

## Primary Citations for NIH Toolbox Measures

June 16, 2020

GENERAL		
N/A	Overall Development	<p>Gershon, R. C., Cella, D., Fox, N. A., Havlik, R. J., Hendrie, H. C., &amp; Wagster, M. V. (2010). Assessment of neurological and behavioural function: The NIH toolbox. <i>The Lancet Neurology</i>, 9(2), 138–139.</p> <p>Gershon, R. C., Wagster, M. V., Hendrie, H. C., Fox, N., Cook, K. F., &amp; Nowinski, C. J. (2013). NIH Toolbox for Assessment of Neurological and Behavioral Function. <i>Neurology</i>, 80(11 Supplement 3), S2-S6.</p> <p>Hodes, R. J., Insel, T. R., Landis, S. C., &amp; NIH Blueprint for Neuroscience Research. (2013). The NIH Toolbox: Setting a standard for biomedical research. <i>Neurology</i>, 80(11 Supplement 3). S1.</p> <p>Nowinski, C. J., Victorson, D., Debb, S. M., &amp; Gershon, R. (2013). Input on NIH Toolbox criteria: Surveying the end user research community. <i>Neurology</i>, 80(11 Supplement 3), S7-S12.</p>
N/A	Considerations for Use in Special Populations	<p>Gershon, R. C., Fox, R. S., Manly, J. J., Mungas, D. M., Nowinski, C. J., Roney, E. M., &amp; Slotkin, J. (2020). The NIH Toolbox: Overview of development for use with Hispanic populations. <i>Journal of the International Neuropsychological Society</i>.</p> <p>Victorson, D., Manly, J., Wallner-Allen, K., Fox, N., Purnell, C., Hendrie, H. C., . . . Gershon, R. C. (2013). Using the NIH Toolbox in special populations: Considerations for the assessment of pediatric, geriatric, culturally diverse, non-English speaking and disabled individuals. <i>Neurology</i>, 80(11 Supplement 3), S13-S19.</p>
N/A	Norming	<p>Beaumont, J. L., Havlik, R., Cook, K. F., Hays, R. D., Wallner-Allen, K., Korper, S. P., . . . Yost, K. J. (2013). Norming plans for the NIH Toolbox. <i>Neurology</i>, 80(11 Supplement 3), S87-S92.</p>
SELECTED CLINICAL VALIDATION STUDIES		

Adult	Neurologic Disorders	<p>Carlozzi, N. E., Goodnight, W., Casaletto, K. B., Goldsmith, A., Heaton, R. K., Wong, A. W. K., . . . Tulsy, D. S. (2017). Validation of the NIH Toolbox in individuals with neurologic disorders. <i>Archives of Clinical Neuropsychology, 32</i>(5), 555-573.</p> <p>Carlozzi, N. E., Goodnight, S., Umlauf, A., Heaton, R. K., Heinemann, A. W., Schalet, B. D., Gershon, R. C., &amp; Tulsy, D. S. (2017). Motor-free composites from the National Institutes of Health Toolbox Cognition Battery (NIHTB-CB) for people with disabilities. <i>Rehabilitation Psychology, 62</i>(4), 464–473.</p> <p>Carlozzi, N. E., Tulsy, D. S., Wolf, T. J., Goodnight, S., Heaton, R. K., Casaletto, K. B., ... &amp; Heinemann, A. W. (2017). Construct validity of the NIH Toolbox Cognition Battery in individuals with stroke. <i>Rehabilitation psychology, 62</i>(4), 443-454.</p> <p>Cohen, M. L., Tulsy, D. S., Holdnack, J. A., Carlozzi, N. E., Wong, A., Magasi, S., ... &amp; Heinemann, A. W. (2017). Cognition among community-dwelling individuals with spinal cord injury. <i>Rehabilitation psychology, 62</i>(4), 425-434.</p> <p>Tulsy, D. S., Carlozzi, N. E., Holdnack, J., Heaton, R. K., Wong, A., Goldsmith, A., &amp; Heinemann, A. W. (2017). Using the NIH Toolbox Cognition Battery (NIHTB-CB) in individuals with traumatic brain injury. <i>Rehabilitation Psychology, 62</i>(4), 413.</p> <p>Tulsy, D. S., Holdnack, J. A., Cohen, M. L., Heaton, R. K., Carlozzi, N. E., Wong, A. W., ... &amp; Heinemann, A. W. (2017). Factor structure of the NIH Toolbox Cognition Battery in individuals with acquired brain injury. <i>Rehabilitation Psychology, 62</i>(4), 435.</p>
Adult & Pediatric	Intellectual Disabilities	<p>Hessl, D., Sansone, S. M., Berry-Kravis, E., Riley, K., Widaman, K. F., Abbeduto, L., ... &amp; Gershon, R. C. (2016). The NIH Toolbox Cognitive Battery for intellectual disabilities: three preliminary studies and future directions. <i>Journal of Neurodevelopmental Disorders, 8</i>(1), 35.</p> <p>Shields, R. H., Kaat, A. J., McKenzie, F. J., Drayton, A., Sansone, S. M., Coleman, J., ... &amp; Widaman, K. F. (2020). Validation of the NIH Toolbox Cognitive Battery in intellectual disability. <i>Neurology, 94</i>(12), e1229-e1240.</p>

Adult	Psychosis	Cassetta, B. D., Menon, M., Carrion, P. B., Pearce, H., DeGraaf, A., Leonova, O., ... & Torres, I. J. (2019). Preliminary examination of the validity of the NIH toolbox cognition battery in treatment-resistant psychosis. <i>The Clinical Neuropsychologist</i> , 1-23.
Adult	Diffuse Gliomas	Lang, S., Cadeaux, M., Opoku-Darko, M., Gaxiola-Valdez, I., Partlo, L. A., Goodyear, B. G., ... & Kelly, J. (2017). Assessment of cognitive, emotional, and motor domains in patients with diffuse gliomas using the National Institutes of Health toolbox battery. <i>World Neurosurgery</i> , 99, 448-456.
<b>SENSATION BATTERY</b>		
<b>Audition</b>		
Adult & Pediatric	Words-in-Noise Test	Zecker, S. G., Hoffman, H. J., Frisina, R., Dubno, J. R., Dhar, S., Wallhagen, M., . . . Wilson, R. H. (2013). Audition assessment using the NIH Toolbox. <i>Neurology</i> , 80(11 Supplement 3), S45-S48.
<b>Vision</b>		
Adult & Pediatric	Static Visual Acuity Test	Rine, R., Roberts, D., Corbin, B. A., McKean-Cowdin, R., Varma, R., Beaumont, J., . . . Schubert, C. (2012). A new portable tool to screen vestibular and visual function in children and adults – NIH Toolbox. <i>Journal of Rehabilitation Research and Development</i> , 49(2), 209-220. Varma, R., McKean-Cowdin, R., Vitale, S., Slotkin, J., & Hays, R. D. (2013). Vision assessment using the NIH Toolbox. <i>Neurology</i> , 80(11 Supplement 3), S37-S40.
<b>Vestibular</b>		
Adult & Pediatric	Dynamic Visual Acuity Test	Li, C., Beaumont, J., Rine, R. M., Slotkin, J., & Schubert, M. C. (2014). Normative scores for the NIH Toolbox Dynamic Visual Acuity Test from 3 to 85 years. <i>Frontiers in Neurology</i> , 5, 223. Rine, R., Roberts, D., Corbin, B. A., McKean-Cowdin, R., Varma, R., Beaumont, J., . . . Schubert, C. (2012). A new portable tool to screen vestibular and visual function in children and adults – NIH Toolbox. <i>Journal of Rehabilitation Research and Development</i> , 49(2), 209-220.
<b>Olfaction</b>		

Adult & Pediatric	Odor Identification Test	Dalton, P., Mennella, J. A., Doty, R. L., Murphy, C., Frank, R., Hoffman, H. J., . . . Slotkin, J. (2013). Olfactory assessment using the NIH Toolbox. <i>Neurology</i> , 80(11 Supplement 3), S32-S36.
<b>Pain</b>		
Adult	Pain severity & Pain interference	Cook, K. F., Dunn, W., Griffith, J. W., Morrison, M. T., Tanquary, J., Sabata, D., . . . Gershon, R. C. (2013). Pain assessment using the NIH Toolbox. <i>Neurology</i> , 80(11 Supplement 3), S49-S53.
<b>Supplemental Measures</b>		
Adult	Vision-related HRQOL (supplemental)	Paz, S. H., Slotkin, J., McKean-Cowdin, R., Lee, P., Owsley, C., Vitale, S., . . . Hays, R. D. (2013). Development of a vision-targeted health related quality of life item measure. <i>Quality of Life Research</i> , 22(9), 2477-2487. Varma, R., McKean-Cowdin, R., Vitale, S., Slotkin, J., & Hays, R. D. (2013). Vision assessment using the NIH Toolbox. <i>Neurology</i> , 80(11 Supplement 3), S37-S40.
Adult	Hearing-related Disability	Zecker, S. G., Hoffman, H. J., Frisina, R., Dubno, J. R., Dhar, S., Wallhagen, M., . . . Wilson, R. H. (2013). Audition assessment using the NIH Toolbox. <i>Neurology</i> , 80(11 Supplement 3), S45-S48.
<b>EMOTION BATTERY</b>		
Adult & Pediatric	Full Emotion Battery	Salsman, J.M., Butt, Z., Pilkonis, P.A., Cyranowski, J.M., Zill, N., Hendrie, H.C., . . . Cella, D. (2013). Emotion assessment using the NIH Toolbox. <i>Neurology</i> , 80(11 Supplement 3), S76-S86.
Adult	Full Emotion Battery	Babakhanyan, I., McKenna, B. S., Casaletto, K. B., Nowinski, C. J., & Heaton, R. K. (2018). National Institutes of Health Toolbox Emotion battery for English- and Spanish-speaking adults: Normative data and factor-based summary scores. <i>Patient Related Outcome Measures</i> , 9, 115—127.
Pediatric	Full Emotion Battery	Paolillo, E. W., McKenna, B. S., Nowinski, C. J., Thomas, M. L., Malcarne, V. L., & Heaton, R. K. (2020). NIH Toolbox® Emotion Batteries for children: Factor-based composites and norms. <i>Assessment</i> , 27(3), 607-620.
<b>Negative Affect</b>		
Adult & Pediatric	Anger self-report Fear self-report	Pilkonis, P. A., Choi, S. W., Salsman, J. M., Butt, Z., Moore, T. L., Lawrence, S. M., . . . Cella, D.

	Sadness self-report	(2013). Assessment of self-reported negative affect in the NIH Toolbox. <i>Psychiatry Research</i> , 206(1), 88-97.
<b>Psychological Well-Being</b>		
Adult	Positive Affect Life Satisfaction Meaning and Purpose	Salsman, J., Lai, J. -S., Hendrie, H., Butt, Z., Zill, N., Pilkonis, P. A., . . . Cella, D. (2014). Assessing psychological well-being: Self-report instruments for the NIH Toolbox. <i>Quality of Life Research</i> , 23(1), 205-215.
<b>Social Relationships</b>		
Adult	Emotional Support Instrumental Support Friendship Loneliness Perceived Rejection Perceived Hostility	Cyranowski, J. M., Zill, N., Bode, R., Butt, Z., Kelly, M. A. R., Pilkonis, P. A., . . . Cella, D. (2013). Assessing social support, companionship, and distress: National Institute of Health (NIH) Toolbox adult social relationship scales. <i>Health Psychology</i> , 32(3), 293-301.
<b>Stress and Self-Efficacy</b>		
Adult & Pediatric	Perceived Stress Self-Efficacy	Kupst, M. J., Butt, Z., Stoney, C. M., Griffith, J. W., Salsman, J. M., Folkman, S., & Cella, D. (2015). Assessment of stress and self-efficacy for the NIH Toolbox for Neurological and Behavioral Function. <i>Anxiety, Stress and Coping</i> , 28(5), 531-544.
<b>MOTOR BATTERY</b>		
Adult & Pediatric	Full Battery	Reuben, D. B., Magasi, S., McCreath, H. E., Bohannon, R. W., Wang, Y. C., Bubela, D. J., ... & Gershon, R. C. (2013). Motor assessment using the NIH Toolbox. <i>Neurology</i> , 80(11 Supplement 3), S65-S75.
<b>Balance</b>		
Adult & Pediatric	Standing Balance Test	Rine, R., Roberts, D., Corbin, B. A., McKean-Cowdin, R., Varma, R., Beaumont, J., . . . Schubert, C. (2012). A new portable tool to screen vestibular and visual function in children and adults – NIH Toolbox. <i>Journal of Rehabilitation Research and Development</i> , 49(2), 209-220.
<b>Locomotion</b>		
Adult	4-meter Walk Test	Bohannon, R. W., & Wang, Y. C. (2019). Four-meter gait speed: Normative values and reliability determined for adults participating in the NIH Toolbox study. <i>Archives of Physical Medicine and Rehabilitation</i> , 100(3), 509-513.
<b>Endurance</b>		
Adult	2-minute Walk Test	Bohannon, R. W., Wang, Y. C., & Gershon, R. C. (2015). Two-minute walk test performance by

		adults 18 to 85 years: normative values, reliability, and responsiveness. <i>Archives of Physical Medicine and Rehabilitation</i> , 96(3), 472-477.
Pediatric	2-minute Walk Test	Bohannon, R. W., Wang, Y. C., Bubela, D., & Gershon, R. C. (2018). Normative two-minute walk test distances for boys and girls 3 to 17 years of age. <i>Physical &amp; Occupational Therapy in Pediatrics</i> , 38(1), 39-45.
<b>Strength</b>		
Adult	Hand Grip Strength	Wang, Y. C., Bohannon, R. W., Li, X., Sindhu, B., & Kapellusch, J. (2018). Hand-grip strength: Normative reference values and equations for individuals 18 to 85 years of age residing in the United States. <i>Journal of Orthopaedic &amp; Sports Physical Therapy</i> , 48(9), 685-693.
<b>Dexterity</b>		
Adult & Pediatric	9-hole Pegboard Test	Wang, Y. C., Bohannon, R. W., Kapellusch, J., Garg, A., & Gershon, R. C. (2015). Dexterity as measured with the 9-Hole Peg Test (9-HPT) across the age span. <i>Journal of Hand Therapy</i> , 28(1), 53-60.
<b>COGNITION BATTERY</b>		
Adult & Pediatric	Full Cognition Battery	Weintraub, S., Dikmen, S. S., Heaton, R. K., Tulsky, D. S., Zelazo, P. D., Bauer, P. J., ... & Fox, N. A. (2013). Cognition assessment using the NIH Toolbox. <i>Neurology</i> , 80(11 Supplement 3), S54-S64.
Adult	Full Cognition Battery	Mungas, D., Heaton, R., Tulsky, D., Zelazo, P. D., Slotkin, J., Blitz, D., ... & Gershon, R. (2014). Factor structure, convergent validity, and discriminant validity of the NIH Toolbox Cognitive Health Battery (NIHTB-CHB) in adults. <i>Journal of the International Neuropsychological Society</i> , 20(6), 579-587. Weintraub, S., Dikmen, S. S., Heaton, R. K., Tulsky, D. S., Zelazo, P. D., Slotkin, J., ... & Havlik, R. (2014). The cognition battery of the NIH toolbox for assessment of neurological and behavioral function: Validation in an adult sample. <i>Journal of the International Neuropsychological Society</i> , 20(6), 567-578.
Pediatric	Full Cognition Battery	Bauer, P. J., & Zelazo, P. D. (2013). Ix. Nih toolbox cognition battery (cb): summary, conclusions, and implications for cognitive

		<p>development. <i>Monographs of the Society for Research in Child Development</i>, 78(4), 133-146.</p> <p>Mungas, D., Widaman, K., Zelazo, P. D., Tulskey, D., Heaton, R. K., Slotkin, J., ... &amp; Gershon, R. C. (2013). VII. NIH Toolbox Cognition Battery (CB): Factor structure for 3 to 15 year olds. <i>Monographs of the Society for Research in Child Development</i>, 78(4), 103-118.</p> <p>Weintraub, S., Bauer, P. J., Zelazo, P. D., Wallner-Allen, K., Dikmen, S. S., Heaton, R. K., ... &amp; Havlik, R. J. (2013). I. NIH Toolbox Cognition Battery (CB): introduction and pediatric data. <i>Monographs of the Society for Research in Child Development</i>, 78(4), 1-15.</p>
Adult	Composite Scores	<p>Heaton, R. K., Akshoomoff, N., Tulskey, D., Mungas, D., Weintraub, S., Dikmen, S., ... &amp; Gershon, R. (2014). Reliability and validity of composite scores from the NIH Toolbox Cognition Battery in adults. <i>Journal of the International Neuropsychological Society</i>, 20(6), 588-598.</p>
Pediatric	Composite Scores	<p>Akshoomoff, N., Beaumont, J. L., Bauer, P. J., Dikmen, S. S., Gershon, R. C., Mungas, D., ... &amp; Heaton, R. K. (2013). VIII. NIH Toolbox Cognition Battery (CB): composite scores of crystallized, fluid, and overall cognition. <i>Monographs of the Society for Research in Child Development</i>, 78(4), 119-132.</p>
<b>Executive Function / Attention</b>		
Adult	Dimensional Change Card Sort Test Flanker Inhibitory Control and Attention Test	<p>Zelazo, P. D., Anderson, J. E., Richler, J., Wallner-Allen, K., Beaumont, J. L., Conway, K. P., ... &amp; Weintraub, S. (2014). NIH Toolbox Cognition Battery (CB): Validation of executive function measures in adults. <i>Journal of the International Neuropsychological Society</i>, 20(6), 620-629</p>
Pediatric	Dimensional Change Card Sort Test Flanker Inhibitory Control and Attention Test	<p>Zelazo, P. D., Anderson, J. E., Richler, J., Wallner-Allen, K., Beaumont, J. L., &amp; Weintraub, S. (2013). II. NIH Toolbox Cognition Battery (CB): Measuring executive function and attention. <i>Monographs of the Society for Research in Child Development</i>, 78(4), 16-33.</p>
<b>Episodic Memory</b>		
Adult	Picture Sequence Memory Test	<p>Dikmen, S. S., Bauer, P. J., Weintraub, S., Mungas, D., Slotkin, J., Beaumont, J. L., ... &amp; Heaton, R. K. (2014). Measuring episodic memory across the lifespan: NIH toolbox picture sequence memory test. <i>Journal of the International Neuropsychological Society</i>, 20(6), 611-619.</p>

Pediatric	Picture Sequence Memory Test	Bauer, P. J., Dikmen, S. S., Heaton, R. K., Mungas, D., Slotkin, J., & Beaumont, J. L. (2013). III. NIH Toolbox Cognition Battery (CB): measuring episodic memory. <i>Monographs of the Society for Research in Child Development, 78(4)</i> , 34-48.
<b>Working Memory</b>		
Adult	List Sort Working Memory Test	Tulsky, D. S., Carlozzi, N., Chiaravalloti, N. D., Beaumont, J. L., Kisala, P. A., Mungas, D., ... & Gershon, R. (2014). NIH Toolbox Cognition Battery (NIHTB-CB): List sorting test to measure working memory. <i>Journal of the International Neuropsychological Society, 20(6)</i> , 599-610.
Pediatric	List Sort Working Memory Test	Tulsky, D. S., Carlozzi, N. E., Chevalier, N., Espy, K. A., Beaumont, J. L., & Mungas, D. (2013). V. NIH toolbox cognition battery (CB): measuring working memory. <i>Monographs of the Society for Research in Child Development, 78(4)</i> , 70-87.
<b>Processing Speed</b>		
Adult	Pattern Comparison Processing Speed Test	Carlozzi, N. E., Tulsky, D. S., Chiaravalloti, N. D., Beaumont, J. L., Weintraub, S., Conway, K., & Gershon, R. C. (2014). NIH toolbox cognitive battery (NIHTB-CB): the NIHTB pattern comparison processing speed test. <i>Journal of the International Neuropsychological Society, 20(6)</i> , 630-641.
Pediatric	Pattern Comparison Processing Speed Test	Carlozzi, N. E., Tulsky, D. S., Kail, R. V., & Beaumont, J. L. (2013). VI. NIH Toolbox Cognition Battery (CB): measuring processing speed. <i>Monographs of the Society for Research in Child Development, 78(4)</i> , 88-102.
<b>Language</b>		
Adult	Picture Vocabulary Test Oral Reading Recognition Test	Gershon, R. C., Cook, K. F., Mungas, D., Manly, J. J., Slotkin, J., Beaumont, J. L., & Weintraub, S. (2014). Language measures of the NIH toolbox cognition battery. <i>Journal of the International Neuropsychological Society, 20(6)</i> , 642-651.
Pediatric	Picture Vocabulary Test Oral Reading Recognition Test	Gershon, R. C., Slotkin, J., Manly, J. J., Blitz, D. L., Beaumont, J. L., Schnipke, D., ... & Adams, M. J. (2013). IV. NIH Toolbox Cognition Battery (CB): Measuring language (vocabulary comprehension and reading decoding). <i>Monographs of the Society for Research in Child Development, 78(4)</i> , 49-69.