**Table S1.** Mediation analysis between BMIz and cognitive performance mediate by physical fitness.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | n | Predictor - Mediator | Mediator – Outcome | Total effect | Direct effect | Indirect effect | Mediation | Mediation |
|  |  |  | a | b | c | c' | a x b | % | Type |
| BMIz-GFS-Cogn | Model 1 | 912 | -1.24\* (-1.41, -1.07) | 0.17\* (0.06, 0.28) | -0.47\* (-0.77, -0.18) | -0.27 (-0.59, 0.06) | -0.21\* (-0.35, -0.07) | 43.5% | (FM)Indirect only |
|  | Model 2 | 912 | -1.17\* (-1.34, -1.00) | 0.11\* (0.00, 0.23) | -0.36\* (-0.66, -0.07) | -0.23 (-0.55, 0.09) | -0.13 (-0.27, 0.00) | 36.9% | (NM) No effect |
| BMIz-CRF-Cogn | Model 1 | 962 | -0.32\* (-0.37, -0.26) | 0.48\* (0.16, 0.80) | -0.47\* (-0.75, -0.19) | -0.32\* (-0.62, -0.02) | -0.15\* (-0.27, -0.05) | 32.5% | (PM)Complementary |
|  | Model 2 | 962 | -0.30\* (-0.36, -0.25) | 0.35\* (0.03, 0.67) | -0.36\* (-0.65, -0.08) | -0.26 (-0.56, 0.04) | -0.11\* (-0.21, -0.01) | 29.0% | (FM)Indirect only |
| BMIz-MF-Cogn | Model 1 | 975 | -0.72\* (-0.81, -0.63) | 0.17 (-0.03, 0.37) | -0.46\* (-0.75, -0.18) | -0.34\* (-0.66, -0.02) | -0.12 (-0.26, 0.02) | 26.3% | (NM)Direct only |
|  | Model 2 | 975 | -0.68\* (-0.77, -0.59) | 0.05 (-0.16, 0.25) | -0.34\* (-0.62, -0.06) | -0.31 (-0.62, 0.01) | -0.03 (-0.17, 0.11) | 9.7% | (NM)No effect |
| BMIz-SAF-Cogn | Model 1 | 970 | -0.19\* (-0.25, -0.14) | 0.45\* (0.14, 0.76) | -0.44\* (-0.73, -0.16) | -0.36\* (-0.65, -0.07) | -0.09\* (-0.16, -0.03) | 19.7% | (PM)Complementary |
|  | Model 2 | 970 | -0.19\* (-0.24, -0.13) | 0.39\* (0.08, 0.69) | -0.33\* (-0.61, -0.04) | -0.26 (-0.54, 0.03) | -0.07\* (-0.14, -0.02) | 22.0% | (FM)Indirect only |

*BMIz: Body Mass Index (zscore); CRF: Cardiorespiratory Fitness; MF: Muscular Fitness; SAF: Speed-Agility Fitness; GFS: Global Fitness Score; Cogn: Cognition; SVI: School Vulnerability Index. Model 1: Adjusted for sex and PHV; Model 2: Adjusted Model 1 + SVI. \*p-value <0.05; FM: full mediation; NM: no mediation; PM: partial mediation.*