

Midlife moderate and vigorous physical activity levels associated with brain power

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The amount of time spent in moderate and vigorous physical activity every day is linked to midlife brain power, indicates research published online in the *Journal of Epidemiology & Community Health*.

This [intensity](#) level seems to be the best for working memory and [mental processes](#), such as planning and organization, and replacing it with just 6-7 minutes of light intensity activity or [sedentary behavior](#) every day is associated with poorer cognitive performance, the findings indicate.

Previously published studies link daily moderate and [vigorous physical activity](#) (MVPA) to health, but few have included time spent asleep, which makes up the largest component of any 24 hour period, say the researchers. They therefore adopted a compositional approach to discern whether MVPA relative to all other daily movement behaviors might be best for midlife cognitive performance.

They drew on participants in the 1970 British Cohort Study, which included people born across England, Scotland, and Wales in 1970 whose health was tracked throughout childhood and adulthood.

From 2016 to 2018, 8,581 participants had reached the ages of 46 and 47, at which point they were asked to fill in detailed health, background, and lifestyle questionnaires, and to wear an activity tracker for up to 7 days and for at least 10 consecutive hours a day.

They took various cognitive tests for verbal memory (immediate and delayed word recall tasks) and executive function (verbal fluency and processing speed/accuracy). Scores for each test were calculated produce an overall global score for memory and executive function.

Among those who agreed to wear activity trackers, 2,959 participants were excluded due to device error, insufficient wear time, or failing to fully complete the questionnaires.

The final analysis included 4,481 participants, just over half of whom (52%) were women. Two-thirds (66%) were married and 43% were educated up to the age of 18. Over two-thirds (68%) were occasional or

non-risky drinkers and half had never smoked.

Analysis of the activity tracker data showed that participants clocked up an average of 51 minutes of MVPA, 5 hours 42 minutes of light intensity physical activity, 9 hours 16 minutes of sedentary behaviors, and 8 hours 11 minutes of sleep over a 24 hour period.

Time spent in MVPA relative to other types of behavior was positively associated with cognitive performance after adjusting for educational attainment and workplace physical activity. But additional adjustment for health issues weakened these associations.

Sedentary behavior relative to sleep and light physical intensity activity was also positively associated with cognitive performance, a trend that likely reflects greater engagement in cognitively stimulating activities such as reading or working rather than any apparent benefit from watching TV, note the researchers.

The associations were stronger for executive function than they were for memory.

Compared with the average across the sample, participants in the upper half of cognitive performance scores spent more time in MVPA and sedentary behaviors and less time sleeping, while the lowest 25% of scorers clocked up the most light intensity physical activity.

To better understand the joint associations of movement with cognition, the researchers reallocated time from one component to another, minute by minute, to estimate what impact this might have on global cognitive performance scores.

This revealed increases in scores after MVPA theoretically displaced other activities.

Individuals' cognition showed a 1.31% improvement in cognition ranking compared to the sample average improvement after as little as 9 minutes of sedentary activities with more vigorous activities—a positive trend that became far more substantive with much greater reductions in sedentary activities.

Similarly, there was a 1.27% improvement from replacing gentle activities or 1.2% from replacing 7 minutes of sleep. Such improvements showed further improvement with greater exchanges of time.

Sedentary behavior was also favorable for cognition score, but only after substituting it for 37 minutes of light intensity physical activity or 56 minutes of sleep.

Participants began theoretically declining in their cognition ranking within the study sample by 1-2% after just 8 minutes of more vigorous activity was replaced by sedentary activities. Ranking continued to decline with greater declines in MVPA.

Similarly, replacing vigorous activities with 6 minutes of light intensity [physical activity](#) or 7 minutes of sleep was linked with similar falls of 1-2% in cognition ranking, again worsening for greater losses of MVPA.

The activity trackers can only capture time spent in bed rather than sleep duration or quality, which might help to explain the association with sleep, say the researchers.

"MVPA is typically the smallest proportion of the day in real terms, and the most difficult intensity to acquire. Perhaps partly for this reason, loss of any MVPA time whatsoever appeared detrimental, even within this relatively active cohort," they explain.

This is an observational study, and as such, can't establish cause. The researchers highlight various caveats: Activity tracker measures can't provide context for each component of movement. Despite a large sample size, people of color were underrepresented, limiting the generalizability of the findings.

Nevertheless, they conclude, "This robust method corroborates a critical role for MVPA in supporting cognition, and efforts should be made to bolster this component of daily movement."

More information: Exploring the associations of daily movement behaviours and mid-life cognition: a compositional analysis of the 1970 British Cohort Study, *Journal of Epidemiology & Community Health* (2023). [DOI: 10.1136/jech-2022-219829](https://doi.org/10.1136/jech-2022-219829)

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