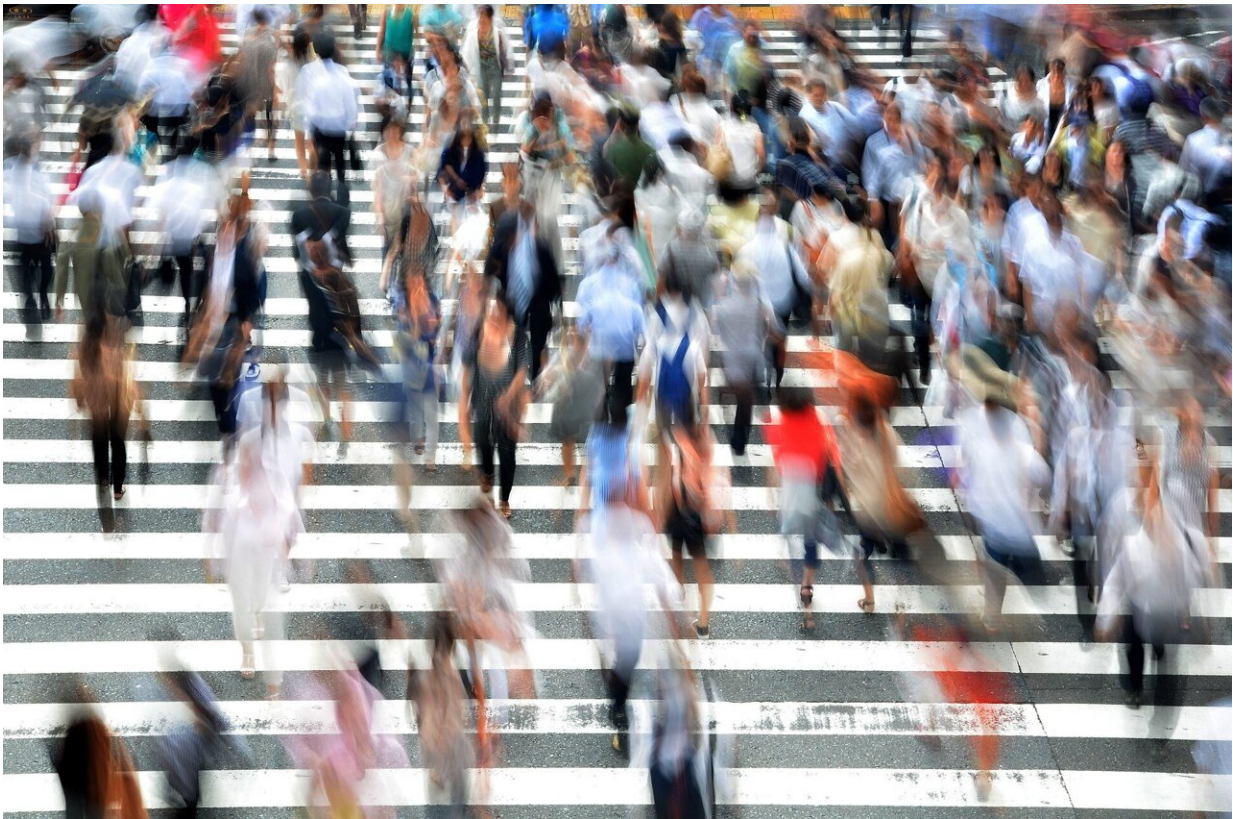# Medical Xpress

Interplay of sex, marital status, education, race linked to 18 year US lifespan gap

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The interplay of a quartet of sex, marital status, education, and race is linked to an 18 year lifespan gap for US citizens, and while no one factor is more influential than any of the others, the more of these influential

factors a person has, the higher their risk of an earlier death, finds research published in the open access journal *BMJ Open*.

But a simple scoring system based on these characteristics can help overcome this complexity to identify those most at risk, say the researchers.

Individual risks and genetic factors explain part of the differences in health and death, but the evidence increasingly points to the role of social determinants—the conditions in which people are born, grow, live, work and age—in shaping health, explain the researchers.

But when it comes to identifying those groups at high risk of early death, using only one of these factors often masks wide lifespan inequalities within these groups, and various factors influence health in different ways, making it difficult to identify a person at risk, they add.

To better understand how these inequalities act in tandem with one another, and to identify people at high risk of an early death from all, and specific, causes more accurately, the researchers looked at lifespan differences associated with four key social determinants, with the aim of drawing up a scoring system.

They extracted information on registered deaths and population numbers from national statistics and census data for the period 2015–19, to analyze the potential influence of all combinations of sex, race, marital status, and education level on the risk of early death—54 different groups in total.

They included 12 specific causes of death, representing the 11 leading causes of death in the US, to include homicide and lung, breast, prostate, and other cancers.

The final analysis is based on partial life expectancy—years lived between the ages of 30 and 80. This revealed very large differences between the 54 groups, with an 18 year difference between those with the shortest and longest partial life expectancies.

For example, white men with a high school diploma or less, who have never married have the shortest partial life expectancy of 37 years. At the other end of the scale, white married women with a university degree can expect to clock up 55 years in partial life expectancy.

But no one factor conferred a clear advantage to all people equally, the researchers found.

For example, university-educated white married men have a partial life expectancy of 52 years, which is higher than that of 81% of all the female groups (22 out of 27). Similarly, some groups with low educational attainment outlive some with high educational attainment.

And married Hispanic women educated to high school level or below have a partial life expectancy of 51 years, which is higher than 44% of the groups characterized by a university degree (eight out of 18).

And a characteristic that curtails partial life expectancy can be offset by a characteristic that extends it, and vice versa, say the researchers.

For example, education to high school level or below reduces partial life expectancy by nearly four years, but being married and female increases it by almost five years, bringing the life expectancy of married women with this level of educational attainment above the national level.

And while a university degree extends partial life expectancy by nearly four years, never being married and male sex shortens it by nearly five years, bringing it below the national level.

Based on these findings, the researchers developed a scoring system, ranging from –10 to a maximum of 8, for identifying groups at high risk of early death across the four social determinants of health.

Being female (score of 4), and married (0), white (1) and educated to high school level or less (–5) yields a total score of 0. Around half of the 54 groups score 0 or above and nearly one in five (19%) –5 or lower.

While not everyone in low scoring groups will die early, people in these groups might be at heightened risk, and so might need more medical or public health interventions, explain the researchers.

Marriage and higher educational attainment are two characteristics that always confer lower risk, but the gradient isn't as obvious for race. Some specific causes of death, such as suicide, unintentional injuries, chronic lung disease and lung cancer adversely affect more Whites, while others, such as liver disease, adversely affect more Hispanics.

Most causes of death tend to adversely affect Blacks across the board. And women generally have a survival advantage over men for all causes of death, except for other cancers and Alzheimer's disease.

But different social determinants of health affect each cause of death differently, as a result of which, the causes of death contributing to the mortality disadvantage vary across the 54 groups, even if the overall score is the same, the researchers found.

For example, white previously-married women with a high school degree or less are at high risk of dying from lung cancer, other cancers, chronic lung disease, Alzheimer's disease, kidney disease, and influenza and pneumonia.

And Black never-married men with a university degree are at higher risk

of dying from heart disease, prostate cancer, cerebrovascular diseases, diabetes, kidney disease and homicide. Both these groups have an overall risk score of −3.

The researchers acknowledge that the scoring system could oversimplify underlying factors at play. Marital status is also prone to change. And including more characteristics, such as income, residential area, environmental factors, access to health care, or lifestyle could enhance the scoring system's precision, they suggest.

But they nevertheless conclude, "There is a complex interaction between social and individual determinants of health, with no one determinant explaining the full observed variation in lifespan.

"Having one characteristic that is associated with higher mortality is often not a sufficient criterion to be considered at high risk of mortality, but the risk does increase with the number of such characteristics. In addition, not all analyzed social determinants of health have the same degree of influence on lifespan and mortality."

More information: Inequalities in lifespan and mortality risk in the US, 2015–2019: a cross sectional analysis of subpopulations by social determinants of health, *BMJ Open* (2024). DOI: 10.1136/bmjopen-2023-079534

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