Amish Men Live Longer

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Abstract: This study examines differences in the longevity of Amish men compared to the men within the general population of the United States. Data for this analysis comes from the 1965 Ohio Amish directory, specifically the birth and death dates of men from the Holmes County settlement. Amish men's longevity is compared with the white men of Ohio based on life tables published online by the Social Security Administration. Amish men live an average of five years longer than white men of Ohio, and Amish farmers outlive Amish non-farmers. When the findings are considered with published research on Amish work practices, we concluded that the remarkable longevity of Amish men might be attributed to their exceptional level of physical activity.

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Introduction

A mark of Western modernity has been an emphasis on mechanization and labor-saving devices. The emphasis is on efficiency; that is, producing more with less effort. Automation has replaced human effort to a significant extent. Electricity has been extremely versatile in enabling automation, such as in factories with much labor-saving equipment for greater production with less human effort. Moreover, farming today is highly mechanized to produce more with minimum human input. Across the industrialized world, an ethos exists that sees labor-intensive operations as antiquated, while labor-saving devices are highly favored. Hard work is not esteemed, while leisure and recreation are valued. Many individuals, even when fully employed, are required to exert little physical effort to complete their jobs and still have an abundance of free time. Meanwhile, some observers believe that aspects of human well-being have been lost as a result of the labor-automation movement. Work involving physical effort has health-related benefits, and in place of hard work in the farm fields or factories of the past, physical fitness has taken on great importance in many parts of modern society. Physical fitness centers are important establishments today to recover the health value of physical effort.

In the Amish communities of North America, a different ethos prevailed—and in many places still prevails—one that holds physical labor as honorable and desirable, recreation in lower esteem, and idle time as decadent. The value of hard work has been part of the Anabaptist faith since its early generations in sixteenth-century Europe and including its Amish offshoot in 1693.



Anabaptists developed a sense that, through their close relation to the soil, they are in harmony with the Creator of all things. Tilling the soil has become a "moral imperative" for the Amish. Ericksen et al. (1980) discussed how the imperative of farming relates to the faith of the Amish and how it contributes to their community cohesion.

Amish men generally have a different lifestyle compared with non-Amish men (Kraybill et al., 2013, pp. 275–276, 335–336). During the lifespans of the Amish men in this study (those from the 1965 Ohio Amish directory), mixed farming was the preferred occupation of the Amish, which was largely continuous with their European history. In the twentieth century, the Amish made limited use of tractors and labor-saving technology, and the Amish way of farming entailed much physical labor. The Amish consider hard work and long hours honorable and not to be avoided. The limited amount of technology that the Amish have accepted along the way was more for the purpose of increasing production and not reducing their workload (author's personal observation).

The lifestyle of the Amish differs in many ways from the lifestyle of the broader American society. One could argue that there are negative factors that are part of the Amish lifestyle that distract from optimal health and well-being, but there are also positive aspects that might enhance health and well-being. What is the net effect of these factors on the lifelong well-being and longevity of the Amish? In an attempt to evaluate that effect, we studied the lifespans of Amish men and compared the results with the lifespans of their non-Amish counterparts.

Data and Methods

The Amish men used for this study were the married men listed in the 1965 Holmes County, Ohio, Amish directory (Cross & Gingerich, 1965). The directory includes 1,973 married Amish men and their spouses and children, plus 18 single men. The demographic data include birth dates of all family members but no death dates except in a few cases where the husband died and the widow lived long enough to be included in the 1965 directory. Death data for the Amish men had to be collected from other sources, including the Ohio Amish directories of 1973, 1981, 1988, 1996, and 2010; a few Amish genealogies published in recent years; funeral notices available on the internet, and the online SAGA files. The death data for 1,527 men were found and became available for analysis. The remainder (446) included those who might still be alive and those whose death dates could not be found in any of the available resources.

The average age of marriage for Amish men is reported to be 22 years, and most live to be 75 to 85 years old (Kraybill et al., 2013, p. 233). Therefore, most of the men listed as household heads in the 1965 directory would have been born by about 1943 but may have been born in 1880 or earlier. First, it was determined how many Amish men had reached the age of 25. From that number, the number who survived to their thirty-fifth birthday was determined, then those who survived to their forty-fifth, fifty-fifth, sixty-fifth, seventy-fifth, and finally, their eighty-fifth birthday. These calculations were completed for cohorts of men born during 1895–1904, 1905–1914, 1915–1924,

¹ SAGA (<u>https://www.saga-omii.org/</u>) is the Swiss Anabaptist Genealogy Society of Kidron, Ohio. The organization's website includes 62 databases, which contain over 7 million records. Membership is required to access the data. This research project made intensive use of this resource.

and 1925–1934. A decade's worth of death dates was pooled in order to achieve robust numbers for analyses.

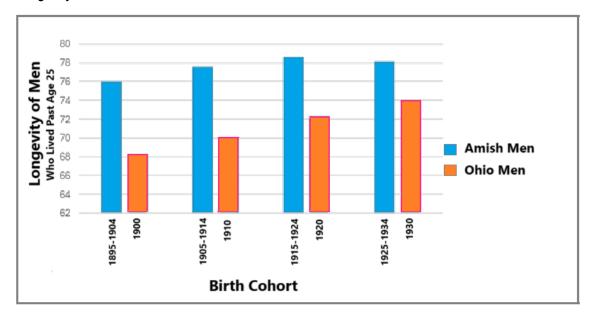
For a comparison group, survival data for white men of Ohio was collected from Social Security Administration life tables (Bell & Miller, 2009). The life tables begin with all live births and report on those who survive at five-year intervals. In order to make this data on Ohio men equivalent to the data on Amish men, the number of men surviving past age 25 was set to 100%, and the percentage of those who survived to ages 35, 45, 55, etc., were then calculated as percentages of those surviving past age 25.

Cohort data must be used to calculate longevity in this kind of study, although period data are more readily available. Cohort data refers to the data of a group (cohort) of people (always the same people) who are followed all through their lives, whereas period data is based on deaths if they occurred at *this year's* rate and projected forward. Cohort data is, of course, available only after the deaths have occurred and can be calculated "in hindsight" only, but it is accurate. Period data can be calculated into the future, although only approximately because death rates are estimated by using the current year's rates. Cohort data and period data are expertly discussed by Dattani (2023).

Results

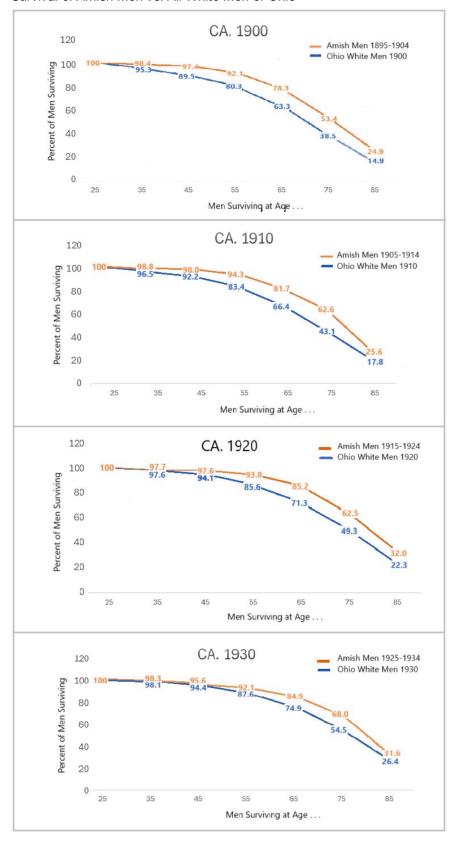
Amish men born between 1895 and 1934 who lived past their twenty-fifth birthday had an average lifespan of 76.3 years, compared with the white men of Ohio of the same age category, who had an average lifespan of 71.3 years, for a difference of five years. The Ohio men's lifespans were determined using cohort life tables from an internet website (Bell & Miller, 2009). The life expectancies were calculated for those born in 1900, 1910, 1920, and 1930, adjusted for the increase in population of each decade, and averaged.

Figure 1
Longevity of Amish Men and White Men of Ohio over Four Decades



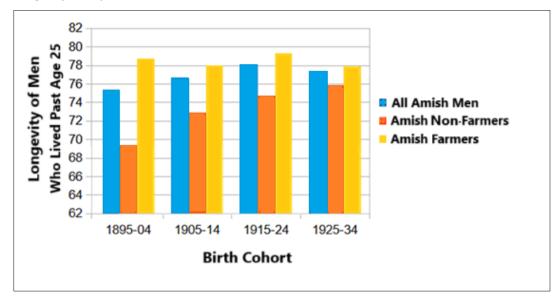
The survival curves for birth cohorts of Amish men in the four decades following 1900 are shown in Figure 2. The survival rate of the Amish men was decidedly better than the survival rate of all white men of Ohio. For those four decades, the difference between Amish men and Ohio men who survived past age 65 remained nearly stable at around 10 to 15 years.

Figure 2
Survival of Amish Men vs. All White Men of Ohio



Amish men who were reported to be farmers in the 1965 directory lived longer than Amish men whose occupation was reported to be other than farming. As shown in Figure 3, for the cohort born between 1895 and 1904, the difference is-nine years, although this difference dropped in more recent decades to about two years.

Figure 3
Longevity Comparison: Amish Farmers with Amish Non-Farmers



Discussion

We studied the lifespans of the Amish men who lived past their twenty-fifth birthday. The life expectancy at birth of Holmes County Amish men could not be calculated because the death data for Amish infants is not reliable. The vital data are not clear about whether a newborn was a live birth or a stillbirth. Therefore, the lifespans of those men who survived past the age of 25 was used rather than life expectancy at birth.

In the present study, the Amish male population was compared with the entire population of white men in Ohio. Arguably, a comparison with the Ohio *rural* population would have been more appropriate since a substantial portion of Ohio's population is urban and the Amish are entirely rural. However, rural versus urban tabulations for individual states do not exist, and in any case, rural and urban life expectancy had been virtually equal until roughly 1990. Only since then did rural life expectancy begin lagging behind urban life expectancy (Singh & Siahpush, 2014; Abrams et al., 2021); therefore, the validity of the present study should not have been compromised by using the entire white male population of Ohio for comparison.

The Amish have a cautious attitude toward modern medicine, resulting in lower utilization of conventional health care, and they have a greater dependence on complementary and alternative healing practices than the general public does. They are sometimes skittish about vaccines, especially childhood vaccinations (Kraybill et al., 2013, p. 345; Scott et al., 2021). They limit their education to the eighth grade, and as might be expected, they have a lower level of knowledge of

medicine and health care. Therefore, they are unable to critically evaluate various health practices and sometimes engage in questionable health practices (Kraybill et al., 2013, pp. 335–336). In considering these negative attributes, one might expect Amish men to have poorer health and shorter lifespans than their non-Amish counterparts. Yet the opposite appears to be true. In this article, we showed that the Holmes County, Ohio, Amish men live significantly longer and enjoy greater health and longevity than the overall white male population of Ohio. So how shall we account for this counterintuitive situation?

Research extensively demonstrates that exercise promotes health and longevity (McPhee et al., 2012), effectively mitigating the negative impact of the low educational attainment of the Amish. In a previous study, Mitchell et al. (2012) have shown that the Amish men of Lancaster County, Pennsylvania, work harder and, on average, live three years longer than men in the general population. The present study demonstrates that Amish men of the Holmes County, Ohio, settlement also live longer than their white male counterparts. The question arises whether this superior longevity is common to all Amish men. The survival curves in Figure 2 show no hint of change in this survival relationship for Amish men born during the first four decades of the twentieth century (or the lifespans of the men in the 1965 Ohio Amish directory).

In the Lancaster County study, the Amish men lived about three years longer than the non-Amish men (Mitchell et al., 2012), whereas our study found that the Holmes County Amish outlive their white male counterparts of Ohio by five years. Even though both studies found that Amish men live longer, variation in the estimated differences in longevity between the Lancaster study and this study is likely due to the comparison groups. The Lancaster study included only men from Lancaster County, whereas this study's comparison group was based on Ohio state-level data from the Social Security Administration.

The effect of education on longevity is paradoxical in relation to the Amish. According to Case and Deaton (2021), on average a man with a bachelor's degree or higher will have a life expectancy of 10 years longer than a man without a high school education. The Amish attend neither high school nor college, and yet their longevity is far better than most non-Amish, non-high school graduates. The effect of education on the longevity of non-Amish persons is most likely mediated through higher income, or more favorable environmental conditions, better dietary practices, and easier access to medical services, but since these factors are not characteristics of Amish life, we must look for other factors to explain this paradox. The lifestyle of the Amish (low rates of smoking and drinking, and greater physical exercise from work) and their approach to hard work is more likely to convey the favorable longevity of Amish men and explain this paradox.

The Amish diet contains more food they produce on their farms and in their gardens compared with their non-Amish counterparts, suggesting a health advantage for the Amish. A study of the Holmes County Amish (Cuyun Carter et al., 2011) found that the Amish may lose the nutritional advantage they gain from consuming more of their homegrown food because they consume fewer vegetables and more saturated fats than their non-Amish neighbors. Thus, it is unlikely that their health and greater longevity can be attributed to superior dietary practices.

Traditional Amish Lifestyle and Fewer Debilitating Diseases

The Amish have lower cancer rates than their non-Amish counterparts (Cross et al., 1968; Miller, 1983; Hamman et al., 1981; Westman et al., 2010), except for breast cancer and juvenile leukemia (Troyer, 1988; Troyer, 1994). Overall, the age-adjusted rate for all cancers is 60% of the rate for the Ohio population (Westman et al., 2010). Tobacco use among the Amish, while not absent, is much lower than among the general public (Ferketich et al., 2008) and, as expected, in Ohio the Amish have only 37% tobacco-related cancers compared with the non-Amish in the state. The Amish rate of non-tobacco-related cancers is 72% of the rate for the Ohio non-Amish (Westman et al., 2010). Even skin cancer is lower among the Amish, even though, with their emphasis on agriculture and the concomitant sun exposure, we might have expected the opposite. Cervical cancer among the Amish women of Holmes County has been found to be significantly lower than among the surrounding non-Amish population (Cross et al., 1968). Lung cancer has been similarly studied among the Amish in Lancaster County, Pennsylvania, and it too was much lower among the Amish than among the non-Amish (Miller et al., 1983). Lower rates of cancer would remove some of the cancer mortality and would effectively increase Amish longevity.

Most chronic diseases are less common among the Amish than among the non-Amish. Amish young people are 3.3 times less likely than non-Amish people to be overweight (Hairston et al., 2013), and they have about half the prevalence of diabetes than non-Amish youth (Hsueh et al., 2000). Only about 10% of Amish schoolchildren have asthma and allergies, whereas 20% to 30% of Hutterite schoolchildren (with whom they have some commonality in terms of lifestyle) have allergic conditions (Ober et al., 2017; Holbreich et al., 2012). The difference is attributed to the different farming practices of the two communities. The Amish have family farms where young children are exposed to farm animals and manure, whereas the Hutterites have large communal farms operated with modern machinery and children are rarely exposed to animals and farm dirt. It is thought that early exposure to environmental microbes influences the immune system in a positive way. Cardiovascular diseases are higher among the Amish, which makes them the exception among diseases of the Amish (Gillum et al., 2010; Bielak et al., 2008).

The Amish Way of Farming Is Disappearing

Historically, the preferred Amish occupation has been farming—family farms engaged in mixed-crop agriculture using a minimum of modern mechanization. The Amish ethos continues to include a close relationship to the soil, making agriculture a natural fit. Horses are used for field work such as plowing and conditioning the soil for planting, grain is harvested with binders and threshed with old-fashioned threshing machines, and hay is harvested and stored as loose hay. That leads us to suspect that the Amish work harder than their non-Amish neighbors. However, the work patterns of the Holmes County Amish have changed in recent years. Milkers powered by diesel engines are now generally allowed, hay is baled with horse-drawn balers equipped with gasoline engines to power the baler mechanism, and field work is sometimes done with hired tractors. No-till farming practices have replaced plowing in many cases. Yet, for the period of this research (the bulk of the twentieth century), many of the old ways were solidly observed. Moreover, the percentage of

Amish households engaged in full-time farming today is a small fraction of the nearly universal farming of the mid-1960s (Kraybill et al., 2013, pp. 281–283).

In recent years, medical literature has extolled the health benefits of exercise. Physical exercise slows and even reverses muscle loss during aging (Melov et al., 2007). It also slows or reduces cardiovascular events (Eijsvogels et al., 2016), stroke (Hussain et al., 2018), hypertension (Juraschek et al., 2014), diabetes (Juraschek et al., 2015), and cancer (Vainshelboim, 2017). With its myriad of exercise-related health benefits, it is not surprising that moderate exercise increases longevity and reduces premature death (Paffenbarger et al., 1986; Wen et al., 2011). A little exercise provides a little benefit (as little as 15 minutes of physical activity a day can boost the lifespan by three years; Paffenbarger et al., 1986), much exercise plus clean living can result in a great deal of benefit, as much as 10 years of additional life (Fraser & Shavlik, 2001).

A study from Ohio State University established that the Amish work harder than their non-Amish neighbors (Katz et al., 2012). Amish individuals located in Holmes County, Ohio, were provided with pedometers for a period of time to record the number of steps they took in a day and the results were compared with the non-Amish people of the same area measured similarly. The Amish men averaged 11,447 steps per day and the non-Amish men averaged 7,605. In a smaller Amish community in southern Ontario, Amish men were also given pedometers to record the number of daily steps. Those Amish men took even more: 18,425 steps daily (Bassett et al., 2004). The Amish community values physical labor highly, which supports their model of labor-intensive farming and provides significant health benefits through natural and abundant exercise.

Amish Farmers Outlive Amish Non-Farmers

Amish men who are farmers live longer than Amish men who are not farmers, and from other studies (e.g., Katz et al., 2012), we learned that Amish farmers work harder (take more steps) than non-farming Amish men, which points to the inordinate emphasis on hard work and exercise being responsible for additional longevity. This observation reinforces our earlier conclusion that work and exercise are somehow directly or indirectly responsible for the extended longevity of Amish farmers. The difference is striking for the oldest cohorts of Amish men, although it is diminished in the more recent cohorts (Figure 3). The Amish way of farming is physically demanding and involves long hours of work six days a week. Even on Sundays, chores must be done.

In an attempt to understand this farmer-related variance, we could conceive that Amish men with serious physical limitations from illnesses or accidents might shy away from farming and seek less-demanding occupations. Those men would have shortened lifespans because of their suboptimal health. However, the fraction of Amish men with serious limitations is quite small (author's personal observation) and would not explain the difference.

Despite the Amish community's historically cautious approach toward adopting modern technology, some labor-saving innovations have gradually been accepted over time. These include grain-threshing machines, corn-husking machines, hay loaders, hay balers, motorized washing machines, motorized chainsaws, power lawn mowers, string trimmers, and running water systems. However, Amish farming practices have noticeably lagged behind mechanization in other lines of

Amish work, such as woodworking. It is possible that the intensive labor associated with Amish farming has become slightly less demanding over the past century, leading to a somewhat diminished, yet still significant, longevity advantage for the Amish population.

Amish community members are typically well-informed about one another. The details of one family's life become, in a sense, everybody else's business, because they genuinely care about one another; they live in what social scientists call a high context society (Hostetler, 1993; Kraybill et al., 2013). Bauermeister and Leary (1999) argued that the need to belong is a powerful human necessity. Numerous subsequent publications have addressed the health and well-being benefits of social cohesion. A robust social network is essential for maintaining good physical health and well-being (Valtorta et al., 2016). Furthermore, older individuals with weak social networks are at significant risk for cardiovascular diseases (Brummett et al., 2001; Bosworth et al., 1999). Additionally, Boss et al. (2015) found a correlation between loneliness and loss of cognitive function, a correlation validated by Lee et al. (2024), who demonstrated that cognitive loss is accompanied by a significant loss of the frontal lobe volume and the basal ganglia volume. We can safely assume that the Amish, with their tight-knit social structure, benefit massively from this well-established association between social cohesion and health and well-being benefits. They reject aspects of modernity that would distract from their tight social cohesion, which suggests that they intuitively grasp the significance of maintaining that cohesion.

CDC Validates Findings

The Centers for Disease Control and Prevention has developed a website showing the life expectancy of each of the country's census tracts (National Center for Health Statistics, 2018). Figure 4 is a modification of the CDC's image of Holmes County with the county's eight census tracts color-coded for life expectancies. The boundaries of the county's 14 townships are superimposed on the map, along with the percentage of the Amish population in each township.² Note that the CDC's life expectancy roughly coincides with the concentration of Amish residents.

² The data on Amish population is from an unpublished project. It is based on raw data derived from the 2010 Ohio Amish Directory (Wengerd, 2009).

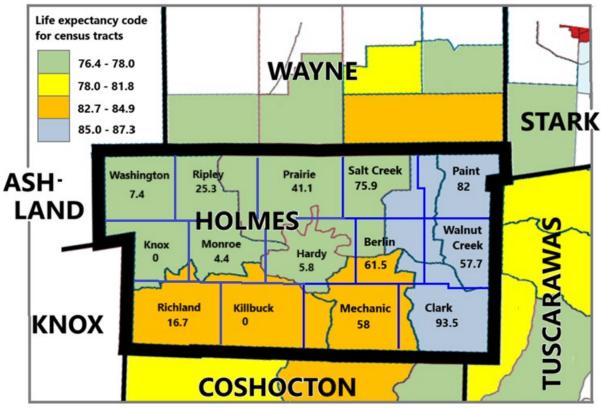


Figure 4
Life Expectancy Ranges for Census Tracts in Holmes County and Surrounding Areas

Note. The number in each of the 14 Holmes County townships is the percentage of the population that is Amish.

Conclusion

We have established that, on average, Amish men in Holmes County, Ohio, live five years longer than white men of Ohio, and Amish farmers live longer than Amish non-farmers. Evidence for Amish male longevity is based on information on Amish men born roughly between 1880 and 1940 whose productive lives stretched mainly throughout the twentieth century. This extended longevity may be attributed to their favorable attitude toward long hours of hard work, an attitude embedded in Amish culture.

References

Abrams, L. R., Myrskylä, M., & Mehta, N. K. (2021). The growing rural—urban divide in U.S. life expectancy: Contribution of cardiovascular disease and other major causes of death. *International Journal of Epidemiology*, *50*(6), 1970–1978. https://doi.org/10.1093/ije/dyab158

- Bassett, D. R., Jr., Schneider, P. L., & Huntington, G. E. (2004). Physical activity in an Old Order Amish community. *Medicine and Science in Sports and Exercise*, *36*(1), 79–85. https://doi.org/10.1249/01.MSS.0000106184.71258.32
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, *117*(3), 497–529. https://doi.org/10.1037/0033-2909.117.3.497
- Bell, F. C., & Miller, M. L. (2009). Life tables for the United States Social Security area 1900–2100 (Actuarial Study No. 120). https://www.ssa.gov/oact/NOTES/as120/LifeTables_Body.html
- Bielak, F., Yu, P., Ryan, K. A., Rumberger, J. A., Sheedy, P. F., II, Turner, S. T., Post, W., Shuldiner, A. R., Mitchell, B. D., & Peyser, P. A. (2008). Differences in prevalence and severity of coronary artery calcification between two non-Hispanic white populations with diverse lifestyles. *Atherosclerosis*, *196*(2), 888–895. https://doi.org/10.1016/j.atherosclerosis.2007.01.041
- Boss, L., Kang, D.-H., & Branson, S. (2015). Loneliness and cognitive function in the older adult: A systematic review. *International Psychogeriatrics*, *27*(4), 541–553. https://doi.org/10.1017/S1041610214002749
- Bosworth, H. B., Siegler, I. C., Brummett, B. H., Barefoot, J. C., Williams, R. B., Clapp-Channing, N. E., & Mark, D. B. (1999). The association between self-rated health and mortality in a well-characterized sample of coronary artery disease patients. *Medical Care*, 37(12), 1226–1236. https://doi.org/10.1097/00005650-199912000-00006
- Brummett, B. H., Barefoot, J. C., Siegler, I. C., Clapp-Channing, N. E., Lytle, B. L., Bosworth, H. B., Williams, R. B., Jr., & Mark, D. B. (2001). Characteristics of socially isolated patients with coronary artery disease who are at elevated risk for mortality. *Psychosomatic Medicine*, 63(2), 267–272. https://doi.org/10.1097/00006842-200103000-00010
- Case, A., & Deaton, A. (2021). Life expectancy in adulthood is falling for those without a BA degree, but as educational gaps have widened, racial gaps have narrowed. *Proceedings of the National Academy of Science*, *118*(11), e2024777118. https://doi.org/10.1073/pnas.2024777118
- Cross, H. E., & Gingerich, E., comps. (1965). *Ohio Amish directory: Holmes County and vicinity*. Johns Hopkins University School of Medicine.
- Cross, H. E., Kennel, E. E., & Lilienfeld, A. M. (1968). Cancer of the cervix in an Amish population. *Cancer*, 21(1), 102–108. <a href="https://doi.org/10.1002/1097-0142(196801)21:1<102::AID-CNCR2820210116>3.0.CO;2-N">https://doi.org/10.1002/1097-0142(196801)21:1<102::AID-CNCR2820210116>3.0.CO;2-N
- Cuyun Carter, G. B., Katz, M. L., Ferketich, A. K., Clinton, S. K., Grainger, E. M., Paskett, E. D., & Bloomfield, C. D. (2011). Dietary intake, food processing, and cooking methods among Amish and non-Amish adults living in Ohio Appalachia: Relevance to nutritional risk factors for cancer. *Nutrition and Cancer*, 63(8), 1208–1217. https://doi.org/10.1080/01635581.2011.607547

- Dattani, S. (2023). Period versus cohort measures: What's the difference? Our World in Data. https://ourworldindata.org/period-versus-cohort-measures-whats-the-difference
- Eijsvogels, T. M. H., Molossi, S., Lee, D.-C., Emery, M. S., & Thompson, P. D. (2016). Exercise at the extremes: The amount of exercise to reduce cardiovascular events. *Journal of the American College of Cardiology*, 67(3), 316–329. https://doi.org/10.1016/j.jacc.2015.11.034
- Ericksen, E. P., Ericksen, J. A., & Hostetler, J. A. (1980). The cultivation of the soil as a moral directive: Population growth, family ties, and the maintenance of community among the Old Order Amish. *Rural Sociology*, 45(1), 49–68.
- Ferketich, A. K., Katz, M. L., Kauffman, R. M., Paskett, E. D., Lemeshow, S., Westman, J. A., Clinton, S. K., Bloomfield, C. D., & Wewers, M. E. (2008). Tobacco use among the Amish in Holmes County, Ohio. *Journal of Rural Health*, *24*(1), 84–90. https://doi.org/10.1111/j.1748-0361.2008.00141.x
- Fraser, G. E., & Shavlik, D. J. (2001). Ten years of life: Is it a matter of choice? *Archives of Internal Medicine*, 161(13), 1645–1652. https://doi.org/10.1001/archinte.161.13.1645
- Gillum, D., Staffileno, B., Schwartz, K., Coke, L., & Fogg, L. (2010). The prevalence of cardiovascular disease and associated risk factors in the Old Order Amish in northern Indiana: A preliminary study. *Online Journal of Rural Nursing and Health Care*, 10(2), 28–37. https://doi.org/10.14574/ojrnhc.v10i2.44
- Hairston, K. G., Ducharme, J. L., Treuth, M. S., Hsueh, W.-C., Jastreboff, A. M., Ryan, K. A., Shi, X., Mitchell, B. D., Shuldiner, A. R., & Snitker, S. (2013). Comparison of BMI and physical activity between Old Order Amish children and non-Amish. *Diabetes Care*, *36*(4), 873–878. https://doi.org/10.2337/dc12-0934
- Hamman, R. F., Barancik, J. I., & Lilienfeld, A. M. (1981). Patterns of mortality in the Old Order Amish: I. Background and major causes of death. *American Journal of Epidemiology*, 114(6), 845–861. https://doi.org/10.1093/oxfordjournals.aje.a113255
- Holbreich, M., Genuneit, J., Weber, J., Braun-Fahrländer, C., Waser, M., & von Mutius, E. (2012). Amish children living in northern Indiana have a very low prevalence of allergic sensitization. *Journal of Allergy and Clinical Immunology*, *129*(6), 1671–1673. https://doi.org/10.1016/j.jaci.2012.03.016
- Hostetler, J. A. (1993). *Amish Society* (4th ed.). Johns Hopkins University Press. https://doi.org/10.56021/9780801844416
- Hsueh, W. C., Mitchell, B. D., Aburomia, R., Pollin, T., Sakul, H., Gelder Ehm, M., Michelsen, B. K., Wagner, M. J., St. Jean, P. L., Knowler, W. C., Burns, D. K., Bell, C. J., & Shuldiner, A. R. (2000). Diabetes in the Old Order Amish: Characterization and heritability analysis of the Amish Family Diabetes Study. *Diabetes Care*, 23(5), 595–601. https://doi.org/10.2337/diacare.23.5.595
- Hussain, N., Gersh, B. J., Gonzalez Carta, K., Sydó, N., Lopez-Jimenez, F., Kopecky, S. L., Thomas, R. J., Asirvatham, S. J., & Allison, T. G. (2018). Impact of cardiorespiratory fitness on frequency of atrial fibrillation, stroke, and all-cause mortality. *American Journal of Cardiology*, 121(1), 41–49. https://doi.org/10.1016/j.amjcard.2017.09.021

- Juraschek, S. P., Blaha, M. J., Blumenthal, R. S., Brawner, C., Qureshi, W., Keteyian, S. J., Schairer, J., Ehrman, J. K., Al-Mallah, M. H. (2015). Cardiorespiratory fitness and incident diabetes: The FIT (Henry Ford Exercise Testing) Project. *Diabetes Care*, 38(6), 1075–1081. https://doi.org/10.2337/dc14-2714
- Juraschek, S. P., Blaha, M. J., Whelton, S. P., Blumenthal, R., Jones, S. R., Keteyian, S. J., Schairer, J., Brawner, C. A., & Al-Mallah, M. H. (2014). Physical fitness and hypertension in a population at risk for cardiovascular disease: The Henry Ford Exercise Testing (FIT) Project. *Journal of the American Heart Association*, *3*(6), e001268. https://doi.org/10.1161/JAHA.114.001268
- Katz, M. L., Ferketich, A. K., Broder-Oldach, B., Harley, A., Reiter, P. L., Paskett, E. D., & Bloomfield, C. D. (2012). Physical activity among Amish and non-Amish adults living in Ohio Appalachia. *Journal of Community Health*, *37*(2), 434–440. https://doi.org/10.1007/s10900-011-9460-9
- Kraybill, D. B., Johnson-Weiner, K. M., & Nolt, S. M. (2013). *The Amish*. Johns Hopkins University Press. https://doi.org/10.56021/9781421409146
- Lee, H., Yong, S. Y., Choi, H., Yoon, G. Y., & Koh, S. (2024). Association between loneliness and cognitive function, and brain volume in community-dwelling elderly. *Frontiers in Aging Neuroscience*, *16*, 1389476. https://doi.org/10.3389/fnagi.2024.1389476
- McPhee, J. S., French, D. P., Jackson, D., Nazroo, J., Pendleton, N., & Degens, H. (2016). Physical activity in older age: Perspectives for healthy ageing and frailty. *Biogerontology*, *17*, 567–580. https://doi.org/10.1007/s10522-016-9641-0
- Melov, S., Tarnopolsky, M. A., Beckman, K., Felkey, K., & Hubbard, A. (2007). Resistance exercise reverses aging in human skeletal muscle. *PLoS One*, *2*(5), Article e465. https://doi.org/10.1371/journal.pone.0000465
- Miller, G. H. (1983). Lung cancer: A comparison of incidence between the Amish and non-Amish in Lancaster County. *Journal of the Indiana State Medical Association*, 76(2), 121–123.
- Mitchell, B. D., Lee, W.-J., Tolea, M. I., Shields, K., Ashktorab, Z., Magder, L. S., Ryan, K. A., Pollin, T. I., McArdle, P. F., Shuldiner, A. R., & Schäffer, A. A. (2012). Living the good life? Mortality and hospital utilization patterns in the Old Order Amish. *PLoS One*, 7(12), Article e51560. https://doi.org/10.1371/journal.pone.0051560
- National Center for Health Statistics. (2018). *U.S. Small-Area Life Expectancy Estimates Project—USALEEP*. https://www.cdc.gov/nchs/nvss/usaleep/usaleep.html
- Ober, C., Sperling, A. I., von Mutius, E., & Vercelli, D. (2017). Immune development and environment: Lessons from Amish and Hutterite children. *Current Opinion in Immunology*, 48, 51. https://doi.org/10.1016/j.coi.2017.08.003
- Paffenbarger, R. S., Jr., Hyde, R., Wing, A. L., & Hsieh, C.-C. (1986). Physical activity, all-cause mortality, and longevity of college alumni. *New England Journal of Medicine*, *314*(10), 605–613. https://doi.org/10.1056/NEJM198603063141003

- Scott, E. M., Stein, R., Brown, M. F., Hershberger, J., Scott, E. M., & Wenger, O. K. (2021). Vaccination patterns of the northeast Ohio Amish revisited. *Vaccine*, *39*(7), 1058–1063. https://doi.org/10.1016/j.vaccine.2021.01.022
- Singh, G. K., & Siahpush, M. (2014). Widening rural-urban disparities in all-cause mortality and mortality from major causes of death in the USA, 1969–2009. *Journal of Urban Health*, 91, 272–292. https://doi.org/10.1007/s11524-013-9847-2
- Troyer, H. (1988). Review of cancer among 4 religious sects: Evidence that life-styles are distinctive sets of risk factors. *Social Science & Medicine*, *26*(10), 1007–1017. https://doi.org/10.1016/0277-9536(88)90218-3
- Troyer, H. (1994). Medical considerations of the Amish. In J. Dow, W. Enninger, & J. Raith (Eds.), *Internal and external perspectives on Amish and Mennonite life 4* (pp. 68–87). Unipress.
- Vainshelboim, B., Müller, J., Lima, R. M., Nead, K. T., Chester, C., Chan, K., Kokkinos, P., & Myers, J. (2017). Cardiorespiratory fitness and cancer incidence in men. *Annals of Epidemiology*, 27(7), 442–447. https://doi.org/10.1016/j.annepidem.2017.06.003
- Valtorta, N. K., Kanaan, M., Gilbody, S., Ronzi, S., & Hanratty, B. (2016). Loneliness and social isolation as risk factors for coronary heart disease and stroke: Systematic review and meta-analysis of longitudinal observational studies. *Heart*, 102(13), 1009–1016. https://doi.org/10.1136/heartjnl-2015-308790
- Wen, C. P., Wai, J. P., Tsai, M. K., Yang, Y. C., Cheng, T. Y., Lee, M.-C., Chan, H. T., Tsao, C. K., Tsai, S. P., & Wu, X. (2011). Minimum amount of physical activity for reduced mortality and extended life expectancy: A prospective cohort study. *Lancet*, *378*(9798), 1244–1253. https://doi.org/10.1016/S0140-6736(11)60749-6
- Wengerd, M., comp. (2009). *Ohio Amish directory: Holmes County and vicinity, 2010*. Carlisle Press.
- Westman, J. A., Ferketich, A. K., Kauffman, R. M., MacEachern, S. N., Wilkins, J. R., III, Wilcox, P. P., Pilarski, R. T., Nagy, R., Lemeshow, S., de la Chapelle, A., & Bloomfield, C. D. (2010). Low cancer incidence rates in Ohio Amish. *Cancer Causes & Control*, 21(1), 69–75. https://doi.org/10.1007/s10552-009-9435-7