

Moderate-to-high TV viewing in midlife linked to later cognitive and brain health decline

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Spending moderate to high amounts of time watching television throughout midlife was linked to greater cognitive decline and lower gray matter volumes in the brain later in life, according to preliminary research from three studies (P149, MP24 and MP67) to be presented at the American Heart Association's Epidemiology, Prevention, Lifestyle & Cardiometabolic Health Conference 2021 (EPI).

"While studies have shown the benefits of exercise to support [brain health](#), less is known about the potential consequences of prolonged sedentary behavior such as television viewing on brain structure and function. This is important to look at because other studies have shown that physical activity and sedentary behaviors may have different effects on health and disease," said Kelley Pettee Gabriel, M.S., Ph.D., FAHA, lead author of one of the studies and a professor of epidemiology in the School of Public Health at the University of Alabama at Birmingham. "Engaging in healthy behaviors during midlife, between ages 45 to 64 years in the context of our study, may be [important factors](#) to support a healthy brain later in life."

Cognition includes one's abilities to remember, think, reason, communicate and solve problems. Life expectancy is increasing in the United States, which experts believe will likely be associated with an increase in the prevalence of cognitive impairment and dementia. An aging population with multiple factors that do not support a healthy brain may lead to an increased number of people with dementia. Worldwide, more than 7 million new dementia cases are diagnosed annually. By 2050, the prevalence of dementia is expected to increase by 116% in high-income countries and 264% in low-income countries.

"There are currently no medications available to cure or stop dementia. However, a recent report showed that nearly 40% of worldwide dementia diagnoses may be prevented or delayed by modifying twelve [risk factors](#) including exercise," said lead author of the second study

Priya Palta, Ph.D., M.H.S., assistant professor of medical sciences and epidemiology at Columbia University Vagelos College of Physicians and Surgeons in New York City.

To better understand the effects of sedentary behavior during midlife on brain health, Palta and Gabriel led teams to examine television viewing information collected in midlife from a subset of participants from the Atherosclerosis Risk in Communities (ARIC) Study and the ARIC Neurocognitive Study (NCS). Participants were asked how much they watched television in leisure time. The self-reported responses were not based on specific hours or amounts of time, but whether they: never or seldom watched TV (low), sometimes watched TV (medium/moderate) or often/very often watched TV (high). Palta's study focused on cognitive decline and risk of dementia, while Gabriel's study focused on structural brain markers from brain imaging scans.

Palta's study (P149—Sedentary Behavior In Mid-life And Risk Of Change In Global Cognitive Function And Incident Dementia: The Atherosclerosis Risk In Communities Neurocognitive Study/ARIC-NCS) included 10,700 adults. All participants (mean age of 59 years, 44% male, 19% Black people) provided self-reported assessments of television viewing at Visit 1 (1987-1989) and Visit 3 (1993-1995) to detail their level of television viewing each time. Over that time, 6,463 participants reported persistence in their television viewing, meaning they reported no change in their television viewing habits at visits 1 and 3. They received additional cognitive tests of working memory, language and executive function/processing speed, administered at Visit 4 (1996-1998) and Visit 5 (2011-2013).

In this study, the researchers found:

- Compared to people reporting that they never or seldom (low viewing) watched TV, participants reporting that they sometimes

(moderate viewing) or often/very often (high viewing) watched TV had a 6.9% greater decline in cognitive function over 15 years, suggesting worse changes in performance on cognitive tests over the course of the study.

- High amounts of television viewing were not notably associated with a higher dementia risk.
- Participants' reported physical activity and exercise habits did not appear to alter the relationship between time spent watching television during midlife and changes in cognitive function and risk of dementia.

Gabriel's study (MP24—Sedentary Behavior In Mid-life And Structural Brain Magnetic Resonance Imaging Markers Of Cerebrovascular Disease And Neurodegeneration In Late-life: The Atherosclerosis Risk In Communities Neurocognitive Study ARIC/NCS) included 1,601 adults. All participants (mean age of 76.2 years, 60.5% female, 27.2% Black adults) self-reported their level of television viewing at Visit 1 and Visit 3 (seldom/never, sometimes or often/very often) and then underwent a magnetic resonance imaging (MRI) scan of the brain at Visit 5. Of this group, 971 people reported persistent levels of television viewing at Visit 1 and Visit 3, and they were included in the final analysis to determine how sedentary behavior may have affected brain structure measures. Using the brain MRI scans, researchers looked at several structural brain markers, including deep gray matter volume in the brain of each participant. Gray matter is the darker tissue of the brain and spinal cord and it is involved in muscle control, seeing and hearing, decision-making and other important brain functions. The higher a person's volume of brain gray matter, the better cognitive skills they typically have.

In this study, researchers found:

- Compared to participants who said they never or seldom (low

viewing) watched TV during midlife, those who said they sometimes (moderate viewing) or often/very often (high viewing) watched TV had lower volumes of deep gray matter more than a decade later in life, which indicates greater brain atrophy or deterioration.

- The association with the level of TV watching to brain gray matter was greater with persistent television viewing throughout midlife. Specifically, compared to people who said they never or seldom watched TV at both Visit 1 and Visit 3, people who reported they sometimes or often/very often watched TV at both of those visits had lower volumes of deep gray matter in late life.
- The participants' self-reported physical activity and exercise habits did not change the associations between the level of television viewing during midlife with brain structure measures of gray matter.

"Our findings suggest that the amount of television viewing, a type of sedentary behavior, may be related to cognitive decline and imaging markers of brain health. Therefore, reducing sedentary behaviors, such as television viewing, may be an important lifestyle modification target to support optimal brain health," Palta said.

"In the context of cognitive and brain health, not all sedentary behaviors are equal; non-stimulating sedentary activities such as television viewing are linked to greater risk of developing cognitive impairment, whereas cognitively stimulating sedentary activities (e.g., reading, computer and board games) are associated with maintained cognition and reduced likelihood of dementia," said the lead author of the third study Ryan Dougherty, M.S., Ph.D., a postdoctoral fellow in the department of epidemiology at the Johns Hopkins Bloomberg School of public health in Baltimore, Maryland. "Considering the contextual differences in varying sedentary behaviors is critical when investigating cognitive and brain health."

Dougherty's study (MP 67—Long-term TV Viewing Is Associated With Gray Matter Brain Volume In Midlife: The Coronary Artery Risk Development In Young Adults (CARDIA) Study) also found a correlation between television viewing and the volume of gray matter in the brain. In this ancillary study to the CARDIA Brain MRI Substudy, investigators evaluated data from the Coronary Artery Risk Development in Young Adults (CARDIA) study, a longitudinal study which began in 1985-86 with 5,115 people from four U.S. cities (Birmingham, Ala.; Chicago, Ill.; Minneapolis, Minn. and Oakland, Calif.).

The substudy of 599 participants (mean age of 30 at baseline and 50 at follow-up; 306 females; 264 Black Americans) from three of the original cities (Birmingham, Minneapolis and Oakland), launched five years into the CARDIA study. During the 20-year substudy period, (1990-91 to 2010-11), participants took part in follow-up visits every five years, during which they were asked the average number of hours per day spent viewing television over the previous 12 months.

Dougherty noted that television viewing patterns were stable over time. His team calculated the mean television viewing time over the 20-year period for each participant to assess long-term patterns of television viewing time as a proxy for the amount of sedentary activity time.

Twenty years into the substudy (2010-11) MRI scans were taken to assess structural measures of gray matter in the brain. The researchers found:

- Greater television viewing in early to mid-adulthood was associated with lower gray matter volume.
- Considering the effect estimates, a one-hour greater mean television time was associated with approximately a 0.5% reduction in gray matter volume which is similar to the annual

rate of atrophy throughout mid-late adulthood, Dougherty noted.

- As with Gabriel's study, the participants' physical activity and exercise habits did not impact the association between the level of television viewing during midlife with brain structure measures of gray matter.

"In our findings, television viewing remained associated with cognitive function and gray matter volume after accounting for [physical activity](#), suggesting that this sedentary behavior may impart a unique risk with respect to brain and cognitive health," Dougherty said. "This is an important finding since it is now well accepted that the neurobiology of dementia including brain atrophy begins during midlife. That's a period where modifiable behaviors such as excessive television viewing can be targeted and reduced to promote healthy brain aging."

The three researchers agreed there is a need to identify modifiable behaviors, such as excessive television viewing, that may be targeted prior to the development of cognitive impairment. Promoting healthy brain aging is important, particularly given current trends in television viewing and binge-watching behaviors.

Limitations of these studies are that television viewing was based on participant reporting, which may not be accurate. Television viewing is only one type of sedentary behavior and provides an incomplete picture of total sedentary time.

"This research is very timely and important in the midst of the current COVID-19 pandemic because we know people are spending more time engaging in sedentary behaviors such as watching [television](#) while being in quarantine," said American Heart Association President Mitchell S.V. Elkind, M.D., M.S., FAHA, FAAN, professor of neurology and epidemiology at Vagelos College of Physicians and Surgeons and the Mailman School of Public Health, and attending neurologist at New

York-Presbyterian/Columbia University Irving Medical Center. "These are interesting correlations among [television viewing](#), cognitive decline and [brain structure](#). Television viewing is just one type of [sedentary behavior](#) yet it's very easy to modify and could make a big difference in maintaining and improving [brain](#) health."

Provided by American Heart Association

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