

Syllable Diadochokinesis in Professional Boxers and Mixed Martial Artists

Background: Recent studies in our laboratory have documented slower speech rates in passage readings for boxers and mixed martial artists (MMAs) compared to healthy controls.

Diadochokinetic rate tasks (DDK), where syllables are repeated as quickly as possible, more directly measure speech motor abilities than reading or spontaneous speech tasks (e.g., less cognitive/linguistic confounds). We investigated DDK rates for professional boxers, MMAs, and controls with no history of RHI.

Methods: Participants were 27 professional boxers, 37 professional MMA fighters, and 30 controls ranging in age from 20 to 77 years of age from the Professional Athletes Brain Health Study. They were asked to repeat the syllable /kʌ/ as rapidly and evenly as possible for at least 10 seconds. Three measures for each set of /kʌ/ repetitions were obtained: average syllable repetition rate (DDK avr) and two measures of regularity: coefficient of variance of period and coefficient of variance of intensity.

Results: The three groups differed significantly in DDK avr, $H(2) = 23.01$, $p < .01$, and the effect size was large ($d = 1.1$). DDK rate for boxers was 4.85 syls/s ($SD = 1.13$, range = 2.1 – 7.3), for MMAs was 5.48 ($SD = 0.9$, range = 3.2 – 6.7), and for controls was 6.33 ($SD = 1.10$, range = 4.1 – 9.5). Boxers produced slower DDK rates than controls, $H(1) = -34.31$, $p < .01$ but did not differ significantly from MMAs, $H(1) = -13.82$, $p = .27$. MMAs also produced slower repetition rates for /kʌ/ than controls, $H(1) = -20.48$, $p = .02$. Measures of stability showed little difference among the groups was found.

Discussion: The average DDK rate for boxers was nearly 1.5 syllables per second slower than for controls, and MMA fighters averaged 0.85 syllables per second slower than controls.

Professional fighters exhibited evidence of speech motor impairment associated with RHI.

Speech DDK tasks show promise for assisting in the diagnosis of subtle motor impairment in head injury, even for individuals with no overt speech impairment.