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Health Disparities Across the Life Cycle

Committee on Population Meeting

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Meeting Summary

On June 23, 2016, the Committee on Population (CPOP) convened in Washington, D.C. to consider health disparities across the life cycle. Sponsored by the Division of Behavioral and Social Research (BSR) at the National Institute on Aging (NIA), National Institute of Health (NIH), the meeting offered a chance to elicit expert input about the implications on research priorities from recent findings documenting rising morbidity and mortality in midlife among white non-Hispanic Americans. Invited speakers shared their views on the state of the science regarding the life course perspective, effects of inequality and social class, education, cohort, and race/ethnicity on health disparities, as well as needed data, analytical frameworks and future research. The agenda and list of participants are included as Appendices 1 and 2.

Several key themes emerged from the presentations and discussions.

- Health disparities are increasing in the United States, arising from multiple conditions of disadvantage that have a historical context, including growing differences in education and income. Understanding these disparities requires considering the interplay of dynamic biological, social, and cultural factors across the life course.
 - Institutional and cultural contexts should not be overlooked: cohort designs can help illuminate the role that specific policies and historical contexts have had on health disparities.
 - A life course perspective is necessary to better understand the timing and mechanisms by which risks, exposures, and advantages impact health outcomes. This approach requires longitudinal datasets that span adulthood, rather than focusing exclusively on aging populations.
 - Physiological indicators can provide better insight into pre-disease pathways.
- Changes in social institutions have the potential to have large impacts on health disparities.
 - More work is needed to understand how changes in education, healthcare, income, and workplace practices influence health disparities.
 - More data and research are needed on the changing nature of work: both on the relationship between employees and workplaces, and as it relates to shifting family structures.
- Many studies have examined disparities with reference to mortality or a single health outcome (such as obesity or diabetes). The field would benefit from studies that measure a broad range of health outcomes.
 - To better understand the biological pathways that lead to disease, biological risk factors must be measured along with mortality and morbidity outcomes.
 - Measures of emotional and psychological well-being, and the ways that these variables relate to physiological health over time, should be considered.
 - Subjective measures of health should be supplemented with objective health measures, including biomarkers.

- Patterns of health disparities are heterogeneous across social contexts.
 - Different dimensions of socioeconomic status (e.g., income, inequality, education, and experiences of discrimination) may predict different aspects of health, or influence health more strongly at different stages of life.
 - The relationship between socioeconomic status and health is likely to be bidirectional in some contexts: poor health can lead to declines in socioeconomic status.
 - Specific social contexts such as geography, families, neighborhoods, and schools may moderate the effects of race, education, or social class on health outcomes.
 - Health trends are different between men and women, and likely the causes of these trends are different as well. More research is needed to understand the distinct biological and social factors influencing women's and men's health across social groups.
 - Patterns of disparities are increasingly variable across geographical contexts, both within the United States and across the globe. These differences may provide insight into effects of social policies and other contextual variables on health disparities.

Introductory Remarks

John Haaga, Division of Behavioral and Social Research (BSR), National Institute on Aging (NIA)

NIA has a long tradition of commissioning reviews by the Committee on Population (CPOP) to help inform its program development. A key area of emphasis in the behavioral and social sciences has been the study of health disparities. Haaga thanked participants at the meeting for sharing their ideas for moving this research agenda forward. He noted that BSR is also actively evaluating its investments in data infrastructure with the goal of positioning the field to generate high impact research findings for years to come.

BSR is also interested in identifying and translating basic research findings into effective interventions that address health disparities. Over the past 5 to 10 years, there has been a profusion of studies yielding interesting and largely unexplained results in the area of health disparities. NIA funds a number of interventions that have direct policy implications, but they tend not to be linked to research on observational datasets. Instead, they tend to be linked to good ideas, but are unlikely to have a discernable impact on stubborn trends at the national level. New research-based interventions developed through a broad-based plan over a 5- to 10-year time horizon may be needed to address the kinds of population disparities that are the focus of this meeting.

Invited Presentations

Overview of Health Disparities and Their Causes and Consequences

Lisa Berkman, Harvard University

Recent patterns of health disparities in the United States illustrate an urgent problem in need of large-scale solutions. There are five key questions that are important for researchers and policymakers to focus on:

- What is already known about trends in health disparities.
- Specific aspects of environmental exposure that worsen health outcomes. While race and ethnicity are convenient indexes of inequality, it is key to focus on understanding potentially etiologically important variables such as education, discrimination, absolute income levels, and social class and stigmas in order to better understand the mechanisms that lead to health disparities (and to begin to understand how to address them).
- Theoretical and analytical lenses that consider the etiologic issues behind health disparities, including the life course perspective, cohort differences, time and period effects, and gendered associations between exposures and outcomes.
- Ways to reduce health disparities. For example, health disparities are tightly related with phenomena such as family dynamics, single parenthood, and criminal justice policies. Addressing these problems can potentially reduce health disparities.
- The path forward with regard to needed data; analytic, causal, and descriptive frameworks; and interventions.

Data from a recent National Academy of Sciences panel illustrate a robust recent trend: life expectancy (LE) in the United States has fallen from fairly average levels in the early 1980s to the lowest among industrialized nations by 2000. Not only has average LE failed to keep pace with other countries, the LE distribution has also widened, with life expectancies rising by as much as 6-8 years among those with the highest income, and 0-2 years among the least educated.¹ Across the income distribution, men have seen larger gains in LE than women. There are also prominent racial disparities in health outcomes. This pattern of increasing inequality is not a global trend:² although countries such as France show large inequalities between social classes, disparities have typically not increased between the 1970s and the present. A recent study found that inequalities in mortality by education tend to be slightly larger in the United States than in most Western European countries. Additionally, higher levels of mortality exist in

¹Barry Bosworth et al., "Later retirement, inequality in old age, and the growing gap in longevity between rich and poor," *Economic Studies at Brookings* (Washington, DC: The Brookings Institution, 2016).

² Anne Case and Angus Deaton, "Rising morbidity and mortality in midlife among white non-Hispanic Americans in the 21st century," *Proceedings of the National Academy of Sciences* 112, no. 49 (December 8, 2015): 15078-15083, doi: 10.1073/pnas.1518393112.

the United States at all levels of educational attainment.³ This is due in part to the high levels of chronic disease in the United States. Compared to Western European countries, the United States has the highest levels of heart disease, diabetes, obesity, and numerous other chronic diseases and disabilities.

Changes in the U.S. social and policy landscape may have fostered rising inequalities, however, it is challenging to determine causal relationships. Evidence suggests that changing work and family dynamics have had a negative impact on women's health. For example, single motherhood in early- and middle-adulthood is a risk factor for disability and health in later life.⁴ Policies that target income and taxation, the workplace, retirement savings, and housing and urban development can influence health outcomes. Studies of the Earned Income Tax Credit show that increases reduced incidences of low birth weight, decreased smoking rates among women, and improved maternal health. Women who were working in a country with a maternal leave policy at the time of birth of their first child were 16 percent less likely to be depressed 30 years later. Workplace dynamics have also been changing rapidly in recent decades, and the support that workplaces have traditionally provided can no longer be taken for granted, as discussed by David Weil in *The Fissured Workplace*.⁵

Discussion

Exploring Changes in the Nature of Work

Researchers do not have a good understanding of how workplaces are changing and how these changes affect individuals. There is a large need for more data on work, employment, and family. Population-based data sets addressing issues related to the changing nature of the workplace include the Panel Study of Income Dynamics ([PSID](#)), and the Longitudinal Employer-Household Dynamics ([LEHD](#)). Significant effort has gone into creating the LEHD, but it can be difficult to use. The Work Family Health Network (WFHN) studies psychosocial interventions that address the health of workers and families. However, more resources are needed. It would be helpful if large datasets like the census and the Health and Retirement Study (HRS) included codes for specific employers. An HRS Module focusing on work issues could also be very valuable.

Addressing these data needs could make it easier to address key questions about the relationships between men's and women's opportunities and behavior; changes in education and the economy; the impact of incarceration and the shortage of economic opportunities for men on health, as well as racial differences in marital status and earnings. These issues are tightly linked, and their relationship to health over the life course has been underestimated. A

³ van Hedel, Karen, Mauricio Avendano, Lisa F. Berkman, Matthias Bopp, Patrick Deboosere, Olle Lundberg, Pekka Martikainen, Gwenn Menvielle, Frank J. van Lenthe, and Johan P. Mackenbach. "The contribution of national disparities to international differences in mortality between the United States and 7 European countries." *American journal of public health* 105, no. 4 (2015): e112-e119.

⁴ Berkman, Zheng, Glymour, Mothering alone: cross-national comparisons of later-life disability and health among women who were single mothers, *J Epidemiol Community Health* doi:10.1136/jech-2014-205149

⁵ Weil, D. (2014). *The fissured workplace*. Harvard University Press.

better understanding of these relationships could lead to new interventions and policies for addressing disparities.

A Global View on Inequality

On a global level, inequality has probably fallen in recent years as poverty has decreased. Researchers must balance local, regional, and global perspectives in their study of health disparities. Additionally, less industrialized countries should also be considered when investigating health and policy trends. It can be difficult to find robust data sources in less industrialized countries, however, some do exist. One example is the Costa Rican Longevity and Healthy Aging Study ([CRELES](#)) dataset. Harmonizing and linking data sources across different nations could allow researchers to explore the invariant and contextual aspects of the relationship between socioeconomic status and health.

The Life Course Perspective

Jennifer Karas Montez, Syracuse University

The life course perspective provides key insights into the causes and consequences of health disparities. In particular, this perspective highlights the role that timing plays in creating health disparities, both on historical and biological time scales. Typically, life course researchers explore the ways that adult morbidity and mortality reflect the accumulation of exposures in childhood and later in life. Childhood exposures and early-life conditions are thought to affect later-life morbidity and mortality in one of three ways. First, childhood exposures may have direct, lasting, biological impacts (“imprints”) on the health of individuals. Second, “pathway” models predict that childhood environment may impact adult health primarily by influencing adult environment, which directly impacts health. Finally, a combination of these two models is possible, whereby there is a cumulative impact of adverse childhood conditions on adult environment as well as on adult morbidity and mortality. While these frameworks provide a grounding for the study of life course effects on health, they are fairly static and decontextualized. In order to fully understand how exposures over the life course lead to illness and mortality, researchers must consider sociohistorical and biological contexts. This requires integrating three often-overlooked concepts into life course research: 1) Attention to the timing of events, exposures, transitions, and their consequences on health; 2) Understanding of the natural history and physiological trajectory of “normal biological systems”; 3) Consideration of cohort-specific geographic and secular contexts, such as changes in disease prevalence or treatment availability over time or across regions.

Cardiovascular and metabolic systems appear to be particularly susceptible to adverse exposures in early life. This could be due to sensitive periods of physiological development, or due to the chronic impacts of exposures, which may cause hormonal changes that have lasting health effects. Distinguishing between these two hypotheses requires significant data infrastructure: specifically, longitudinal data that provides detailed information about the timing of stressors throughout childhood as well as health in adulthood. [MIDUS](#) (Midlife in the United States, A National Longitudinal Study of Health and Well-being) includes a module that

asked respondents whether they experienced 27 adversities at different ages. Fifty-two percent of adults in MIDUS experienced at least one adverse event in childhood. Individuals whose exposure to adverse childhood events was limited to one developmental period did not differ in risk of obesity or diabetes from those who experienced no adverse events, regardless of the developmental period in which the event occurred. However, the 14 percent of respondents who reported chronic childhood exposures to stressors (occurring in more than one developmental period) had elevated adult risk for obesity and diabetes. In the case of heart disease, exposure to stressors *at any age* was related to higher health risk in adulthood. These data provide no evidence for a (postnatal) sensitive period in which exposure to adverse events has a greater impact on the development of cardiometabolic systems, and suggest that chronic exposure to adversity is a more important risk factor than the timing of adversity, especially for obesity and diabetes. However, Montez pointed out that this study provides a decontextualized picture of the impacts of adversities on cardiometabolic health. More research is needed to understand whether these effects would be similar across cohorts, geographic contexts, and adult age ranges.

A second study examined the role of timing in the consequences of health disparities. Past studies have yielded potentially inconsistent findings with regard to the role of socioeconomic status (SES) on metabolic syndrome (MetS) in adulthood. However, results reliably show a more pronounced relationship between SES and MetS for women, especially those who are postmenopausal. Informed by this social and biological context, Dr. Montez and colleagues used data from the Study of Women's Health Across the Nation ([SWAN](#)) to examine how SES over the life course influences women's risk of MetS during menopausal transition. Results indicate that women who reported adverse SES in childhood had significantly worse MetS at premenopausal baseline than those reporting good, fair, or average SES. As women moved across the menopausal baseline, childhood SES was no longer a significant predictor; instead, more proximal exposure, as indexed by their own educational attainment, strongly predicted large disparities in risk of developing MetS. Again, Montez warned that it is unknown how robust these findings would be across different cohorts, time periods, and geographic contexts, particularly considering changes in hormone replacement therapy utilization, obesity, fertility, and the importance of women's education over time and geography.

Discussion

Nature of Reported Adverse Events

The study on childhood exposures sought to understand the best ways to operationalize childhood adversity to predict later health. Results showed that the number of adverse events was a better predictor of health than the timing or types of events. However, there are still many open questions about how to best measure childhood adversity. Events differ in the time window over which their effects are experienced, in whether they occur equally at all ages, and in how stressful they are perceived to be. In addition to age differences, there may be sex differences in the experience, reporting, and impacts of adverse events. The MIDUS study found few sex differences, although there was a slightly stronger relationship between adverse events and heart disease in women. Future research could investigate whether specific types of

events affect children differently depending on age of occurrence, as well as the effect of perceived stressfulness of an event on health outcomes.

Reports on adverse events were retrospective. Available evidence suggests that respondents report reliably about objective events and experiences such as the adverse events used here. Men and women report adverse events at a similar level, but the kinds of events they report differ. Sex differences could be studied further by comparing event reporting across sibling and twin data.

Bidirectional Effects of SES and Health

Other researchers have shown bidirectional associations between SES and health. In particular, there is evidence that health status has a large effect on adult SES. In the study on MetS, analyses controlled for early life health but did stratify data to investigate this variable in more detail. Because the study examined health outcomes that are unlikely to have large impacts on achievement, such as hypertension, glucose levels, and obesity, reverse causality is not a large concern in this case. The SWAN dataset contains other health measures that could be used to test the bidirectional relationship between SES and health outcomes.

Available datasets tend to focus on chronic disease and physiological functioning, often ignoring emotional and psychological well-being. Including these measures would allow for more fine-grained analysis of the bidirectional relationship between health and SES in adult and aging populations.

Contribution of Intermediary Factors

Adverse events can affect later outcomes through both biological and behavioral mechanisms. The study on childhood exposures used educational attainment as an indicator of adult SES but did not distinguish between economic, behavioral, and psychosocial influences on health outcomes. The MetS study found that health behaviors explained more of the association between childhood SES and women's MetS risks than did economic status or psychosocial resources, explaining 33 to 50 percent of the association.

Opportunities for Further Research

The MIDUS dataset is homogeneous in terms of race and SES. Although results are consistent within the dataset when controlling for educational achievement, replicating the timing analysis in a more diverse dataset would be informative. Replicating the MetS effect in a population of men and women would allow for greater understanding of the role of menopause compared to other aging processes in the changing relationship between adversity and health outcomes.

Effects of Inequality and Social Class: The Nature and Explanations of Disparities in Socioeconomic Position Over the Life Course, and Their Implications for Future Health Science and Policy

James S. House, University of Michigan

Income-based health disparities have been present throughout human history. However, scientific and policy attention to these issues has waxed and waned. While there were efforts to address the relationship between poverty to health in the mid-nineteenth century, social factors were largely ignored from the late 19th to mid-20th century as researchers and policymakers focused on infectious diseases, which were viewed at the time as equal-opportunity threats. Even as societies became more aware of the significance of class issues in the mid-20th century, little attention was paid to the impact of poverty on health until the late 20th century. In the late 1970s, England's Labour government commissioned the Black Report, which found that the welfare state, including a quarter century of the National Health Service, had done little to impact occupational disparities in mortality. Other nations reported similar findings. This history highlights the challenges of assessing empirical reality within a given social and scientific context.

Disparities in LE at age 50 have increased over time. U.S. disparities tend to be higher than in other countries—even some poorer countries. Chetty et al. have shown geographical variability in health disparities within the United States: Expected LE for low income 40-year-olds in Detroit is much lower than for individuals in the same income bracket in New York or San Francisco.⁶ The relationship between income and health tends to be strong in infancy and early to mid-childhood, and weaker from late adolescence to early adulthood. The relationship strengthens again from early adulthood to early old age, and then weakens in later old age due to biology and social welfare supports. Data from the Americans' Changing Lives (ACL) study show that education and income are larger predictors of the relationship between age and health than smoking, stress, and social supports. Income differences can account for 25-30 year differences in age of onset of illness or disability. These large effects stem from the fact that education and income determine levels of exposure to almost every other risk factor for health, including health behaviors, chronic stress, medical care, and environmental exposures. Income specifically plays a large role in determining the conditions of life and work, while education is a stronger predictor of health behaviors. Health care and insurance tend to be poor explanatory factors; observational data and experimental interventions have demonstrated that changes in health care policy have had minimal effects on health disparities.

While it can be difficult to determine causality in sociological contexts, there is evidence from numerous income interventions for a causal relationship between income and health. There is a pressing need to evaluate the health impacts of income policies and interventions, including those that are not designed with the goal of influencing health outcomes. It is critical that NIH

⁶ Raj Chetty et al., "The association between income and life expectancy in the United States, 2001-2014." *Journal of the American Medical Association* 315, no. 16 (April 26, 2016): 1750-1766, doi:10.1001/jama.2016.4226.

support this type of evaluation. In general, research and policy on income must be better integrated with research and policy on health outcomes. Failure to do so causes underestimation of the value of income policies, and a failure to understand the relationship between stagnant and declining incomes and healthcare costs and outcomes.⁷

Discussion

Evaluating Income Interventions

Policies on wages, social security, and education are changing in the United States. As these changes occur, there are opportunities to evaluate the effects of these variables on the health of the population and of population subgroups. Although it is believed by some that NIA does not fund health evaluations of economic policy, this is not the case. NIA issued a guide notice clarifying NIH priorities in health economics research last winter. It included CPOP priorities such as social determinants of health, and the effects of anything—including income—on health. As long as health outcomes are measured, such studies can be funded by NIA. In order to get such projects funded, it is critical that proponents serve on review panels and advocate for this type of research.

Meeting attendees noted a number of specific studies showing the relationship between income and health. Two recent NIA-funded studies, one in Yucatan peninsula and the other in South Africa, found that increases in pension income had multi-generational impacts on health. Another study showed positive health effects on elderly individuals living in East Germany upon receiving West German pensions after German reunification. Additionally, research by Amitabh Chandra has shown that runaway health care spending saps spending on social programs such as education. Finally, some interventions have been effective at reducing disparities within long-term care settings and Medicaid Advantage populations. For example, Kaiser Permanente has reduced racial disparities through effective use of email.

Mechanisms for Effects of Inequality on Health Outcomes

Some meeting attendees were surprised that effects of education and income on health outcomes do not operate through access to or use of health services. The relationship between access to health services and outcomes may be stronger in developing countries, where infectious disease and maternal mortality are the main causes of death. However, even in those contexts, the relationship between medication and mortality may be overestimated.

Animal studies have shown that food insecurity can have large negative effects on multigenerational health outcomes. More research is needed to determine the relative impacts of deprivation and insecurity on health.

Differences in Health Disparities by Location

Health disparities vary widely by location within the United States. Chetty et al. showed that when comparing LE between different metropolitan areas, differences in investment in social

⁷ House, J. S. (2015). *Beyond Obamacare: Life, death, and social policy*. New York: Russell Sage.

resources and programs had more explanatory power than differences in access to health care. Other research has shown particularly low LEs in the Mississippi Delta, Appalachia, and the “stroke belt” in the Southeastern U.S.

Educational Attainment, Health and Mortality in the United States: Recent Findings and Continued Questions

Robert A. Hummer, University of North Carolina, Chapel Hill

There is a large literature, spanning several scientific disciplines, demonstrating relationships between educational attainment, health, and mortality in the United States. One motivation for this research has been the robust and consistent finding of gaps in health outcomes by educational attainment. The 2015 paper by Case and Deaton⁸ demonstrating widening educational gaps and increasing mortality for specific causes of death, was particularly effective in sparking scientific and media interest in this issue. While there is ongoing debate about the causes and magnitude of this widening, the evidence that the gap is widening has been consistently shown in over a dozen studies. The increasing impact of education on mortality is particularly evident among women and non-Hispanic Whites; individuals who did not finish high school or earn a GED are now particularly living shorter and less healthy lives than their more highly educated counterparts. At least for Whites, these divergences appear to be happening on a cohort basis, with younger birth cohorts showing larger educational health and mortality disparities.

Population researchers have made considerable progress in recent years in measuring and understanding educational disparities in health and mortality. Specifically, they have documented disparities well, particularly in individuals over the age of 50. They have also documented changes in disparities across time and, to a lesser extent, across birth cohorts. They have considered subgroup variations by race and sex, and have measured disparities across a range of outcome measures. They have also obtained some information about mediators of education-health and education-mortality relationships. This has been possible because of the availability of large longitudinal data sets that provide measures of educational attainment, health and follow-up mortality, health behavior, and other mediators.

There are also a number of ways to improve our understanding of these relationships. One is to consider education-health and education-mortality relationships among those younger than age 50. Better understanding these more relationships among younger adults could make it easier to identify mechanisms, and could also provide more relevant data from the perspective of designing interventions. Additionally, researchers have not considered the relationship between education and health/mortality across the full educational distribution, including the highly educated. More research is also needed on biological, childhood, and adolescent confounders of relationships between educational attainment and adult health and mortality. Understanding these confounders, along with the ways that such confounders might also work

⁸ Anne Case and Angus Deaton, "Rising morbidity and mortality in midlife among white non-Hispanic Americans in the 21st century," *Proceedings of the National Academy of Sciences* 112, no. 49 (December 8, 2015): 15078-15083, doi: 10.1073/pnas.1518393112.

to moderate education-health relationships, is a necessary precursor to understanding the mechanisms by which education influences health. Researchers must also do more to consider how contextual variables such as geography of residence, family contexts, and school contexts moderate associations between education and health, as well as how mediators might work differently across these contexts. Finally, most education-health research has focused on self-reported outcomes. The field should make use of biologically measured outcomes as well.

Recent research tends to focus on understanding the mechanisms by which educational attainment in adolescence and early adulthood leads to differences in health and mortality in later life. However, there is a very important need to understand how early life factors such as biological make-up, early life health, and demographic contexts confound and moderate the relationship between education and health. Understanding these early-life mechanisms and contexts are critical to making progress in the field of population health.

With new funding opportunities available and maturing datasets providing exciting new avenues for exploration, there are rich opportunities to address the widening educational gaps in health and mortality outcomes and better understand the mechanisms that are responsible for such gaps.

Discussion

Mechanisms of Education's Impact on Health

Two types of data would be particularly helpful for disentangling the mechanisms, moderators, and contexts of the education-health relationship. First, more data are needed on educational process to help researchers understand what happens in school in terms of educational content, skills, the development of social relationships, and educational context. Most studies of education and health rely on years in school as a measure of educational achievement; however, this measure obscures considerable detail.

Second, more data are needed on the trajectories that individuals follow after leaving school. It is possible that these first steps into the labor market set individuals on trajectories that continue into late adulthood. By failing to study the time period between the end of education and age 50, researchers lose critical life course data that could inform the understanding of mechanisms.

Dynamic changes are also occurring in the process of school selection. Some parents make active choices, while others face constraints in deciding where to send their children to school. These changes are likely to influence the relationship between parent and early childhood characteristics and child success. They also impact school contexts: children are more likely to go to school with individuals from similar family contexts.

Social group membership may also serve as an important mechanism or mediator of the relationship between education and health outcomes. Almost all health-related behaviors are influenced by how one is perceived by others in one's social group. Social context is heavily

influenced by educational attainment, but is also influenced by larger cultural and contextual factors.

An example of the importance of social and societal contexts comes from studies of how quickly adolescents in Malawi lose literacy after they leave school. Women lose literacy much more quickly, an effect that appears to be driven both by their experiences in school and their life courses after leaving school (boys have more opportunities to use their literacy skills as they enter the workforce, while most girls get married and start families).

The Effects of Race and Ethnicity: Patterns, Explanations, and Directions for Future Research

Tyson Brown, Duke University

Racial and ethnic health disparities in health and life expectancy are well documented. The Black/White gap in life expectancy has been narrowing, however there is still a gap of about 3.4 years. The fact that the gap is narrowing is encouraging yet puzzling, given the widening racial/ethnic inequalities in other areas such as wealth and incarceration rates. Importantly, there are also large racial and ethnic inequalities in an array of other measures of health, including inflammation, biological risk, self-rated health, chronic diseases, functional limitations, and disability.

The weathering hypothesis posits that due to differential exposure to disadvantage and stressors, U.S.-born Blacks and Latinos experience health deterioration at earlier ages as well as more rapid declines in health. There is also growing evidence that racial/ethnic disparities in health tend to peak in midlife and wane at older ages. This may be in part an artifact of mortality selection as the sickest individuals the least likely to survive to old age. Whites may also be able to delay health problems until later in life and then experience a compressed period of health problems in old age.

One cause of racial disparities in health may be the effects of institutional racism, including racial inequalities in socioeconomic resources. However, racial differences in health remain when controlling for SES differences. There are racial and ethnic disparities in health at all levels of education, although disparities are often largest at higher levels of education. Moreover, growing evidence suggests that Blacks and Latinos received diminished health returns to socioeconomic resources relative to Whites.

Many researchers have theorized that chronic stress, trauma, discrimination, segregation, and neighborhood conditions underlie racial/ethnic inequalities in health. The Stress Process Model predicts that social characteristics (such as race and ethnicity) impact stress exposure and access to psychosocial resources, which in turn impact health. Few population-based, empirical studies have been conducted to test this and other theories. The studies that do exist show that Blacks and Latinos experience stressful events more frequently than Whites, but the effects are modest and the evidence is not robust.

A recent study sought to investigate the relative contributions of SES, discrimination, stressors, neighborhood characteristics, and biological risk to racial disparities in health outcomes. All five of these factors accounted for significant variance in the disparities between race and self-reported health between Blacks and Whites. Cumulatively, these factors explained 82 percent of the gap in self-reported health. For Mexican Americans and Whites, the gap was mediated completely by SES, and partially by stressors, neighborhood characteristics, and biological risk.

Research on racial and ethnic health disparities is limited by the available data. Many datasets lack comprehensive stress measurement and information on exposures to inequality across the life course. In addition, small sample sizes of minority groups limit research on within-group heterogeneity. Furthermore, many studies have focused on single health outcomes, risking misclassification of ill individuals and underestimations of racial and ethnic disparities.

Future research should move beyond characterizing the racial and ethnic health gap and work to improve understanding of the causes and consequences of the gap. This will require comprehensive measurement of racial inequality across the life course, an integrated biopsychosocial approach to understanding causes of health disparities across levels of analysis, and the investigation of a wide array of health outcomes. Research on within-group heterogeneity can shed light on group-specific mechanism and processes that shape health outcomes. For example, growing evidence suggests that, among Blacks in the U.S., skin shade shapes health and racial identity buffers the health consequences of discrimination and other stressors. Period and cohort effects are an understudied but important topic, as historical racialized events such as the civil rights movement and the September 11th terrorist attacks have had lasting impacts on discrimination and racial inequality. Individuals must be studied within context, with focus on social networks, age-patterned exposures, and potential sensitive periods in responding to racism. Rich datasets that provides detail across the full lifespan and across generations are necessary to conduct this research.

Discussion

An “Ideal Data Set” for Racial/Ethnic Disparities

Stress measures within existing large panel studies are crude in nature: participants are typically asked how frequently they experience stressful events or feel discriminated against, but stress reactivity, which is known to influence long-term outcomes, requires biological measurement. Both types of data may be necessary to further the understanding of racial and ethnic disparities in health. Short-term studies with physiological measurements should be complemented with longitudinal datasets that cover the full life course and span multiple generations. The National Longitudinal Study of Adolescent to Adult Health ([Add Health](#)) has the potential to be a critical dataset for the study of racial and ethnic disparities across lives and generations.

Implications of the Narrowing Black/White Mortality Gap

The causes of the decreasing Black/White mortality gap are not well understood. The effect is due in part to declines in health status among Whites, but there appear to have been gains in

LE among Blacks as well. Beyond this puzzling finding, there are many reasons to be concerned about future trends in racial and ethnic disparities. Recent increases in incarceration may have delayed health impacts, both for prisoners and for their family members. The Great Recession has also negatively impacted racial and ethnic inequalities in wealth. The current racial climate in the United States, with highly publicized acts of police brutality occurring regularly, could have deleterious effects on Black individuals. Overall, there is little reason to expect racial and ethnic gaps in health disparities to narrow in the near future.

Black/White Paradoxes in Breast Cancer and Mental Health

While Blacks tend to have lower outcomes across a wide variety of health measures, understanding the exceptions to this rule could provide insight into the role of socially determined processes and the unique mediators of health across racial groups. One example of an exception is breast cancer, which has a lower incidence (but higher mortality rate) among African Americans. There is also a surprising lack of racial disparity in depressive symptomology. It is unclear whether this is an artifact of reporting bias or differences in willingness to seek treatment, however, James Jackson's Affordance Model suggests that Blacks may be able to achieve parity in mental health with Whites by using unhealthy coping behaviors that have negative impacts on physiological health outcomes later in life.

Cohort Differences in Health Disparities

Yang Claire Yang, University of North Carolina at Chapel Hill

Cohort analysis can contribute to the understanding of behavioral and biophysiological risk factors. Cohort effects—changes across groups of individuals who experience an initial event (e.g., birth) in the same year—are distinct from age and time period effects. Cohort effects reflect early life conditions and lifelong exposures to socioeconomic, behavioral, and biological risk factors. They provide context for the individual aging process.

The Cohort Morbidity Phenotype hypothesis suggests that early-life environment (e.g., reduced infection and inflammation or increased nutrition) can have enduring impacts on surviving members of a cohort regardless of later life conditions. Age-period cohort (APC) analysis of U.S. adult mortality shows overwhelming evidence that there are large and continuous declines in mortality across cohorts for all leading causes of death. Declines in mortality across cohorts over time may reflect improvements in initial endowments of health capital at birth due to advancements in education, health care, diets, and health practices. In addition to inter-cohort variation, it is important to measure variation in intra-cohort health trajectories by sex, race, and education. For example, Blacks experience higher rates of cancer mortality, and less pronounced declines in cancer mortality across cohorts.

There are widespread variations in intra-cohort health disparities. For example, for cohorts born very early in the 20th century, depressive symptoms were more common in men than in women, and in Whites than in Blacks. However, for cohorts born in the middle part of the century, these patterns have reversed. Longitudinal analyses further suggest that depression decreases with age for most cohorts but decreases at a slower rate for earlier (older) cohorts. A different set of patterns emerges in data on disability: overall rates of disability and racial and

gender disparities are decreasing in more recent cohorts. The rates of change with age are cohort specific. Successive cohorts have higher levels of disability than their predecessors do at the same ages. Measures of frailty (similar to allostatic load) show differential inter- and intra-cohort patterns for race and SES. Most cohorts showed consistent race disparities in frailty across the life course, but for the Asset and Health Dynamics among the Oldest Old (AHEAD) cohort (born before 1924), racial disparities have decreased with age. Across cohorts, educational disparities in frailty increase across the life course, suggesting cumulative advantage, but income disparities decrease with age in the AHEAD and HRS cohorts.

Cohort patterns can reveal behavioral mechanisms of health outcomes. For example, cohort patterns in cigarette smoking track with lung cancer rates. Although the obesity epidemic is a problem across cohorts, there are large cohort variations that can be partially explained by cohort-specific eating patterns. Biophysiological mechanisms for health outcomes can be measured in cohorts through biomarkers. Cohort patterns in the allostatic load show distinctive risk factors within cohorts, as well as distinct patterns of disparities by sex, race, and SES.

Discussion

Follow-up on Case and Deaton Paper

The Case and Deaton paper describes a pattern of opioid-related deaths that appears to be specifically concentrated in baby boomers, suggesting a cohort-specific phenomenon. However, high levels of opioid prescription since the 1990s, and a sudden decrease in availability in recent years, can also be thought of as a period phenomenon. This period phenomenon may have been particularly problematic for baby boomers both because they were at an age where they were more susceptible to use of opiates, and because of the life experiences of this cohort across the life course; in particular, the greater competition that baby boomers faced in school and in the labor force, and the relatively chaotic nature of family structures throughout their lives. Determining the degree to which this effect is cohort-specific is critical from a policy perspective.

Evidence on Different Birth Cohorts Through Menopause

Although women live longer, measures of health and frailty show marked sex disparities: women are not as healthy as men.

There has been considerable change in how menopause is regulated across cohorts. However, this has received little attention from a cohort perspective, perhaps because such an analysis would require very large sample sizes. Biomarker research has shown that women's advantage in cardiometabolic risk factors appears to disappear after the reproductive years due to loss of the estrogenic protective effect.

Needed Analytical Frameworks, Data, and Future Research

Mark Hayward, University of Texas at Austin

Expanded life course approaches that include data from childhood through old age could provide insight into factors that shape physiological and cognitive capacity in later life. Biologically informed analytical frameworks are important to more fully understand how capacity over the life course is shaped by determinants of gains in capacity (e.g., nutrition, education, genes) and of age-related losses (e.g., occupation, marriage, genes). Exposures in childhood can have lasting effects, but can also be partially offset by advantages in midlife; while risks that occur later in life can incur losses even for those with advantaged childhoods. HRS allows for very good documentation of aging-related losses, however more data are needed that consider early life development, midlife, and aging within the same individuals.

An integrated perspective on health is critical for understanding when and how health disparities emerge. Many studies focus on disparities in mortality, functional problems, or on specific diseases, however, the life course perspective highlights the idea that exposures can give rise to a cascade of risk factors and overlapping health concerns. Research should work to identify how factors like SES influence individuals at different stages of disease development, including the development of physiological risk factors, and the length and trajectory of health processes. Further, attention should be paid to bidirectional relationships between health conditions: Ill individuals are potentially more at risk for other conditions. Answering these questions requires detailed individual-level data that include a wide array of health measures, including measures of biological risk.

While research on health disparities investigating life-course pathways of health disparities is important, it is also important to consider that pathway mechanisms are likely to change over time as macro societal and institutional contexts change. More research is needed on how macro contextual factors influence disparities. For example, the association between education and health has grown stronger and accelerated in magnitude in recent decades. This is likely due to societal factors, including technological, political, and demographic changes. Geographic contexts can also be critical: as states have gained more control over social policy such as healthcare and education, patterns of disparities have begun to vary more across states..

The makeup of social groups also changes dynamically over time. For example, changing immigration patterns have had considerable impact on the makeup of racial and ethnic groups. Today, almost 10 percent of African Americans are foreign-born. Black immigrants may bring with them a different set of advantages and exposures than native-born African Americans. Within the Hispanic population, outcomes vary across foreign- and native-born individuals, and by country of origin. Changes in immigration patterns bring challenges for sampling designs that must be carefully addressed.

Researchers should adopt the mindset that health disparities are dynamic, and reflect changing societal and demographic forces. Taking a broad perspective on health disparities requires rich data resources. These include cohort-level data that provides insight into how specific temporal contexts interact with development; measurements at various points along the pathway from

health to mortality, including “under the skin” biological processes; characterization of institutional forces that have influenced disparities, including changes in the relationship between individuals and government, technology, and work; consideration of geographical differences; and consideration of the changing composition of minority groups.

Discussion

The Health Effects of Health Care and Health Care Policy

Research has often shown minimal impacts of healthcare policy on health disparities, particularly when compared to the effects of educational policy, infrastructure, and economic insecurity. However, it is important not to over-interpret the absence of effects of health policy: when other contextual variables are different, the role that healthcare plays could also change. Findings also depend on the particular outcomes and populations being studied. One area in which there appear to be large impacts of healthcare policy is in access to women’s healthcare clinics.

The ability to treat cardiovascular disease and injuries has improved greatly in recent decades. This improvement in care could explain some historical null effects of healthcare policy on health disparities, and also raises the possibility that inequalities are widening now because the most advantaged members of the population are receiving a higher quality of care that will eventually be available to all members of the population. Reduced smoking rates are likely to have a large impact on the healthcare system as well. The Affordable Care Act has provided incentives for providers to improve the health of the whole population. It is critical that researchers remain invested in studying changes in health policy to determine the extent to which these changes translate into reduced disparities. Importantly, although improvements in health care do not appear reduced health disparities at the national level (although results from more localized studies are promising), they have been successful by other metrics, including economic cost/benefit analyses.

Epigenetics and Biological Framework for the Life Course

Because epigenetic processes are organized through long-term selection, responses may not be compatible with the rapidly changing institutions and technologies of modern life. Physiological and psychological processes may have inconsistent influences on epigenetic expression. Research has shown that epigenetics are highly sensitive to the changing context, and unstable over time. Accordingly, similar variability is expected in epigenetic expression as in institutional variables. Epigenetic expression changes within individuals across contexts, and should be measured over multiple time points within individuals. A research challenge is the biological specificity of epigenetic processes. Both biological and sociological theories must be integrated in order to better understand epigenetic effects on health disparities. Intragenerational and intergenerational models must also be integrated.

Immigration and Invisible Populations

The United States has nearly 50 million immigrants. The immigrant population is changing in a number of ways: newer immigrants may not be as healthy as immigrants were in the past, and

changes in immigration policy (particularly, in the ability of immigrants to leave and re-enter the country) may have influences on both immigrant wellbeing and on the population that chooses to immigrate. It is often unclear whether undocumented immigrants are included in population-based studies, creating confusion. These changes must be attended to and addressed in longitudinal data collection efforts.

Summary and Next Steps

Kathleen Mullan Harris and John Haaga

Several broad themes were apparent throughout the presentations. All presenters agreed that using a life course perspective with longitudinal data is essential to studying health disparities. Such approaches should ideally include the full range of adult ages, as well as cohort designs. A broad set of health outcomes should be measured. It is also important to consider the timing of causes and consequences of health disparities. For example, there is some evidence from the Add Health dataset that enduring racial disparities between Blacks and other racial groups first emerge in young adulthood. More research is needed to understand the physiological trajectory of disparities: often by the time that diseases manifest, it is too late to address disparities. Focusing on markers of disease risk could be more fruitful for intervention.

Another theme was the importance of understanding the mechanisms by which factors such as race, education, and income influence health outcomes. More research is needed on the effects of policy on health, as well as on bidirectional effects of variables like SES on health outcomes. SES has multiple components (e.g., social class, education, income), and it is important to distinguish between the impacts of these components across the life course. Geographical differences, both within the United States and internationally, can inform the relationship between policy and health outcomes.

Social science perspectives are critical to NIA's mission. NIA supports several data infrastructure projects to enable broad research on health disparities, including the [Health and Retirement Study](#), [Gateway to Global Aging](#) for cross-national comparison, and the [National Longitudinal Mortality Study](#), maintained through the Census Bureau, and many others.⁹ NIA is also eager to develop interventions that address health disparities and provide new insight into the scientific understanding of these disparities. Additionally, there are research opportunities for epidemiological studies in Alzheimer's disease.

⁹ See the [NIA Division of Behavioral and Social Research web page](#) on data resources for more information.

Appendix 1

Meeting Agenda

10:00 am	Welcome and Meeting Orientation Kathleen Mullan Harris and John Haaga
10:15 am	Overview of Health Disparities and Their Causes and Consequences Lisa Berkman
11:00 am	The Life Course Perspective Jennifer Karas Montez
11:45 am	The Effects of Inequality and Social Class James House
12:30 pm	Lunch
1:00 pm	The Effects of Education Robert Hummer
1:45 pm	The Effects of Race and Ethnicity Tyson Broan
2:30 pm	Cohort Differences in Health Disparities Claire Yang
3:15 pm	Break
3:30 pm	Needed Data, Analytical Frameworks, and Future Research Mark Hayward
4:15 pm	Summary and Next Steps Kathleen Mullan Harris and John Haaga
4:45 pm	Adjourn

Appendix 2

List of Participants

Committee on Population Members

Kathleen Mullan Harris, Chair, University of North Carolina, Chapel Hill

Jere Behrman, University of Pennsylvania

Lisa Berkman, Harvard University

Ann Blanc, Population Council

Mark Hayward, University of Texas at Austin

Hillard S. Kaplan, University of New Mexico

Sara McLanahan, Princeton University

Presenters

Lisa Berkman, Harvard University

Tyson Brown, Duke University

Mark Hayward, University of Texas at Austin

James House, University of Michigan

Robert Hummer, University of North Carolina, Chapel Hill

Jennifer Karas Montez, Syracuse University

Yang Claire Yang, University of North Carolina, Chapel Hill

National Institutes of Health

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John Haaga, National Institute on Aging

Prisca Ndella Fall, National Institute on Aging

Rosalind King, *Eunice Kennedy Shriver* National Institute of Child Health and Human Development

Evelyn Neil, National Institute on Aging

Georgeanne Patmios, National Institute on Aging

National Academies

Peter Donaldson, Committee on Population

Mary Ghitelman, Committee on Population

Tina Latimer, Committee on Population

Other Participants

Irwin Garfinkel, Columbia University

Karen Harris Brewer, Rose Li and Associates, Inc.

Chandra Keller Allen, Rose Li and Associates, Inc.

Kristen Schorpp, University of North Carolina, Chapel Hill