**Cognitive task battery in the FAST exercise trial**

As described in *Baniqued, P.L., Gallen, C.L., ….. McAuley, E., Kramer, A.F., D'Esposito, M., 2017. Brain Network Modularity Predicts Exercise-Related Executive Function Gains in Older Adults. Front Aging Neurosci 9, 426*.

**Fluid abilities**

**Matrix Reasoning**

On each trial, participants were shown a 3 × 3 grid, with each cell except for one containing an abstract pattern. Participants were instructed to select which among eight options best completes the matrix along both the rows and columns. Participants performed two practice trials and were then given 10 min to complete a maximum of 18 items. We analyzed the total number of correctly answered items.

**Shipley Abstraction**

Participants were given a list of word, letter, or number sequences on a piece of paper and were instructed to write the missing item/s (word, letter or number) in each sequence. Participants were given 5 min to answer 20 items. We analyzed the total number of correctly answered items.

**Letter Sets**

On each trial, participants were presented with ﬁve sets of four-letter strings and asked to determine which set was diﬀerent from the other four. Participants were given 10 min to complete a maximum of 15 trials. We analyzed the total number of correctly answered items.

**Spatial Relations**

On each trial, participants were presented with a 2-dimensional object pattern and instructed to identify which among four three-dimensional ﬁgures would match the 2-dimensional pattern when folded. Participants were given 10 min to complete a maximum of 20 trials. We analyzed the total number of correctly answered items.

**Paper Folding**

On each trial, participants were presented with images that show a sheet of paper folded in a certain sequence and a hole punched through the folded sheet. Participants were asked to select which among ﬁve options matched the pattern of holes that would result when the paper was unfolded. They were given 10 min to complete a maximum of 12 trials. We analyzed the total number of correctly answered items.

**Form Boards**

On each trial, participants were presented with a speciﬁc shape and instructed to choose which pieces (ﬁve total options) will exactly ﬁll the space inside the shape. They were given 8 min to complete a maximum of 24 trials. We analyzed the total number of correctly answered items.

**Spatial Working Memory**

On each trial, an arrangement of two, three, or four black dots was brieﬂy presented on the screen. After a delay, a red dot appeared and participants were instructed to determine if the red dot matched the position of one of the black dots presented earlier in that trial (match or non-match). Participants performed a practice block of 12 trials, and a task block of 120 trials (40 trials per condition). We analyzed mean accuracy during the task block for the more diﬃcult three-dot and four-dot trial conditions.

**Task-Switching** (Kramer et al., 1999; Voss et al., 2010a,b, 2013b; Leckie et al., 2014).

On each trial, participants were shown a number between 1 and 9 (except 5) against a colored background: (1) on a pink background, participants were instructed to determine whether the number was odd or even, (2) on a blue background, they were to determine if the number was higher or lower than 5. Participants completed a high/low practice block (40 trials) an odd/even practice block (40 trials), a single high/low task block (40 trials), a single odd/even task block (40 trials), a mixed practice block (64 trials) and a mixed task block (160 trials). We analyzed performance on the mixed task block and extracted local switch cost (mixed switch reaction time; RT—mixed non-switch RT). To be consistent with our previous longitudinal studies on exercise- and CRF-related resting state FC and cognition, only local cost RT was used in the composite for executive function, and it was reverse scored so that a higher score was better.

**Perceptual speed**

**Digit-Symbol Coding**

Participants were presented with a sheet of paper containing a series of numbers between 1 and 9, were asked to ﬁll in the corresponding symbol based on a digit-symbol key provided. Participants completed 7 practice items and were given 2 min to complete a maximum of 133 items. We analyzed the number of correctly answered items.

**Pattern Comparison**

Participants were given a sheet of paper with a set of line patterns and were tasked to determine whether a pair of line patterns was the same or diﬀerent. Participants completed three practice items, followed by two task sets, each set with a maximum number of 30 items to be completed within 30 s. We analyzed the number of correctly answered items, averaged across two sets of problems.

**Letter Comparison**

Participants were given a sheet of paper with a set of non-word letter strings and were tasked to determine whether a pair of letter strings was the same or diﬀerent. Participants completed three practice items, followed by two task sets, each set with a maximum number of 30 items to be completed within 30 s. We analyzed the number of correctly answered items, averaged across two sets of problems.

**Memory**

**Logical Memory**

Participants listened to stories narrated by an experimenter and after each reading, were asked to recall each story in detail. We analyzed the number of correctly recalled story details, summed across three story-tellings (ﬁrst story, second story, re-reading of second story).

**Paired Associates**

Participants listened to a list of six word pairs read aloud by an experimenter. The experimenter then read the ﬁrst word of each pair and asked participants to recall the paired second word. We analyzed the number of correctly recalled items, averaged across two sets of six pairs each.

**Word Recall**

Participants listened to a list of words and were given 90 s to recall the words in any order. Participants listed to the same list three more times and were asked to recall as many words as possible after each reading. Participants were then read a new list of words, asked to recall as many words as possible from the new list, and then asked to recall words from the old list. We analyzed the total number of correctly recalled items.

**Vocabulary**

**Word Vocabulary**

Experimenters read aloud a list of 33 words and asked participants to verbally give the meaning of each word. Responses are scored 0–2 points according to the quality of the deﬁnition (based on provided word and phrase guidelines). The test is discontinued after six consecutive scores of 0. We analyzed the total number of points.

**Picture Vocabulary**

Experimenters present a maximum of 30 images and participants are tasked to name the objects presented. The test is discontinued after a participant fails to name six consecutive items. We analyzed the total number of correctly named items.

**Synonym-Antonym**

On each trial, participants are presented a target word and are tasked to select which among ﬁve word options is most similar (synonym) or opposite (antonym) in meaning to the target word. Participants completed a synonym block followed by an antonym block, each with a maximum of 10 items to be completed within 5 min. We analyzed the total number of correctly identiﬁed words across the synonym and antonym blocks.