## Outcome Domain:

Infant and Toddler Measures

## Domain Description and Relevance in TBI:

“Childhood and adolescence represent a wide range of developmental levels and even most pediatric measures are inappropriate for infants and toddlers. Therefore, limited special measures are included for this age range.” – McCauley et al. 2012

Table CDE Classification by Type of TBI Study and Relevant Population for Recommended Infant and Toddler Measures

| Outcome Measure Name | Relevant TBI Population | Acute Hospitalized | Moderate/ Severe Rehabilitation | Concussion/ Mild TBI | Epidemiology |
| --- | --- | --- | --- | --- | --- |
| Bayley Scales of Infant and Toddler Development-III (full, not screen) | Pediatric  | Supplemental | Supplemental | Supplemental | Supplemental |
| Brief Infant Toddler Social Emotional Assessment (BITSEA) | Pediatric  | Supplemental | Supplemental | Supplemental | Supplemental |
| Child Behavior Checklist (CBCL) for ages 1.5 to 5 | Pediatric  | Supplemental | Supplemental | Supplemental | Supplemental |
| Mullen Scales of Early Learning | Pediatric  | Supplemental | Supplemental | Supplemental | Supplemental |
| Shape School | Pediatric  | Supplemental | Supplemental | Supplemental | Supplemental  |
| Trails-Preschool (Trails-P) | Pediatric  | Supplemental | Supplemental | Supplemental | Supplemental |

**References**

McCauley SR, Wilde EA, Anderson VA, Bedell G, Beers SR, Campbell TF, Chapman SB, Ewing-Cobbs L, Gerring JP, Gioia GA, Levin HS, Michaud LJ, Prasad MR, Swaine BR, Turkstra LS, Wade SL, Yeates KO. Recommendations for the Use of Common Outcome Measures in Pediatric Traumatic Brain Injury Research. J Neurotrauma. 2012 March; 29: 678-705. PubMed PMID: 21644810.

## Bayley Scales of Infant and Toddler Development-III

### DESCRIPTION

The Bayley-III is a comprehensive measure for assessing infant development. The test is used to assess suspected delays in development and provides a basis for determining if more in-depth assessments are needed. This measure may be used in a variety of settings and is ideal for multi-disciplinary assessment teams. The Bayley-III consists of five domains: cognitive (91 items), language (49 items receptive communication and 48 items expressive communication), motor (66 items fine motor and 72 items gross motor), adaptive behavior and social-emotional. The social-emotional and adaptive behavior items are completed by the child’s parent or caregiver.

### PERMISSIBLE VALUES

Index scores and subtest scaled scores are given (M=50, SD=10). The test also produces percentile ranks and age equivalents.

### PROCEDURES

Administration and interpretation should be by qualified personnel (e.g., formal training in use of standardized instruments, mental health professional trained in assessing child development). Completion time varies according to the age of the child – approximately 30 to 90 minutes.

### COMMENTS

This test is appropriate for children ages 1 to 42 months. The Pediatric CDE Workgroup recommends using the full version of the Bayley-III rather than the screening version.

### RATIONALE

“Earlier versions of this measure have been used extensively in studies assessing outcome after early brain injury. The Bayley also has strong psychometric properties. ” – McCauley et al. 2012

### REFERENCES

Bayley, N. (2005). Bayley Scales of Infant and Toddler Development (Third ed.). Psychological Corporation: San Antonio, TX.

Mullen, E. (1995). Mullen scales of early learning. American Guidance Service, Inc.: Circle Pines, MN.

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Barlow, K., Thomson, E., Johnson, D., and Minns, R. (2005). Late neurologic and cognitive sequelae of inflicted traumatic brain injury in infancy. Pediatrics 116(2), e174-185.

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Bonnier, C., Marique, P., Van Hout, A., and Potelle, D. (2007). Neurodevelopmental outcome after severe traumatic brain injury in very young children: Role for subcortical lesions. J Child Neurol 22, 519.

Ewing-Cobbs, L., Prasad, M., Kramar, J., and Landry, S. (1999). Inflicted traumatic brain injury: relationship of developmental outcome to severity of injury. Pediatr Neurosurg 31(5), 251-258.

Landry, S., Swank, P., Stuebing, K., Prasad, M., and Ewing-Cobbs, L. (2004). Social competence in young children with inflicted traumatic brain injury. Dev Neuropsychol 26(3), 707-733.

Prasad, M., Ewing-Cobbs, L., and Baumgartner, J. (1999). Crush head injuries in infants and young children neurologic and neuropsychologic sequelae. J Child Neurol 14(8), 496- 501.

Prasad, M., Ewing-Cobbs, L., Swank, P., and Kramar, L. (2002). Predictors of outcome following traumatic brain injury in young children. Pediatr Neurosurg 36(2), 64-74.

## Brief Infant Toddler Social Emotional Assessment (BITSEA)

### DESCRIPTION

The BITSEA is based on the Infant Toddler Social Emotional Assessment (ITSEA). This test is a screening test used to assess social or emotional behavior and is appropriate for children ages 1 -3 years old. This test consists of a 42-item parent form, which addresses the domains of Internalizing (8 items), Externalizing (6 items), and Dysregulation (8 Items), behaviors that may indicate autism spectrum disorder (17 items) and other psychopathologies (14 items). In addition to the parent form, there is a child care provider assessment form.

### PERMISSIBLE VALUES

The BITSEA yields a Problem Total Score and a Competence Total Score (M=100, SD=15). The response categories are: Not true/ Rarely (scored=0), Somewhat true/ Sometimes (score=1), and Very true/Often (score=2). There is also a “no opportunity” code which allows raters to indicate that they have not had an opportunity to observe the behavior; this code should be used instead of a zero.

### PROCEDURES

The BITSEA Parent Form takes 5 to 7 minutes to complete as a questionnaire and 7 to 10 minutes as an interview.A Master’s degree is required for scoring.

### COMMENTS

The BITSEA is available in both English and Spanish.

### RATIONALE

“The BITSEA was primarily included … to cover children ages 12-18 months, a range not assessed by the CBCL.” – McCauley et al. 2012

### REFERENCES

Briggs-Gowan, M., and Carter, A. (2006). Brief Infant Toddler Social Emotional Assessment (BITSEA). Pearson Education, Inc: San Antonio, TX.

## Child Behavior Checklist (CBCL) for ages 1.5 to 5 years

### DESCRIPTION

The Child Behavior Checklist measures a child’s competencies by using their parent’s perception of their performance on three scales, which include activities, social and school. Separate forms for ages 1.5 to 5 years and 6 to 18 years, as well as separate forms to be filled out by the parent/caregiver or teacher, are available. Scores for three competence scales and a total competence score can be computed.

### PERMISSIBLE VALUES

Raw scores, *t* scores (M=50, SD=10), and percentiles are given based on test results. The value of *t* scores for each range varies depending on the scale; in some scales higher *t* scores are associated with normal functioning and on others lower *t* scores are associated with normal functioning.

### PROCEDURES

The CBCL can be completed independently by the caregiver or administered by a professional familiar with the CBCL manual. Test can be completed by paper/pencil, online, or on a scannable form. The entire test, which includes the school competence scale, lasts approximately 25-30 minutes. Skills commensurate with at least a Master’s degree level in psychology, social work, or special education are recommended for interpretation.

### COMMENTS

The CBCL has two sets of forms, for ages 1.5 to 5 and ages 6 to 18.

### RATIONALE

“The CBCL School Competence subscale asks parents to rate their child’s performance in several academic subjects from failing to above average, and children with TBI have been rated as having lower academic performance than typically developing children.” - McCauley et al. 2012

### REFERENCES

Achenbach, T. (1991). Manual for Child Behavior Checklist/ 4-18 and 1991 Profile. University of Vermont, Dept. of Psychiatry: Burlington, VT.

Ewing-Cobbs, L., Barnes, M., Fletcher, J., Levin, H., Swank, P., and Song, J. (2004). Modeling of longitudinal academic achievement scores after pediatric traumatic brain injury. Dev Neuropsychol 25(1-2), 107-133.

Fletcher, J., Ewing-Cobbs, L., Miner, M., Levin, H., and Eisenberg, H. (1990). Behavioral changes after closed head injury in children. J Consult Clin Psychol 58(1), 93-98.

Reynolds, CR., Fletcher-Janzen, E. (2007) *Encyclopedia of Special Education*. John Wiley & Sons: Inc. Hoboken, New Jersey.

## Mullen Scales of Early Learning

### DESCRIPTION

The Mullen Scales of Early Learning includes five scales that provide information on cognitive and motor ability**.** The five scales include: Gross Motor (0-33 months only), Visual Reception, Fine Motor, Expressive Language and Receptive Language.In addition to assessing a child’s strength and weaknesses, this measure is used to assess school readiness. Included in the questionnaire are three different forms depending on the age of the child; 15 minute test for a 1-year old, 25-35 minute test for 3 year olds and 40-60 minutes for 5 year olds. The report generated from this measure includes a list of tasks that parents can help their child learn at home (based on age).

### PERMISSIBLE VALUES

T-scores, percentiles, and age-equivalents are given for each scale, plus an Early Learning Composite score (M=100, SD=15).

### PROCEDURES

Administration time is 15 to 60 minutes, depending on the child's age. The younger the child the less time it takes to complete this measure. This instrument should be interpreted by individuals with a doctorate in psychology, education, or a related field.

### COMMENTS

This test is appropriate for children from birth to age 68 months.

### RATIONALE

The test “has strong psychometric properties and has been used with a variety of populations including children with TBI.” – McCauley et al. 2012

### REFERENCES

Mullen, E. (1995). Mullen scales of early learning. American Guidance Service, Inc.: Circle Pines, MN.

Keenan, H., Hooper, S., Wetherington, C., Nocera, M., and Runyan, D. (2007).

Neurodevelopmental consequences of early traumatic brain injury in 3-year-old children. Pediatrics 119, e616-e623

## Shape School

### DESCRIPTION

The Shape School examines inhibition and switching processes in children. The measure uses a storybook design with colors, facial expressions and shapes that a child, ages 3- 6, would know. The Shape School involves four conditions: control, inhibit, switch and both. Each condition includes 15 figures.

### PERMISSIBLE VALUES

The dependent measure for each condition was an efficiency score, calculated from accuracy indexes and naming speed [efficiency = (the number of correct - the number of errors) / total time].

### PROCEDURES

Administration time is approximately one hour: closer to 45 minutes for younger children and 75 minutes for older children.

### COMMENTS

Appropriate for children aged 3 to 6 years.

### RATIONALE

“This measure has excellent potential to elucidate emerging executive functions in young children. ” – McCauley et al. 2012

### REFERENCES

Espy, K. (1997). The Shape School: Assessing executive function in preschool children. Dev Neuropsychol 13, 495-499.

## Trails-Preschool (Trails-P)

### DESCRIPTION

The Trails-P was adapted from the Trail Making Test. This measure, developed for children ages 3-5 years old, uses a storybook design with colorful pictures of dogs to assess psychomotor speed, complex attention, and executive functions. These domains are assessed under four unique conditions:

Condition A: Child stamps dogs in order of size

Condition B: Child stamps bones in order to match the size of the dogs

Condition C: Reversal – Child stamp the dogs in order of size, but ignore the previous distraction of dog bones

Condition D: Child stamps the dog and bones, in size order, but has distraction of cat stimuli

### PERMISSIBLE VALUES

The test is scored by latency to stamp all stimuli, including correcting wrong stamps, and the number of errors made.

### PROCEDURES

The Trails-P is administered in storybook format and should be videotaped for later scoring. The test can be completed in 5-10 minutes.

### COMMENTS

Appropriate for children aged 3 to 5 years.

### RATIONALE

“This measure has been found to capture development changes in executive functions.” – McCauley et al. 2012

### REFERENCES

Espy, K., and Cwik, M. (2004). The development of a Trail Making Test in young children: The TRAILS-P. Clin Neuropsychol 18, 1-12.

Reitan, R., and Wolfson, D. (1992). Neuropsychological evaluation of older children. Neuropsychology Press.