



Social Determinants of Health and Dementia Risk: Education

What Is Already Known

A variety of facets of an individual's health, well-being, and life have been linked to an individual's education, including income, employment, socioeconomic status, housing, prevalence of certain health conditions, and access to health care. Aspects of education as a social determinant of health include the level of educational attainment, the quality of education received, and literacy.

Background and Evidence Base

Years of Formal Education

Studies have long demonstrated that people with more years of formal education – years of schooling in a classroom-based setting taught by professionally trained teachers – are at lower risk for Alzheimer's and other dementias than those with fewer years of formal education. It is important to note that there is no universal, standard definition of low education, meaning there may be inconsistency in definition and measure of education across many of these studies evaluating education and dementia risk. A systematic review published in 2011 found that a majority of the 88 studies examined reported significant effects of lower education on risk for dementia. A meta-analysis concluded that compared with a higher level of education, lower education increases the relative risk of dementia (1.59), especially Alzheimer's dementia (1.80).

An analysis of data from the Harmonized Cognitive Assessment Protocol, a subset of the nationally-representative Health and Retirement Study (HRS), found that each additional year of education was associated with a decreased risk of dementia and concluded that those with lower education bear a disproportionate burden of dementia (along with Black and Hispanic adults). Even among those with a higher genetic risk of developing Alzheimer's disease, higher levels of education decreased the risk.

The benefits of educational attainment on risk for dementia can also be seen at the population level. In 1947, the United Kingdom increased mandatory schooling from age 14 to age 15. A study of the British population showed that the population cohort affected by the policy change (an additional year of mandatory

schooling) had less memory decline and better executive function as they aged compared with those not subject to the policy change. Similarly, in the United States, using data from White participants in the HRS born between 1900 and 1947 who did not attend college, researchers found that populations that were subject to increases in state compulsory schooling laws – and thus were required to attend school for longer – had greater improvements in memory and overall cognition in older age, even after adjusting for sex, birth year, state of birth, and state characteristics. Using a more diverse population from the Washington Heights Inwood Columbia Aging Project (WHICAP), study participants born after 1920 – who had more exposure and access to education than those born before 1920 – were found to have had less memory decline as they aged.

In fact, large improvements in educational attainment (high school graduation rates and college attendance), particularly among women, are frequently cited as one possible reason for a decline in the rates of dementia incidence and prevalence in certain population cohorts since the 1970s.

In the WHICAP study, the difference between those born before and after 1920 was particularly evident among Black Americans. At the same time, however, evidence has also shown that years of education may not have the same impact on risk for developing dementia across all populations. For example, the WHICAP data also show that White participants saw greater benefits to indicators of brain integrity with more years of formal education than Black and Hispanic Americans.

Educational Quality

This possible discrepancy in the effect of years of formal education on dementia risk between different racial and ethnic groups has led many to suggest that another key factor may be the quality of education an individual receives.

Project Talent – a large, nationally-representative cohort study – found that students who attended higher quality high schools, particularly schools with a higher number of teachers with graduate training, had greater cognitive abilities nearly six decades later. The study noted that Black students disproportionately attended lower-quality schools, thus potentially explaining at least



some of the difference in education as a protective factor against dementia.

Why Education May Be Protective

Many researchers believe that formal education is protective against Alzheimer's and other dementias not because it prevents the development of pathological brain changes but through a process known as "cognitive reserve." Under this theory, formal education builds the brain's ability to make flexible and efficient use of cognitive networks that allow an individual to continue to carry out cognitive tasks notwithstanding pathological changes to the brain. Recent research that has incorporated technological advances to measure Alzheimer's disease biomarkers suggests that education levels do not have an effect on the development of Alzheimer's brain changes but rather that formal education may help sustain cognitive function in mid- and late-life and delay the development of symptoms.

Literacy

Literacy is also associated with later life cognition. Among older adults in WHICAP who had fewer than five years of formal schooling, those who were illiterate were significantly more likely to have dementia and develop dementia than those who were literate. It did not, however, affect the rate of cognitive decline.

Implications for Public Health

Drop-out prevention programs and initiatives to increase accessibility and affordability of post-secondary education can help individuals attain more years of formal education. Addressing the quality of education – equalizing educational opportunities – is more difficult and requires some re-thinking. Most public schools remain primarily funded by local property taxes, which means the quality of the years of education received are likely linked to local socioeconomic conditions. And while state and federal funding or other programs look to diminish these disparities, they may be tied to expectations that schools in disadvantaged neighborhoods implement programs that were successful in entirely different contexts.

Discussion

The evidence on education as a protective factor for dementia is robust. It is also complicated. Having fewer years of formal education is associated with lower socioeconomic status (SES), which in turn has many

effects on a person's health that may be relevant to dementia risk. Lower SES is associated with less physical activity, a higher risk of diabetes, a greater prevalence of hypertension, and being more likely to smoke – all of which are risk factors for cognitive decline and possibly dementia. Lower SES may decrease one's access to, and ability to afford, heart-healthy foods that support brain health; decrease a person's ability to afford health care or medical treatments, such as treatments for cardiovascular risk factors that are closely linked to brain health; and increase the likelihood that an individual lives in a neighborhood with greater exposure to toxic substances that may affect brain health such as air pollution. In addition, higher levels of education have been linked to stronger social networks, which can increase access to information about health-protecting resources.

At the end of the day, fewer years of formal education likely plays both a direct and indirect role in dementia risk: directly as an independent risk factor for dementia; and indirectly by influencing a person's socioeconomic status, which in turn is associated with other risk factors for cognitive decline and dementia. Educational attainment, the quality of education, and SES all reflect inequities in how individuals and populations are treated and have been treated over time.

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