executive functioning component may not accurately represent effort in youth, perhaps due to their less developed executive functioning relative to adults (Lezak et al., 2012; Shanmugan & Satterthwaite, 2017). Overall, understanding the cognitive processes contributing to Stroop performance in healthy youth will allow clinicians to better detect deficits in those cognitive processes and understand how they may impact Stroop performance. This would lead to a better understanding of executive functioning and the accurate measurement of effort in healthy youth.

Categories:
Assessment/Psychometrics/Methods (Child)
Keyword 1: executive functions
Keyword 2: effort testing
Keyword 3: validity (performance or symptom)
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16 Development of a Systematic Scoring System to Measure Adherence to a Temporal-Spatial Heuristic when Completing the Rey Complex Figure Task

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Objective: It has been established that capturing how an individual draws the Rey Complex Figure Task (RCF) is as important as assessing what is drawn (Rey, 1941, Osterrieth, 1944). Despite the development of multiple systems that have been designed to measure these qualitative characteristics there are still no systematic means to measure adherence to the temporal-spatial heuristic that represents a typical drawing practice in healthy, neurotypical adults (Visser, 1973; Hamby et al, 1993).This study sought to develop a system for scoring temporal-spatial adherence when drawing the figure to provide objective, continuous data.
Participants and Methods: Fifty-three English-speaking adults (mean age 44.61 yrs, SD 12.48; 44 female) were recruited. Exclusion criteria included vision and hearing impairment not corrected by aids; neurodivergent, neurological or psychiatric diagnosis, cancer or brain injury history. Participants completed the RCF copy phase as part of an extended neuropsychological battery. The RCF drawing process was recorded via video and a ball-point pen that digitally recorded drawing. Order data for the 18 RCF elements (Osterrieth, 1944,Taylor, 1959) was recorded by two scorers and analysed via Principal Component Analysis (PCA) with an equimax rotation to identify elements typically drawn together by a healthy, neurotypical adult. Using scoring methodology adapted from Geary et al (2011), the extent to which participants drew consecutively the member elements of each factor or 'strategy cluster' was calculated and recorded. Strategy Cluster Scores across the population sample were examined to understand normative performance.
Results: Order data was examined for interrater reliability via Pearson's correlation coefficient and was considered good ($r^2 = 0.78$, $p < 0.001$). PCA identified four factors or 'strategy clusters' that were statistically robust and accounted for 67.34% of total variation. The strategy clusters were Core Structure (rectangle, diagonal, horizontal, vertical); Triangular Structure (triangle, horizontal in triangle, vertical in triangle, diamond); Internal Left-Hand Side (four horizontal lines, smaller rectangle, horizontal in top-left quad); and Internal Right-Hand Side (five lines, circle, vertical top-right quad, small triangle). The mean RCF Strategy Cluster Score was 6.23 (SD 1.94; possible range: 2.75 to 10). Population data spread indicated that healthy neurotypical adults only partially observed a temporal-spatial heuristic, rather than strict, absolute adherence.
Conclusions: Four strategy clusters were identified where cluster members were typically drawn consecutively. RCF Cluster Strategy scoring was shown to measure the temporal-spatial heuristic objectively, providing continuous data that lends itself to clinical standardisation. Further, the study demonstrated that whilst healthy, neurotypical adults copy the RCF using a temporal-spatial heuristic, it is only partially adhered to. Traditionally deviation from strict adherence to the four strategy clusters during drawing was deemed to be indicative of cognitive dysregulation, however our findings demonstrate a normal distribution of typical population performance. These findings have important implications for interpreting how RCF drawing strategy informs clinical assessment

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and diagnosis as both very strict and very weak adherence to a temporal-spatial heuristic can be indicative of atypical function. The study supports this novel scoring system as a fast and reliable means to systematically measure RCF Cluster Strategy that with further validation could be adopted within clinical practice.

Categories:
Assessment/Psychometrics/Methods (Adult)
Keyword 1: neuropsychological assessment
Keyword 2: visuoconstruction
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17 Observing Constructs of Drawing Process of the Rey-Osterrieth Complex Figure Test as an Indicator of Persisting Post-Concussive Symptoms

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Objective: Evidence regarding cognitive impairment following concussion/mild traumatic brain injury (mTBI) has been conflicting. Criticism has focused on what is being measured, how it is being measured, and who is being measured (Pertab et al, 2009; Iverson, 2010). However, literature suggests that clinicians and researchers should examine how individuals complete a task rather than what they achieve (Geary et al, 2011). Studies examining the drawing process used to complete the Rey-Osterrieth Complex Figure Task (RCF) have been inconclusive and methodologically weak. The current study addressed several criticisms and limitations by examining whether observing RCF drawing process, including a novel strategy construct, could support a diagnosis of persisting post-concussive symptoms.
Participants and Methods: Sixteen individuals with a history of concussion/mTBI and sixteen matched controls (age, sex, IQ) were included in multiple regression analyses to examine whether RCF drawing constructs predict post-concussive symptoms (mean age 43.59 years; 22 female). At least 3 months had passed since the concussive/mTBI event. Post-concussive symptoms were assessed with the Rivermead Post-Concussive Symptoms Questionnaire (RPCSQ) and the Mental Fatigue Scale (MFS). Separate regression analyses were conducted for each scale. Predictor variables were statistically selected from a catalogue of 4 RCF drawing process constructs – Wholeness, Order, Continuation and Strategy; 15 traditional measures of cognitive function; and 3 psychological state measures. 17 variables were included in the model for the RPCSQ, including Order and Strategy. 18 variables were included for the MFS, including Order, Continuation and Strategy.
Results: Order scores were found to be one of the strongest predictors of RPCSQ scores (B = -2.06; β= 0.20), and MFS scores (B = -1.54, β = 0.26). Individuals drawing fewer core elements at the start of the drawing process were found to report more post-concussive symptoms. Participants who observed a stronger temporal-spatial strategy heuristic, as measured by the Strategy construct, reported more symptoms, particularly mental fatigue (RPCSQ: B = 0.49, β = 0.09; MFS: B = 0.58, β = 0.19). Continuation was also found to be predictive of MFS scores (B = -0.24, β = -0.14), such that the fewer continuation points that were observed, the greater the MFS score.
Conclusions: Two constructs of RCF drawing process – Order and Strategy – were found to predict persisting post-concussive symptoms generally, and mental fatigue specifically. Continuation was also found to predict mental fatigue. Such findings provide a cognitive explanation for patient reports of mental fatigue following concussion – recognised as the most common and persistent symptom. Strict adherence to a temporal-spatial strategy may indicate cognitive inflexibility – a theory supported by the inclusion and influence of other cognitive tasks in the regression models that rely on cognitive flexibility. Individuals exert more effort to shift between perceptual planes and to override global bias, thereby expending cognitive resources more quickly and to a greater extent. These findings provide a credible explanation for the lack of evidence of cognitive impairments in previous research, where neuropsychological tasks focus on attainment rather than process. These findings highlight the clinical importance of assessing cognitive dysregulation, specific cognitive processes and cognitive deficits post-concussion/mTBI.

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