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Trail Making Test (TMT), Delis-Kaplan Executive Function System (D-KEFS)**

Availability	Please click here for more information: Trail Making Test
Classification	Supplemental – Sickle Cell Disease (SCD)
Short Description of Instrument	<p>Summary/Overview of Instrument: The first part of Trail Making Test (TMT) test, TMT-A, requires the subject to rapidly sequence numbers from 1 through 25, with the score being the time to complete the task. The second part, TMT-B, is a more difficult cognitive flexibility task requiring the subject to follow a sequential pattern while shifting cognitive sets, sequencing from 1 to 13 while switching between numbers and letters (i.e., 1-A-2-B-3-C,...), with the score being the time to complete the task. The utility and psychometric properties of the Trails B are so well accepted that it is one of the few measures that it is used across neurologic and psychiatric clinical and research patient populations.</p> <p>Construct measured: Psychomotor speed and executive functions</p> <p>Generic vs. disease specific: Generic</p> <p>Intended use of instrument/purpose of tool: The Trail Making Test is a measure of psychomotor speed, visual scanning, and executive ability.</p> <p>Means of administration (paper and pencil, computerized): Written</p> <p>Location of administration (clinic, home, telephone): Clinical setting</p> <p>Intended respondent (patient, caregiver): Patient</p> <p># of items: N/A</p> <p># of subscales and names of sub-scales: N/A</p>
Scoring and Psychometric Properties	<p>Scoring: Scoring of A and B are reported as the number of seconds required to complete the task. Higher scores indicate greater impairment. Performance varies by age and education, and thus normative standards are used to classify patient performance. Errors affect the patient's score only in that the correction of errors is included in the completion time for the task. If a patient has not completed both parts after five minutes, it is unnecessary to continue the test. In addition to the direct scores, the B-A difference score, the B:A ration, and the B-A/A proportional score have also been used as indicators of certain cognitive operations or specific markers of brain damage (Sanchez-Cubillo et al., 2009). Note: Parts A & B must be completed together and in the correct order for test administration to be valid.</p> <p>Standardization of scores to a reference population: Raw scores (time to complete) are converted to scaled scores (0–19). Scale score is converted to t score by sex, education, age, and ethnicity. Norms are from the Halstead-Reitan Battery (Heaton et al., 2004).</p> <p>Reliability:</p>

	<p>Test-retest or intra-interview (within rater) reliability (as applicable): For intervals of 3 weeks to 1 year, test-retest reliability is moderate to high for Part A (r=0.36–0.79) and Part B (r=0.44–0.89) (Bornstein et al., 1987, Matarazzon et al., 1974, Dikmen et al., 1999).</p> <p>Inter-interview (between-rater) reliability (as applicable): Interrater reliability has been found to be high for both Part A r=(0.94) and Part B (r=0.90).</p> <p>Statistical methods used to assess reliability: Correlational analyses and reliability coefficients.</p> <p>The HD-CAB is a cognitive battery designed specifically for use in late premanifest and early HD clinical trials. This six test assessment battery which includes the Trail Making B test was found be sensitive to disease status and reliable in an observational study in 105 control, 103 premanifest-HD, and 55 early HD subjects (Stout et al., 2014).</p> <p>Validity:</p> <p>Content validity: Part A and B correlate moderately (r=0.31) (Heilbronner et al., 1991).</p> <p>Construct validity: Subtests correlate with visual search tasks (Ehrenstein et al., 1982). In a study by Sanchez-Cubillo and colleagues (2009) suggested that the TMT-A mainly requires visuoperceptual abilities, while the TMT-B requires "primarily working memory and secondarily task-switching ability".</p>
<p>Rationale/Justification</p>	<p>Strengths: Parts A and B are sensitive in cross-sectional and longitudinal studies of prodromal HD. Task has been tested at sites in the United States, Canada, United Kingdom, Australia, Germany, and Spain.</p> <p>Weaknesses: The examiner must carefully monitor a participant's performance to accurately score errors. The reliability of test administration can vary by examiner's reaction time in noticing errors and pointing them out, which introduces imprecision. More severe motor impairment may influence results. Participants who are very cognitively impaired may not be able to complete the task, which must be dealt with statistically (e.g., set a maximum time for noncompleters).</p> <p>Availability: In the Public domain, May be photocopied, though there are versions available for purchase.</p> <p>Special Requirements for administration: Stopwatch.</p> <p>Administration Time: 10 minutes.</p>
<p>References</p>	<p>Reitan RM. Validity of the Trail Making test as an indicator of organic brain damage. <i>Percept Mot Skills</i>. 1958;8:271–276.</p> <p>Chen P, Ratcliff G, Belle SH, Cauley JA, DeKosky ST, Ganguli M. Cognitive tests that best discriminate between presymptomatic AD and those who remain nondemented. <i>Neurology</i>. 2000 ;55(12):1847–1853.</p>

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Specialty Automated Systems Corporation offers an online version of the Trail Making Test. For more information, visit: [Trail Making Test](#).