70-84%
Behavioral organization	2/4	50%	57%	75%	25%	21%	25%	75-79%
Representational elaboration	2/8	25%	64%	81%	10%	16%	39%	84-90%
<i>Total Child</i>	<i>42/58</i>	<i>70%</i>	<i>64%</i>	<i>69%</i>	<i>10%</i>	<i>16%</i>	<i>31%</i>	<i>84-90%</i>
Total Scale	77/110	70%	67%	63%	20%	11%	37%	80-89%

^q The number to the left of the slash mark represents the actual cutoff score for that subtest or total test; the number to the right of the slash mark represents the total number of points available on the subtest or total test.

^r Percentage of items that the child must perform correctly to have mastered that domain.

^s Probability of correctly identifying a normal child in a sample of actual normal children.

^t Probability of correctly identifying a delayed child in a sample of actual delayed children.

Table 5-8. Cutoff scores, total accuracy, and error rates for various classification decisions for 3 to 4 year olds

Subtest	Cutoff Score ^u	Performance ^v Standard	Total Accuracy Normal & Delayed	Error Rates				
				False Delayed	False Normal		Specificity ^w (Normal)	Sensitivity ^x (Delayed)
					R.D.	Multi-Problem		
Caregiver:								
Regulation	4/6	66%	50%	66%	79%	6%	34%	21-94%
Attachment	7/8	87.5%	50%	71%	58%	3%	39%	42-97%
Two-way communication	9/10	90%	50%	72%	47%	12%	38%	63-88%
Behavioral organization	12/14	86%	51%	53%	32%	12%	47%	68-88%
Representational elaboration	6/10	60%	57%	66%	16%	15%	34%	84-85%
Emotional thinking	2/6	33%	65%	43%	16%	25%	57%	75-84%
<i>Total Caregiver</i>	<i>42/54</i>	<i>78%</i>	<i>65%</i>	<i>48%</i>	<i>5%</i>	<i>21%</i>	<i>52%</i>	<i>79-95%</i>
Child:								
Regulation	12/14	86%	53%	76%	53%	3%	24%	47-97%
Attachment	14/16	87.5%	66%	48%	5%	18%	52%	84-95%
Two-way communication	8/8	100%	44%	81%	37%	6%	19%	63-94%
Behavioral organization	2/4	50%	50%	81%	11%	3%	19%	89-97%
Representational elaboration	8/14	57%	65%	48%	5%	21%	52%	79-85%
Emotional thinking	2/10	20%	66%	57%	5%	6%	43%	94-95%
<i>Total Child</i>	<i>48/66</i>	<i>73%</i>	<i>68%</i>	<i>50%</i>	<i>5%</i>	<i>15%</i>	<i>50%</i>	<i>85-95%</i>
Total Scale	93/120	77.5%	72%	38%	5%	18%	62%	82-95%

^u The number to the left of the slash mark represents the actual cutoff score for that subtest or total test; the number to the right of the slash mark represents the total number of points available on the subtest or total test.

^v Percentage of items that the child must perform correctly to have mastered that domain.

^w Probability of correctly identifying a normal child in a sample of actual normal children.

^x Probability of correctly identifying a delayed child in a sample of actual delayed children.

Table 5-9. Characteristics of Subjects for the Reliability Study

Variable (Age)	Normal (N = 26)	RD (N = 27)	PDD (N = 8)
7 to 9 Months	5	5	
10 to 12 Months	5	5	
13 to 18 Months	5	5	
19 to 24 Months	5	4	
25 to 30 Months	3	4	4
36 to 48 Months	3	4	4

Table 5-10. Results of Interobserver Reliability Study

Observers	Reliability Coefficients		
	Caregiver Scale	Child Scale	Subjects
Videotape Observations:			
1 and 2	.907	.9254	46
1 and 3	.919	.9369	20
1 and 4	.9137	.9319	20
1 and 5	.9003	.9791	15
2 and 3	.9099	.9040	20
2 and 4	.9087	.9119	20
2 and 5	.8961	.9784	15
3 and 4	.9165	.9245	20
3 and 5	.9040	.9786	15
4 and 5	.9119	.9786	15
Live Recording and Videotape Observation:			
1 and 3	.8321	.8942	15

Table 5-11. Strengths and Weaknesses of the FEAS

Strengths	Weaknesses
The FEAS is a systematic and comprehensive observational scale that is useful in documenting emotional functioning of children and their caregivers.	
It is theoretically grounded and reflects domains of behaviors that are viewed as important in the measurement of social-emotional functioning in infants and young children.	
It is useful for children ranging in age from 7 months through 4 years of age who have regulatory disorders, pervasive developmental disorders, or are at risk for relational disturbances and their caregivers.	The FEAS may not be useful in assessing children with specific emotional problems such as generalized anxiety disorder, depression, or oppositional defiant disorder. Validation studies are needed to determine if the FEAS is effective in assessment of these populations.
The FEAS has been validated on typically developing children and children with regulatory disorders, pervasive developmental disorders, and children from multi-problem families.	More cross-validation studies are needed on more diverse ethnic populations. The current validation samples are predominately Caucasian.
The FEAS has good construct validity including item discrimination. It is accurate in differentiating the performance of children who are from regulatory disordered and PDD samples.	The FEAS is more useful in detecting children with atypical social-emotional development than typically developing children.
The FEAS is useful in screening normal children between 7 and 18 months of age.	The false delayed error rates are high, therefore, the FEAS may inadvertently rate a typically developing child as having social-emotional problems when they are, in fact, normal.
Concurrent validity studies show that the FEAS is unique in what it measures in relation to other developmental scales.	Concurrent validity is needed with other parent report scales measuring emotional/behavioral problems (e.g. CBC).
Interobserver reliability between five observers was high for ratings on both typically developing and clinical samples. The FEAS can also be administered reliably with live or videotaped observations.	
The FEAS is best at assessing children with regulatory disorders from 7 to 24 months. Certain subscales are better for regulatory disorders from 25 to 48 months than others.	It is important to cross-validate observations from the FEAS with other rating scales such as the Infant-Toddler Symptom Checklist and a comprehensive intake interview to assure accuracy and relevance in diagnosis.
The FEAS is useful for children with pervasive developmental disorders from 2 to 4 years of age.	Because of the difficulties in diagnosing children with PDD under 2 years of age, it may not be possible to expand the usefulness of the FEAS for children with PDD under 2 years of age.
The FEAS is useful in assessing children and their caregivers from multi-problem families from 13 to 18 months of age.	A more expanded sample is clearly needed on multi-problem families.

Filename: FEAS%20Chap5[1]
Directory: C:\Documents and Settings\Administrator\Desktop
Template: C:\Documents and Settings\Administrator\Application
Data\Microsoft\Templates\Normal.dotm
Title: Section III: Research Applications of the FEAS
Subject:
Author: Janet Tunney
Keywords:
Comments:
Creation Date: 1/27/2007 6:41:00 AM
Change Number: 2
Last Saved On: 1/27/2007 6:41:00 AM
Last Saved By: CB
Total Editing Time: 0 Minutes
Last Printed On: 10/9/2008 11:33:00 AM
As of Last Complete Printing
Number of Pages: 32
Number of Words: 7,114 (approx.)
Number of Characters: 40,550 (approx.)