Enhancing the study of chronic disease risk factors across the life course in U.S. population-representative studies

Meeting Summary
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Executive Summary

Meeting Purpose. An important scientific question centers on what factors over the life course lead to the development of chronic disease. To identify opportunities for enhancing research on this topic, the Michigan Center on the Demography of Aging (MiCDA) Longitudinal Studies of Aging in the U.S. Network focused its annual (December 2025) meeting on chronic disease risk factors across the life course in U.S. population-representative studies. The network, funded by the National Institute on Aging (NIA), received additional support from the Institute for Social Research's Survey Research Center (SRC) to expand the meeting to include studies of adults and children to capture the full life course.

The meeting focused on enhancing and maximizing existing resources, with two overarching questions:

- What is currently available in population-representative studies across the life course in terms of measures of chronic disease risk factors?
- What new measures might be added across studies (e.g., biomarkers, wearables, contextual linkages, etc.) to enhance understanding in the near term (3-5 year window) of population-level risks in the US across the life course?

Meeting participants included leadership from 18 studies, representing 22 study samples, each with a unique scientific focus; topical experts on wearables, biomarkers, and contextual factors; and staff from NIH and several NIH agencies (NIA, NICHD, NIDA, OBSSR). Prior to the meeting, study representatives reported about the collection risk factors for chronic conditions. At the meeting, participants joined workgroups that focused on: wearable devices (e.g., accelerometers, heart monitors, continuous glucose monitors, etc.); biomarkers (divided into two groups); linkages to contextual data; and integration of analyses across studies. Workgroups were asked to identify gaps for existing measures and outline priorities for enhancing research that were both feasible and not excessively costly.

Findings: Risk Factor Availability and Key Gaps. Workgroups identified key gaps in collection or creation of existing measures and new priority measurement areas:

- ***Wearables***. Few study samples have incorporated wearables into their collections, most commonly to measure physical activity and rest/sleep, typically with older adults. Wearables have not been used in child- or young-adult focused population-representative studies; adult (18+) study samples have mainly used commercial grade devices, which limits the types of measures that can be accessed by researchers. Studies are just beginning to use wearables that have additional measures (e.g., heart rhythms, oxygen saturation, skin temp). Newer measures that could advance the field focus on the dynamics and/or variability of movement and on the integration of multiple biophysical measures or contextualization with real-time activity data, but these types of measures are not consistently available.
- ***Biomarkers***. While biomarker data collection is common among the study samples, limited information is available in early to mid-adulthood (i.e., ages 18-40), since biomarkers of disease are generally collected in midlife or older ages, when diseases are more highly prevalent. Genetics are the most common type of biomarker and are available across all ages, followed by epigenetics and polygenic scores. Cardiovascular biomarkers and inflammation/immune function are also available in about half the study samples, with better coverage at older ages (when conditions related to these functions are more likely to be observed). Less common biomeasures include neurological, RNA, systems function, metabolomics, chemical exposures, microbiome, nutritional markers, hormones, and drug tests. There are unique challenges to collecting imaging data that make it difficult to scale in national studies.

- ***Contextual linkages***. Nearly all the study samples make available to the research community contextual linkages – that is data about the area or address where the study participant lives. Commonly available linkages include information from the U.S. Census, data about the neighborhoods in which study participants live, and state-level policies. Many study samples also collect a history of where sample members have lived over the life course, but such data could be more widely collected and linked to contextual measures.
- ***Integration.*** Since a single source of panel data does not exist that includes all age groups over time, and starting such a cohort would not yield results for decades to come, the workgroups identified alternative approaches to address these scientific questions. Data integration was discussed as a potential solution for filling in age gaps to create life course data by combining across studies. Yet, best practices for combining estimates across studies to build a synthetic cohort are not readily available.

Priority Areas for Enhancing Infrastructure. Workgroups made suggestions for enhancing infrastructure, prioritizing those that were feasible over the next 3-5 years and not excessively costly:

- ***Collection.*** Workgroups suggested the addition of research-grade actigraphy for individuals under age 65, especially children; exploration of biophysical measurement collection from other types of wearable devices; biomarker collections earlier in the life course, before the onset of disease; exploration of collection of other types of biological material; more widespread collection and linkage of residential histories to contextual data; and discussions with scholars working on integration and harmonization to learn about challenges and successful approaches.
- ***Creation.*** Workgroups suggested creating normative values across the life course with respect to movement, rest/sleep and other biophysical measures; creating and validating new measures that reflect the dynamics of biophysical measures; integrating multiple biophysical measures into indices, and contextualizing biophysical measures with information about activities and wellbeing; creating new biomarkers to capture disease risks for common chronic conditions (e.g., infection markers; liver enzymes, etc.) and assaying multiple studies together to create less commonly available biomarkers; creating new contextual measures such as wildfire smoke, pesticide exposures, noise, and the social environment, including third places (other than home/work); and creating a case study to work through a concrete example of integrating estimates across studies to uncover challenges to study integration.
- ***Harmonization.*** Workgroups highlighted the need for a core set of recommended measures for use across studies. For example: for wearables, harmonize research grade and commercial grade measures within and across studies and identify a core set of harmonized measures and create a pipeline for implementing harmonized algorithms; for biomarkers, harmonize existing epigenetic, genetic, and other key measures and propose a core set of harmonized, life-course biomarker data across studies; for contextual data, harmonize data sources, definitions, and aggregation across place-based characteristics. The data integration group proposed new tools be developed to ease discovery, harmonization, and standardized analyses across data sources.
- ***Other infrastructure.*** Other recommendations around infrastructure raised by workgroups include: Launching a new wearables network for population scholars to establish best practices for wearable data collection, processing, and utilization; developing infrastructure to facilitate collaborative efforts across studies with banked biological data and establishing a central repository for data; developing infrastructure for disseminating information about existing contextual data resources; and investigating the feasibility of adding to an existing enclave a space (“sandbox”) to allow researchers to use multiple, integrated restricted data resources.

Meeting Background

With funding from the National Institute on Aging (NIA), the Michigan Center on the Demography of Aging (MiCDA), leads a scholarly network focused on emerging survey methodological and measurement issues. The Longitudinal Studies of Aging in the U. S. (LSoA) network meets annually to discuss issues that cross-cut NIA-funded population-representative panel studies.

The 2025 LSoA network meeting focused on enhancing the study of chronic disease risk factors across the life course in U.S. population-representative studies. With additional support from the Institute for Social Research's Survey Research Center, the meeting was expanded to include several adult and child focused studies not typically part of the LSoA network, so that the full life course could be captured. Because of the thin number of child-focused studies, a few national child studies that were not population-representative were also invited. A steering committee of faculty from SRC (Esther Friedman, Vicki Freedman, Pamela Herd, Colter Mitchell, Sunghee Lee, Brady West, and Pamela Davis-Kean) put together the meeting agenda and outlined pre-meeting activities.

The hybrid meeting explicitly focused on ways to enhance existing resources rather than launching new studies. Two overarching questions guided activities:

- What is currently available in population-representative studies across the life course in terms of measures of chronic disease risk factors?
- What new measures might be added across studies (e.g., biomarkers, wearables, contextual linkages, etc.) to enhance understanding in the near term (3-5 year window) of population-level risks in the US across the life course?

Meeting participants (see Appendix A) included leaders of LSoA network aging studies and of national child- and adult-focused studies. Topical experts were also invited to facilitate workgroups on wearables, biomarkers, and contextual factors. In addition, staff from NIH and several NIH agencies (NIA, NICHD, NIDA, OBSSR) attended.

At the meeting, the conference organizers shared a summary of existing measures that had been collected from studies in advance of the meeting. Participants then self-selected into five workgroups, each led by at least two topical experts. Workgroups were charged with reviewing existing measures, identifying life course gaps for existing measures, and suggesting new content to be collected. On the second day of the meeting, workgroups gave presentations summarizing gaps and recommendations and meeting participants discussed next steps.

This meeting summary provides an overview of information collected prior to the meeting, gaps identified by the workgroups, and synthesized recommendations.

Participating Population-Representative Studies

Representatives of 21 studies were invited to participate.[1] Each study had a unique scientific focus, and all but one were designed to be population representative). Among the 21 studies invited, 18 provided information about at least one sample in their study. Because some studies had more than one sample (e.g., Future Families Focal Children and Future Families Parents), the meeting ultimately included information from 22 study samples (see Table 1).

Table 1. Key Focus of Population Representative Study Samples

Study/Sample (Abbreviation)	Key Focus
1. Adolescent Brain Cognitive Development Study (ABCD)[m]	Long-term study of brain development and child health
2. Americans' Changing Lives (ACL)*[n]	Neighborhoods, work, social connection and health through adulthood
3. Future of Families Focal Children (FF Child)[r]	Contemporary U.S. birth cohort study of young adults (child interviews)
4. Future of Families Parents (FF Parents)[r]	Contemporary U.S. birth cohort study of young adults (parent interviews)
5. Great Smoky Mountains Study of Rural Aging (GSMS-RA)*[r]	Early determinants of the aging experience in a rural context
6. Health and Retirement Study (HRS)*[n]	Health and economic circumstances of adults over age 50 in the United States
7. HRS Harmonized Cognitive Assessment Protocol (HRS-HCAP)[n]	Dementia risk within ongoing longitudinal studies of aging around the world
8. High School and Beyond: 1980 (HSB 80)*[n]	How high school experiences are associated with educational and life outcomes
9. Mid-Life Health in the Rural South (ML HIRS)[r]	Risk and resilience for health and well-being during midlife in rural, eastern NC
10. Monitoring the Future Longitudinal Panel Study (MTF Long)[n]	Behaviors, attitudes, and values from adolescence through adulthood
11. National Health and Aging Trends Study (NHATS)*[n]	The late-life disablement process and its consequences, including family care
12. National Longitudinal Study of Adolescent to Adult Health (Add Health)*[n]	Longitudinal study of adolescents through adulthood
13. Add Health Parent Study (Add Health Parent)*[n]	Role families play in shaping health and well-being across generations
14. National Longitudinal Study of the High School Class of 1972 (NLSY 72)[n]	Links among education, labor market and postsecondary education experiences
15. National Longitudinal Survey of Youth 1979 (NLSY 79)[n]	Chronicle life-course experiences of a cohort of born 1957 to 1964
16. National Social Life, Health, and Aging Project (NSHAP)*[n]	Older adults' social lives and health
17. Project Talent (PT)*[n]	How and why early life experiences and attributes impact later life outcomes
18. PSID Core (PSID)*[n]	Family life over time and across generations
19. PSID Child Development Supplement (PSID CDS)[n]	Health, development, and well-being of children
20. PSID Transition into Adulthood Supplement (PSID TAS)[n]	Health, development, and well-being of young adults
21. Understanding America Study (UAS)*[n]	Factors shaping individual and family experiences across the life course
22. Wisconsin Longitudinal Study (WLS)*[r]	Health and well-being across the life course for 1957 WI high school graduates

*MiCDA LSoA network study. n=National, population-representative study; r=Regional (or other area), population-representative study; m=Multi-site, not population representative.

[1]Invitees included all 13 MiCDA LSoA network studies (indicated with * in Table 1), which mainly focused on late- and/or mid-life, and 8 additional studies focused on children or adults, including two studies that were national but not population representative (that is, not probability based). Federal studies without NIH funding were considered out of scope.

Most study samples were nationally representative (designated with "n" in Table 1); 5 were regional or representative of other areas (e.g., state or cities; "r"), and 1 was a multi-site study that was not population representative ("m"), but included because of its emphasis on children. About half of the study samples follow a single cohort (sampled in a given time period and then followed, without replenishment). The remaining study samples have been replenished (either periodically or as part of an ongoing design), allowing multiple cohorts to be studied.

Prior to the meeting, study representatives were asked to provide details about their study's design and existing measures of chronic conditions and risk factors, grouped as follows: wearables (e.g., accelerometers, air quality monitors, glucose monitors, etc.); biomarkers (e.g., blood, dried blood, saliva, hair, etc.); contextual data and linkages (e.g., Census data, State policy data, features of neighborhood, pollution, weather, etc.; residence history) and administrative linkages (e.g., CMS claims and assessment, other health insurance or medical records; birth, death, employment, social security, other records; Historic census information).

Summary of Study Sample Coverage and Designs

The national, population-representative study samples - whether replenished (light blue) or not (dark blue) - are able to represent all age groups in 2025 (see Figure 1). However, only one study covers the 0-18 age group. In addition, non-national study samples (orange) cover age groups 25-49, 50-64 and 85+.[2]

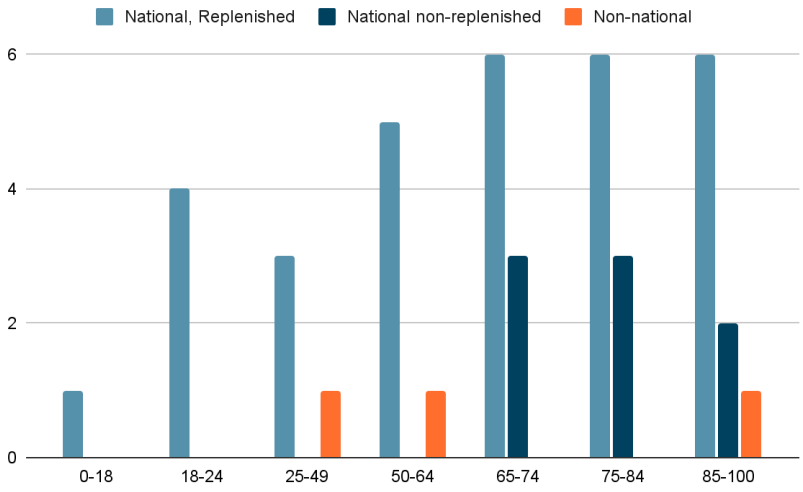

Figure 1. Number of Population Representative Study Samples in 2025, by Age Groups Represented and Type of Sample

The most common data collection interval is 5 years (7 out of 22 study samples). Nine study samples collect data more frequently (e.g., 1 multiple times/year; 1 annually and 5 every other year). Other studies have much longer (e.g, 1 every 10 years) or irregular collection intervals.

Modes of collection also vary across the study samples. Seven of the 22 participating study samples have used four modes of data collection (in-person, phone, web, and mail) over the course of the study; an additional 12 studies have used an in-person mode and at least one other mode (phone, web, or mail). Altogether, 20 of the 22 study samples have had an in-person component.

[2] Other non-replenished study samples represent narrow bands within age groups (e.g., ages 15-19, 59-63) and were therefore not shown in Figure 1.

Summary of Chronic Condition Measures

Study representatives were asked to report the types of measures collected for eight chronic conditions. The conditions of interest were selected based on a review of top causes of death across age groups.

As shown in Figure 2, most chronic conditions were available in most studies. For each of the conditions, study samples most commonly collected either self-reported measures or self-reported measures in combination with objective measures.

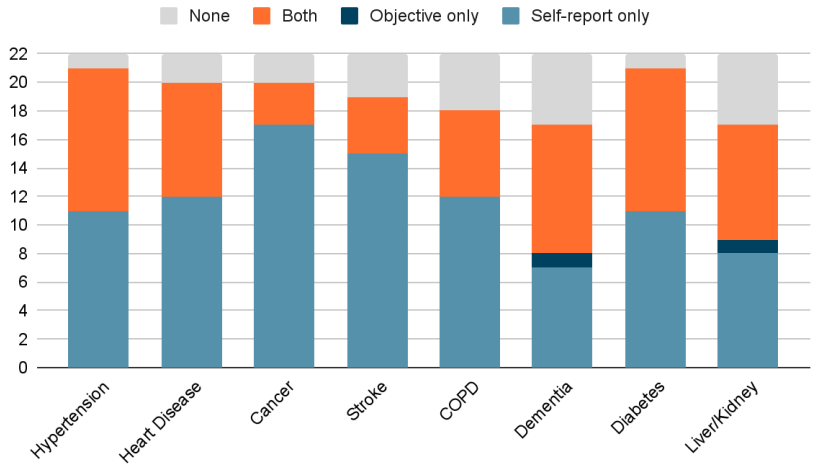

Figure 2. Number of Population Representative Study Samples with Self-report, Objective or Both Types of Measures of Major Chronic Conditions

Summary of Available Risk Factor Measures

Study representatives were asked to report if their study (1) collected data with wearable devices (e.g., accelerometers, heart monitors, continuous glucose monitors, etc.); (2) collected any biomarkers, including whole blood, dried blood, saliva, and other types (e.g., hair, nails, etc.); (3) provided researchers with either (a) geocoded information on participants' place of residence that may be linked to contextual data, or (b) linked contextual variables based on participants' place of residence that the study links; and (4) linked survey responses to any administrative data. Detail at the study sample-level is provided in Appendix B tables.

Wearables. Only 6 of the 22 studies have incorporated wearables into their collections, most commonly to measure physical activity. All but one study sample has used wrist worn devices (rather than placement on the thigh). Two study samples have used wrist-based devices that include measures of heart rate, oxygen saturation and skin temperature and one study has also used wearables to assess air quality.

Four study samples have used research grade devices that provide researchers with raw data on physical activity and rest (e.g., Actiwatch, Actigraph, Geneactiv). Sample sizes ranged from 200-1500 and collection periods range from 3-8 days, depending on the study or sample. Two of these studies with research grade wearables have larger collections planned (5000-6000) with samples ages 47+ and 68+. Several studies have used research grade wrist-worn devices multiple times with the same participants.

Two studies have used commercial grade wrist-worn devices (e.g., apple watch or fitbit), one with children and the other with adults. Sample sizes for these collections range from 1000-5000 and collection periods are longer (e.g., weeks, a year or more). Measures from these commercial devices are more limited than the research grade devices.

Biomarkers. Most of the study samples (n=19 out of 22) have collected samples to obtain biomarkers. The source of material is most often saliva, followed by whole blood and dried blood spots (see Figure 3).

For 17 of the 19 study samples some type of genotyping or assaying of the material has been conducted. A majority of studies (n=17) have collected specimens in person; more than half (n=12) have also used mail to collect specimens. Only 2 study samples used a mail-out/mail-back only design.

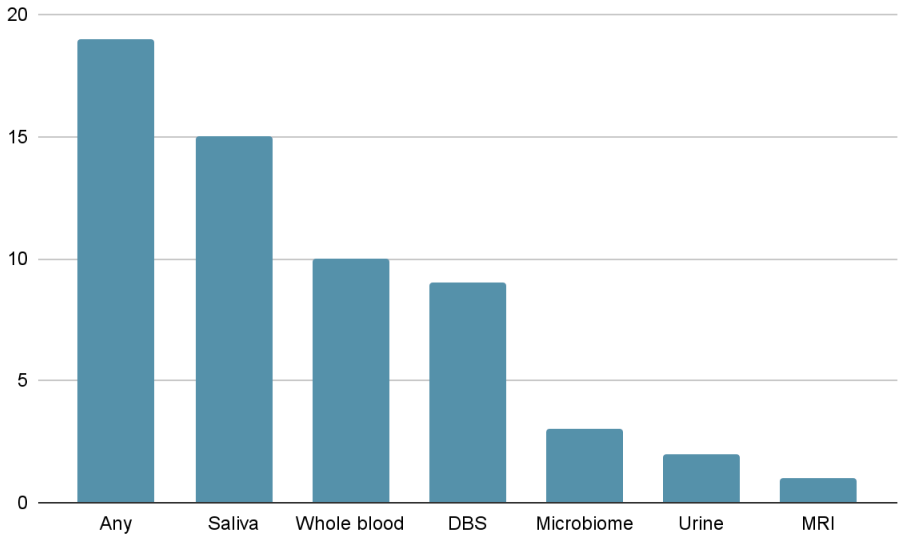

Figure 3. Number of Population Representative Study Samples with Biomarker Collection, by Source of Material

Figure 4 summarizes the number of study samples offering biomarkers to researchers, by type of biomarker. Genetics are the most common type (16 out of 17 with material), followed by epigenetics and polygenic scores. Cardiovascular and inflammation/immune function are also available in 12 study samples. Six to eight study samples have neurological, RNA, systems function, or metabolomic measures. Much less common (4 or fewer study samples) are measures of the chemical exposures, the microbiome, nutritional markers, hormones, imaging and drug tests.

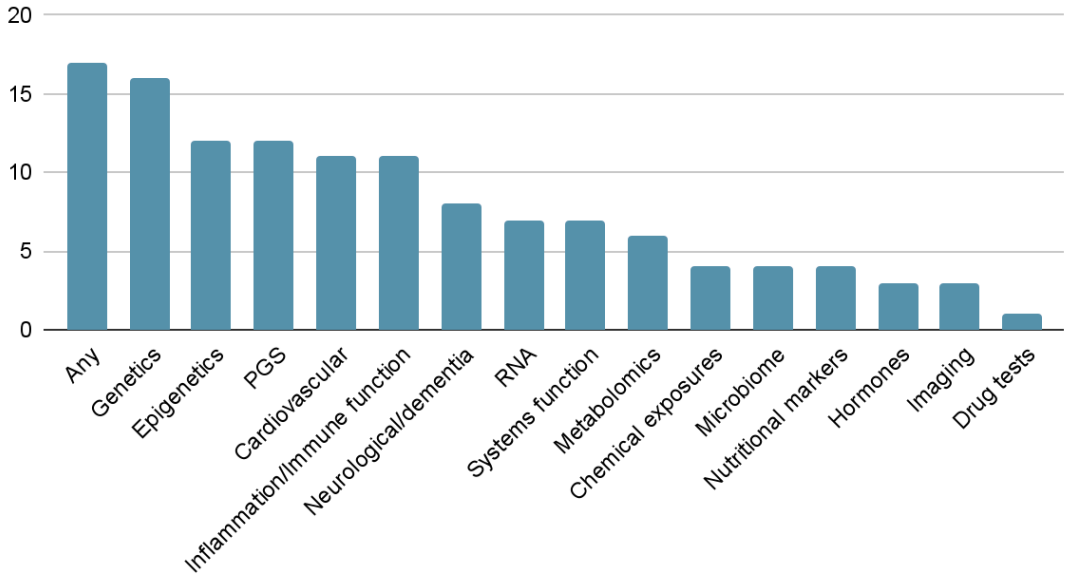

Figure 4. Number of Population Representative Study Samples by Type of Biomarkers Available

Contextual linkages. Nearly all the study samples make available contextual linkages – that is data about the area or address where the study participant lives – to the research community. About half of the study samples (12/22) have geocoded information available for researchers to do their own linking; other studies do linking for the research community; and some do both. Those that share geocoded data generally do so at a more aggregated level of geography than they have access to. For instance, 6 study samples make available census tract or zip code to researchers; 5 make available census block or block group.

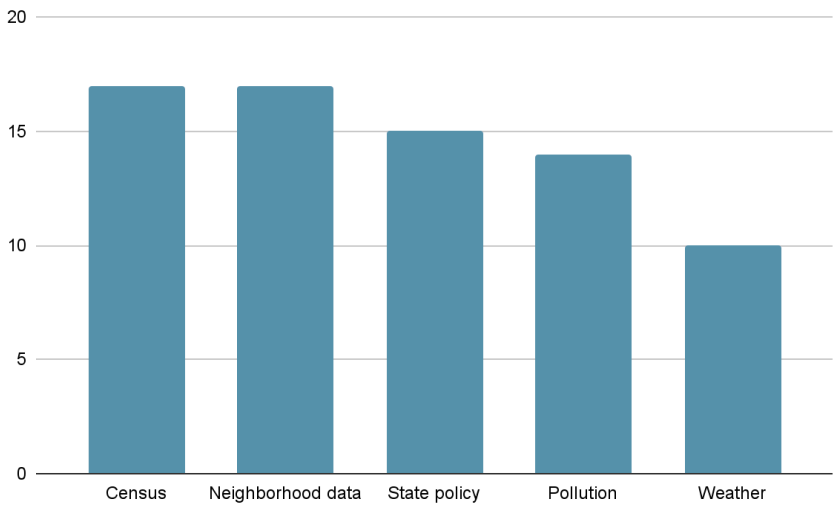

Figure 5. Number of Population Representative Study Samples by Type of Contextual Data Available

Commonly available linkages (see Figure 5) include information from the U.S. Census, data about the neighborhoods in which study participants live, and state-level policies. Most studies also have available pollution and about half have weather-related data. These types of linked files are typically considered restricted and require protections to minimize disclosure risks.

Many study samples (n=15/22) collect a history of where sample members have lived – also called a residence history. Most (n=12/15) obtain address or geocode addresses to latitude/longitude; a few study samples obtain less granular information such as city or zip code.

Administrative linkages. Most study samples are also linked to at least one type of administrative record source (n=16/22) and have made these linkages available to the research community, often as restricted data files.

Death records are the most common linkage (n=13), followed by linkages to files from the Centers for Medicare and Medicaid Services (CMS; n=7), historic Census data (n=6) and education records (n=6). Five studies have linked their data to social security records and four to birth records.

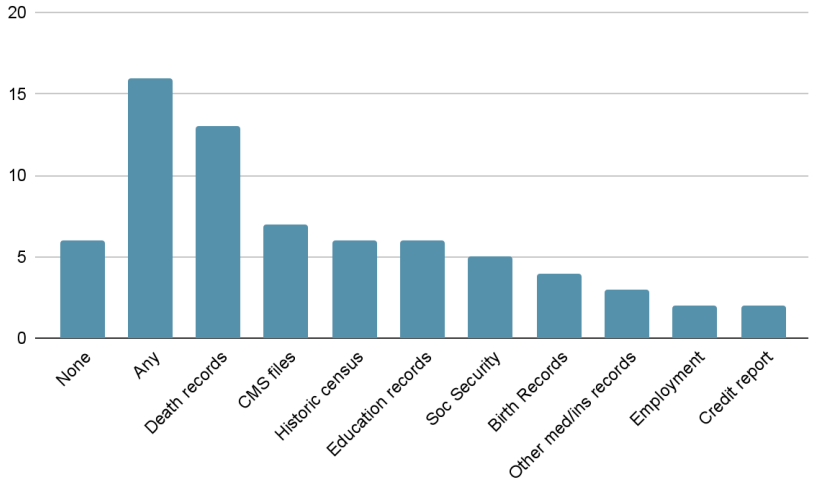

Figure 6. Number of Population Representative Study Samples by Type of Administrative Linkages Available

Workgroups

Meeting participants sorted themselves into five self-selected (hybrid) workgroups with at least two workgroup facilitators per group, shown in Table 2. Following small group discussions to determine if additional or different workgroups were needed, a fifth group was added to focus on issues related to integrating studies to form synthetic cohorts.[3] Appendix C includes a list of workgroup members.

Workgroups discussed key scientific questions related to chronic disease risk factors that should be answered, identified gaps for existing measures, and outlined new priority measurement areas.

Table 2. Workgroup Facilitators and Topics Covered

Group	Facilitators	Topics Covered
Wearables	Jennifer Schrack & Kira Birditt	Accelerometers, Heart monitors, Continuous glucose monitors, etc.
Biomarker A	Colter Mitchell & Allison Aiello	Genetics & Epigenetics; Inflammation/Immune function/Cardiovascular; Chemical exposures (pesticides, metals, etc.); Drug tests (legal, illegal); Systems function (glucose, kidney function, liver function)Imaging (MRI, ultrasound, PET scans, etc.
Biomarker B	Jessica Faul & Bharat Thyagarajan	RNA; Microbiome, Nutrition & Metabolomics; Neurological/dementia; Hormones (stress, testosterone, estrogen, etc.)
Contextual linkages	Grace Noppert, Sarah Adar & Meredith Pedde	Census data, State policy data, features of neighborhood, pollution, weather, etc.; residence history
Integration across studies	Brady West & Rob Warren	Integration across data sets to form synthetic cohorts, harmonization of measures

Priority Scientific Questions and Approaches

Across workgroups, both cross-sectional or longitudinal (panel-based) approaches to answering scientific questions were considered. Short-term (3-5 year) approaches mainly focused on:

1. Documenting patterns of risk factors, using normative data, across different phases of the the life course;
2. Identifying windows of time (e.g., childhood, young adulthood, midlife, later life) when specific risk factors are most strongly associated with or predictive of the presence/onset of various chronic conditions.

Since a single source of panel data does not exist that includes all age groups over time, and starting such a cohort would not yield results for decades to come, the workgroups identified alternative approaches to address these scientific questions. In particular, creation of a harmonized “synthetic” cohort across all age groups seemed a promising direction. Cohorts could be formed using only cross-sectional data from a common time frame (e.g., 2020-2025) or from panel data pieced together from different sources over different age groups and time frames.

[3]An administrative linkages workgroup was considered; however, the time to create new administration linkages did not fit within the targeted 3-5 year time frame.

Gaps Hindering Study of Chronic Disease Risk Factors Over the Life Course

Workgroups were asked to identify gaps in collection or creation for existing measures and new priority measurement areas.

Wearables. To date, wearables in population-representative studies have mainly been used to collect data on physical activity and rest/sleep. With respect to age gaps, wearables have not been used among children under the age of 10. Commercial devices have been used with older children in a multi-site (not population-representative) study (ABCD), so there are no research grade data under the age of 18. Only one study (UAS) has collected data from the 18-49 population (using mainly commercial grade devices).

Studies are just beginning to use wearables that have additional measures added to the wrist-worn technology (e.g., heart rhythms, oxygen saturation, skin temp). Only one other type of wearable - an air quality monitor - was reported being used (by UAS) among the study samples.

Most studies provide researchers with one or more of the following measures: Total daily physical activity (steps, kcals, active minutes, counts); Physical activity intensity (e.g., moderate-to-vigorous, light, sedentary time); Sleep quantity and characteristics (e.g., total sleep time, sleep efficiency, sleep fragmentation, awakenings). Newer measures that could advance the field focus on the dynamics and/or variability of movement, including: diurnal/circadian patterns ("Rest/Activity Rhythms"); transitions between active and sedentary states ("fragmentation"); variability of activity (within and between days). Research is needed to determine whether these measures can be developed with adequate reliability and validity from commercial devices. Also potentially promising is research to investigate the integration of multiple measures (e.g., activity, sleep, heart rhythms, oxygen saturation, skin temp.) in ways that might enhance prediction of chronic disease onset. The addition of self-reported daily experiences to contextualize the data (e.g., EMA) could facilitate better understanding of the linkage between information gleaned from wearables and chronic disease onset.

Biomarkers. Research with biomarkers has most often focused on: (1) the evolution of risk factors over the life course; and (2) subclinical disease measures that will allow early disease detection. Biomarkers can also serve as indicators of other risk factors that are linked to chronic condition onset.

Biomarker data collection is common among the study samples, but limited information is available in early- to mid-adulthood (i.e., ages 18-40). Genetics data has the broadest age coverage; epigenetics has near full age coverage but is still better covered at older ages. Cardiovascular biomarkers and markers of inflammation or immune function have better coverage at older ages because conditions related to these systems are more common at older ages. Less commonly available biomeasures include neurological, RNA, systems function, metabolomics, chemical exposures, microbiome, nutritional markers, hormones, and drug tests. Imaging has high cost and challenging logistics that make it difficult to scale for most population-representative studies, unless expressly designed to incorporate.

One of the limits to biomarker data is that markers are typically aligned with age groups so that collection occurs when the disease (or exposure) is highly prevalent. For instance, biomarkers for cardiovascular disease or inflammation/immune function are typically collected and assayed for older adult populations. To understand how biomarkers are distributed over the life course requires a shift toward collection for all age groups, irrespective of disease prevalence.

Contextual data/linkages. Contextual factors may shape the ability to engage in positive and negative health behaviors and therefore may contribute to the understanding of many risk factors that influence chronic disease onset. Growth of data about place provides new opportunities to characterize a study participant's experiences without adding to survey length. Because data are place-based they are available for everyone in a study participant's household, regardless of age.

Historical contextual data are increasingly available to facilitate understanding of contextual influences over the life course. Linkages to historical data require information on where study participants lived across the life course. Some study samples (13/22) have collected a residential history from participants and/or used commercial products (like LexisNexis), but not all study samples have information to link to historic contextual data.

Integration. Data integration was discussed as a potential solution for filling in age gaps to create life course data by combining across studies. Yet best practices for combining estimates across studies to build a synthetic cohort are not readily available.

The workgroup outlined an approach for identifying and developing integrated data. 1. Discovery of key measures in studies of interest. 2. Review to ensure studies conceptualize, operationalize, and measure in comparable ways for comparable groups of people. 3. Implementation of post-hoc harmonization of measures. 4. Derivation of combined estimates.

Users interested in combined estimates across data sources may be able to analyze each source separately and then combine estimates (and covariances). However, pooled analyses may give the researcher more flexibility in undertaking integrated analysis. Options to pool data may be limited in cases where the researcher wishes to include data sources that may increase risk of disclosure (e.g., geographic data) or are subject to regulation (e.g., health claims) or require data use agreements (e.g., privately owned data).

Priority Areas for Enhancing Infrastructure

Workgroups were also asked to prioritize suggestions that were important to understanding chronic condition development but also feasible and not excessively costly. Recommendations for priority areas (see Table 3) focused on enhancing infrastructure over the next 3-5 years. We classified recommendations into four categories: Collection, Creation, Harmonization, and Other infrastructure.

Collection. Each workgroup suggested targeted collection of data that would fill existing gaps in knowledge about the full life course, especially for children and adults under the age of 65:

- Research grade actigraphy should be added to population-representative studies for individuals under age 65 and especially children. Collection of biophysical measures from other types of wearables (e.g., heart rate monitoring, glucose monitoring, etc.) should be explored in population-representative research studies across the life course.
- Biomarker collections should start earlier in the life course and should include exploration of collection of other types of material (e.g., baby teeth). New strategies may be needed for collecting nutritional data to complement blood-based markers.
- Residential histories should be collected more widely and linked to contextual data, providing data across ages and life stages.
- Discussions with scholars working on integration and harmonization are needed to learn about challenges and what approaches have been most successful.

Creation. Each workgroup suggested creating new measures:

- Create normative values across the life course with respect to movement, rest/sleep and other biophysical measures. Create and validate measures that reflect the dynamics of biophysical measures, integrate multiple biophysical measures into indices, and contextualize biophysical measures with information about activities and wellbeing.
- Identify new biomarkers (e.g., infectious disease exposure, liver enzymes) to capture disease risks. Assay banked samples from multiple studies together to minimize lab and batch effects and potentially reduce costs per assay. Use this approach to broaden coverage for less common biomarkers (e.g., neurological, RNA, systems function, metabolomic measures, chemical exposures, microbiome, nutritional markers, hormones, and drug tests) and to explore new biomarkers.
- Develop new contextual measures to capture wildfire smoke, pesticide exposures, noise, and more refined measures of social environment including third places (e.g. community spaces distinct from work and home). Create measures for third places to capture broader geographic experiences beyond home and work.
- Create a case study to work through a concrete example of integrating estimates across studies to uncover challenges to study integration.

Harmonization. The theme of harmonization - that is, drawing upon existing measures to make them as comparable as possible - was raised in all workgroups. A major theme was the need to identify a minimum set of recommended best measures for use across studies to move the field forward.

- For wearables, harmonization of research grade and commercial grade measures within and across studies is needed. A core set of harmonized measures should also be identified and a pipeline for creating harmonized algorithms across multiple studies developed.
- For biomarkers, harmonizing is needed for existing epigenetics, genetics, and other key measures. A core set of harmonized, life-course biomarker data, should be identified for use across studies.
- For contextual data, harmonization is needed for data sources, definitions, and aggregation across place-based characteristics.
- For the data integration group, harmonization is needed to develop infrastructure for combining estimates from multiple datasets. New tools may also be needed to ease discovery, harmonization, and standardized analyses across data sources to create life course data.

Other infrastructure. Other recommendations around infrastructure raised by workgroups include:

- Launch a new wearables network for population scholars to establish best practices for wearable data collection, processing, and utilization. Model it after the successful biomarker network.
- Develop infrastructure to facilitate collaborative efforts across studies with banked data. Resources are needed for studies to process their samples to obtain core measures. (potentially teaming up to get discounted assays). Create a centralized NIH data repository for biomarker data, modeled after the NIH genomic repository.
- Develop infrastructure for disseminating information about existing contextual data resources broadly.
- Investigate the feasibility of a restricted data resource (“sandbox”), initially through the MiCDA virtual restricted data enclave, that will allow researchers to apply to use multiple restricted data resources for integrated life course analyses.

Table 3. Priority Areas for Infrastructure Building to Study Chronic Disease Risk Factors Over the Life Course				
	Wearables	**Biomarkers**	**Contextual factors**	**Integration**
COLLECTION	Collect wearable info across life course - add research grade actigraphy to population representative studies with other age groups <65, especially children Explore collection of biophysical measures from other types of wearables (e.g., heart rate monitoring, glucose monitoring, etc.) in population-representative studies across the life course.	Collect more samples from children; explore collection of other sample types (e.g. teeth) Identify new strategies for collecting nutritional data (e.g. scan grocery receipts)	Collect residential histories across the life course	Conduct focus groups with scholars who work on integration and harmonization to identify challenges to combining different data sources
CREATION	Create normative physical activity, sleep and other measures from wearables across life course; create dynamic and integrated biophysical measures using standard algorithms.	Create and disseminate new biomarkers (e.g., infectious disease exposure, liver enzymes) from banked samples and assay broaden coverage for less common biomarkers by conducting assays for multiple studies together	Create new measures of: wildfire smoke, pesticide exposures, noise and more refined measures of social environment, including third places (other than home/work).	Work through a concrete case to uncover challenges in study integration
HARMONIZATION	Harmonize research grade and commercial grade measures across studies Identify minimum data set of recommended wearable measures	Harmonize existing measures, including, epigenetics, genetics, and other key biomarkers Identify minimum data set of recommended biomarker measures	Harmonize data sources, definitions, and aggregation across studies with focus on features of place Identify a minimum data set of recommended contextual factors	Develop infrastructure for combining estimates from multiple public-use data sets Develop tools to facilitate harmonization
OTHER INFRASTRUCTURE	Launch wearables network for population scholars (establish best practices for data collection, processing, utilization, etc)	Help studies get their data processed; explore multi-study discounts. Create centralized NIH data repository (as with genetic data)	Disseminate information about existing contextual data resources	Investigate feasibility of restricted data “sandbox” that will allow researchers to apply to use multiple restricted data resources for integrated life course analyses

Next Steps

The final meeting session was devoted to outlining shorter- and longer-term next steps. In addition to preparing a meeting summary, additional possible activities include:

- Developing a white paper that recommends a standardized set of core risk factors, measured via wearables, biomarkers, and contextual linkages, over the life course. The paper could begin with a series of presentations at a symposium held in conjunction with the LSoA 2026 annual meeting;
- Investigating a MiCDA Integrated Life Course Analysis Sandbox to use contextual data with restricted variables across multiple data sets;
- Developing a case study for building a harmonized, synthetic cohort across studies; and
- Exploring opportunities to develop a wearables network for population scholars.

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Appendix A. Attendees

SRC-MiCDA Joint Meeting on Enhancing Measurement of Chronic Disease Risk Factors Over the Life Course in U.S. Population Studies
December 4-5, 2025
Institute for Social Research

First Name	Last Name	Title	Affiliation
Joelle	Abramowitz	Associate Research Scientist	University of Michigan
Sara	Adar	Professor, Epidemiology	University of Michigan
Allison	Aiello	Professor, Epidemiology	Columbia University
Kira	Birditt	Research Professor, Survey Research Center	University of Michigan
Shanna	Breil	Social Science & Survey Strategy Officer	NIH
Sandra	Brown	Research Professor	San Diego State University
David	Braudt	Program Officer & Project Scientist	NIH/NIA
Sarah	Burgard	Professor, Sociology	University of Michigan
Kate	Cagney	Director, Institute for Social Research	University of Michigan
Randy	Capps	Program Director, Population Dynamics Branch	NIH/NICHD
Alicia	Carmichael	Research Area Specialist Lead	University of Michigan
Deborah	Carr	Professor, Sociology	Boston University
Stephanie	Chardoul	Director, Survey Research Operations	University of Michigan
Minki	Chatterji	Program Officer	NIH/NIA
Thomas	Crossley	Research Professor, Survey Research Center	University of Michigan
Kate	Duchowny	Research Assistant Professor, Survey Research Center	University of Michigan
Naomi	Duke	Associate Professor of Pediatrics and Sociology	Duke University School of Medicine
Josh	Ehrlich	Associate Professor, Ophthalmology and Visual Sciences	University of Michigan
Michal	Engelman	Professor, Sociology	University of Wisconsin-Madison
Jessica	Faul	Research Associate Professor, Survey Research Center	University of Michigan
Vicki	Freedman	Research Professor, Survey Research Center	University of Michigan
Esther	Friedman	Research Associate Professor, Survey Research Center	University of Michigan
Rosella	Gardecki	Assistant Director, Center for Human Resource Research (CHRR)	Ohio State University
Richard	Gonzalez	Professor, Psychology	University of Michigan
Eric	Grodsky	Professor, Sociology	University of Wisconsin-Madison
Tania	Gutsche	Co-Director, CESR	University of Southern California
Kathleen	Mullan-Harris	Professor, Sociology	University of North Carolina
Brenda	Jones-Harden	Professor, Human Development & Quantitative Methodology	University of Maryland
Pamela	Herd	Professor, Public Policy	University of Michigan

Maggie	Hicken	Research Associate Professor, Survey Research Center	University of Michigan
Emily	Hooker	Program Director	NIH/NIA
Todd	Horowitz	Branch Chief	NIH/NIA
V. Joseph	Hotz	Research Professor	University of Chicago
Mengyao	Hu	Associate Professor	UT Health, Houston
Robert	Hummer	Professor, Sociology	University of North Carolina
Noura	Insolera	Assistant Research Scientist, Survey Research Center	University of Michigan
Justin	Jager	Research Associate Professor, Survey Research Center	University of Michigan
Kriti	Jain	Program Official	NIH/NIA
Joy	Jang	Assistant Research Scientist, Survey Research Center	University of Michigan
Susan	Jekielek	Program Director	NIH/NICHD
Arie	Kapteyn	Director, Center for Economic and Social Research	University of Southern California
Amelia	Karraker	Program Official, Div. of Behavioral & Social Research	NIH/NIA
Pamela	Davis-Kean	Professor, Psychology & Director, Survey Research Center	University of Michigan
Jon	King	Senior Scientific Advisor to the Director	NIH/NIA
Rosalind	King	Program Director	NIH/OBSSR
Nicole	Kirgis	Associate Director, Survey Research Operations	University of Michigan
John	Kubale	Research Assistant Professor, ICPSR	University of Michigan
Ken	Langa	Research Professor, Survey Research Center	University of Michigan
Jinkook	Lee	Research Professor, Economics	University of Southern California
Sunghee	Lee	Research Associate Professor, Survey Research Center	University of Michigan
Marsha	Lopez	Branch Chief	NIH/NIDA
Donovan	Maust	Research Professor, Geriatric Psychiatry	University of Michigan
Helen	Meier	Research Assistant Professor, Survey Research Center	University of Michigan
Colter	Mitchell	Research Associate Professor, Survey Research Center	University of Michigan
Grace	Noppert	Research Assistant Professor, Survey Research Center	University of Michigan
Emerald	Nguyen	Program Official	NIH/NIA
Colm	O'Muircheartaigh	Professor, Harris School of Public Policy	University of Chicago
Megan	Patrick	Research Professor, Survey Research Center	University of Michigan
Sarah	Patterson	Research Assistant Professor, Survey Research Center	University of Michigan
Karen	Peterson	Professor, Nutritional Sciences	University of Michigan
Meredith	Pedde	Assistant Research Scientist, Epidemiology	University of Michigan
John	Phillips	On Detail: Senior Advisor to the Director	NIH
Jennifer	Schrack	Professor, Epidemiology	Johns Hopkins University
Janine	Simmons	Deputy Director, BSSR	NIH/OBSSR
Bharat	Thyagarajan	Professor	University of Minnesota
Rob	Warren	Professor, Sociology	University of Minnesota
Brady	West	Research Professor, Survey Research Center	University of Michigan
Wei	Zhao	Assistant Professor, Epidemiology	University of Michigan

Appendix B. Detailed Tables

Study Abbreviations in tables that follow:

ABCD: Adolescent Brain Cognitive Development Study
ACL: Americans' Changing Lives
Add Health: National Longitudinal Study of Adolescent to Adult Health
Add Health Parent: National Longitudinal Study of Adolescent to Adult Health Parent Study
FF Child: Future of Families Focal Children
FF Parent: Future of Families Parents
GSMS-RA: Great Smoky Mountains Study of Rural Aging
HRS: Health and Retirement Study
HRS-HCAP: Harmonized Cognitive Assessment Protocol
HSB 80: High School and Beyond
ML HIRS: Mid-Life Health in the Rural South
MTF Long: Monitoring the Future Longitudinal Panel Study
NHATS: National Health and Aging Trends Study
NLSY 72: National Longitudinal Study of the High School Class of 1972
NLSY 79: National Longitudinal Survey of Youth 1979
NSHAP: National Social Life, Health, and Aging Project
PSID: PSID Core
PSID CDS: PSID Child Development Supplement
PSID TAS: PSID Transition into Adulthood Supplement
PT: Project Talent
UAS: Understanding America Study
WLS: Wisconsin Longitudinal Study

Appendix Table B1. Study Design Elements in Population-Representative Studies

	First Year	Most Recent Year	Interval (in Years)	National, Regional, Other Area or Multi-site	Replenished	Mode	2025 Age Group
ABCD	2015	2025	<1	M	Yes	In-person, Web	15-19
ACL	1986	2021	irreg	N	No	In-person, Phone	61+
Add Health	1994	2025	5	N	No	In-person, Web	39-51
Add Health Parent	1994	2026	10	N	No	In-person, Phone	64+
FF Child	1998	2023	5	R	No	All four	25-29
FF Parent	1998	2023	5	R	No	In-person, Web, Phone	41-65
GSMS-RA	1993	2023	5	R	No	In-person, Web, Mail	42-46
HRS	1992	2026	2	N	Yes	All four	51+
HRS HCAP	2016	2026	5	N	Yes	In-person, Phone	65+ (60+ in 2026)
HSB 80	1980	2021	irreg	N	No	In-person, Phone, Mail	59-63
Mid-Life HIRS	2025	2025	n/a	R	No	In-person, Web, Mail	30-55
MTF Long	1976	2025	1	N	Yes	Web, Mail	18-65
NHATS	2011	2026	1	N	Yes	In-person	67+
NLS 72	1972	2026	irreg	N	No	All four	72-73
NLSY 79	1979	2025	2	N	No	In-person, Phone	60-68
NSHAP	2005	2026	5[1]	N	Yes	All four	50+
PSID CDS	1997	2024	5	N	Yes	All four	0-17
PSID Core	1968	2025	2	N	Yes	All four	18+
PSID TAS	2005	2025	2	N	Yes	Web, Phone	18-28
PT	1960	2020	irreg	N	No	All four	75-84
UAS	2014	2025	<1	N	Yes	Web	18+
WLS	1957	2026	2	R	No	In-person, Phone, Mail	85+

[1]More frequent for groups with high mortality risk
N=national population-representative; R=population-representative for a region, state or other areas (e.g., cities); M=multi-site, not population-representative

Appendix Table B2. Wearable Collections in Population-Representative Studies

Study	Ages	Year	n	Monitor	Days	Placement	Measures
ABCD	10-13	2018	5000	Fitbit	weeks	wrist	Physical activity, sleep
FF Child	15, 22 panel	2015, 2022	1000	Actiwatch Spectrum	7	wrist	Physical activity, sleep
HRS	51+	2019	200 (pilot)	Geneactiv	7	wrist	Physical activity
NHATS	72+, 73+, 74+, 75+, 76+ panel	2021-2025	800	Actigraph Insight/Actigraph Leap	7	wrist	Physical activity (2021-2025), sleep (2025)
NHATS	68+, 69+, 70+ panel	2026-2028*	6000	Actigraph Leap	7	wrist	Physical activity, sleep, heart rate, oxygen saturation, temperature
NSHAP	62+[1]	2010	793	Actiwatch Spectrum	3	wrist	Physical activity, sleep
NSHAP	50+[1]	2015	780	Gulf Coast Data Concepts	3	wrist	Physical activity, sleep
NSHAP	55+[1]	2021	1635	Geneactiv	8	wrist	Physical activity, sleep
NSHAP	47+[1]	2027*	5000	Geneactiv	8	wrist	Physical activity, sleep
UAS[2]	18+ monthly	2021-2025	1000-1500	Geneactiv; Fitbit; Apple watch; Activpal; Air quality monitors	year+	wrist[3]	Physical activity, sleep, heart rate, oxygen saturation, temperature, basal metabolic rate, air quality

[1] and co-resident partners of any age
[2] American Life in Realtime (ALiR)
[3] except activpal
*Planned

Appendix Table B3.a. Biomarker Collections in Population-Representative Studies: Genetics, Epigenetics and Polygenic Scores

Study	Ages	Year	Genetics	Epigenetics	PGS
ABCD	9-19	2016-2025	Yes	Yes	Yes
ACL	58+	2019	No	Yes	No
Add Health	18-26; 24-32; 33-44; 39-51	2001-02, 2008-09, 2016-18, 2022-25	Yes	Yes	Yes
Add Health Parent	64+	2026-27*	Yes	Yes	Yes
FF Child	9, 15, 22	2007; 2013; 2020	Yes	Yes	Yes
FF Parent	27-53 (mothers)	2012	Yes	Yes	Yes
GSMS-RA	9-16; 19-30	1990s-2000s	Yes	Yes	No
HRS	51+	2006-present	Yes	Yes	Yes
HRS HCAP	65+ (60+ in 2026)	2016-present	Yes	Yes	Yes
HSB 80	58	2021	Yes	Yes	Yes
Mid-Life HIRS	31-56	2026-27*	Yes*	Yes*	No
NHATS	67+	2017	Yes	No	Yes
NLS 72	72	2026	Yes	Yes	Yes
NSHAP	57-85, 62-90, 50-95, 55-100, 47+[1]	2005, 2010, 2015, 2021, 2027	Yes	No	No
PSID CDS	5-17 & caregivers	CDS-2014	Yes	No	Yes
UAS	18+	2025	Yes	No	No
WLS	69-70	2008	Yes	No	Yes

[1] Also includes co-resident partners of any age
*Planned

Appendix Table B3.b. Biomarker Collections in Population-Representative Studies: Cardiovascular, Inflammation/Immune function, and Systems function

Study	Ages	Year	Cardiovascular	Inflammation/ Immune function	Systems function
ABCD	9-19	2016-2025	Yes	Yes	No
ACL	58+	2019	No	No	No
Add Health	18-26; 24-32; 33-44; 39-51	2001-02, 2008-09, 2016-18, 2022-25	Yes	Yes	Yes
Add Health Parent	64+	2026-27*	No	No	No
FF Child	9, 15, 22	2007; 2013; 2020	Yes	Yes	Yes
FF Parent	27-53 (mothers)	2012	No	No	No
GSMS-RA	9-16; 19-30; 40-50	1990s-2000s, 2020s*	Yes	Yes	No
HRS	51+	2006-present	Yes	Yes	Yes
HRS HCAP	65+ (60+ in 2026)	2016-present	Yes	Yes	Yes
HSB 80	58	2021	Yes	Yes	Yes
Mid-Life HIRS	31-56	2026-27*	Yes*	Yes*	No
NHATS	67+	2017	Yes	Yes	No
NLS 72	72	2026	Yes	Yes	Yes
NSHAP	57-85, 62-90, 50-95, 55-100, 47+	2005, 2010, 2015, 2021, 2027*	Yes	Yes	Yes
PSID CDS	5-17 & caregivers	CDS-2014	No	No	No
UAS	18+	2025	No	No	No
WLS	69-70	2008	No	No	No
*Planned					

Appendix Table B3.c. Biomarker Collections in Population-Representative Studies: Neurological/dementia, RNA, and Microbiome

Study	Ages	Year	Neuro/dem	RNA	Microbiome
ABCD	9-19	2016-2025	No	No	No
ACL	58+	2019	No	No	No
Add Health	18-26; 24-32; 33-44; 39-51	2001-02, 2008-09, 2016-18, 2022-25	Yes	Yes	Yes
Add Health Parent	65+	2026-27*	No	Yes	No
FF Child	9, 15, 22	2007; 2013; 2020	No	No	No
FF Parent	27-53 (mothers)	2012	No	No	No
GSMS-RA	9-16; 19-30; 40-50	1990s-2000s, 2020s*	Yes	No	No
HRS	51+	2006-present	Yes	Yes	No[1]
HRS HCAP (60+ in 2026)	65+	2016-present	Yes	Yes	No[1]
HSB 80	58	2021	Yes	Yes	Yes
Mid-Life HIRS	31-56	2026-27*	Yes*	Yes*	No
NHATS	67+	2017	No	No	No
NLS 72	72	2026	Yes	Yes	Yes
NSHAP	57-85, 62-90, 50-95, 55-100, 47+	2005, 2010, 2015, 2021, 2027*	No	No	No
PSID CDS	5-17 & caregivers	CDS-2014	No	No	No
UAS	18+	2025	No	No	No
WLS	72 (microbiome); 80+ (ADRD)	2020-2028 (ADRD); 2011 (Microbiome)	Yes	No	Yes

* Planned
[1] Oral only

Appendix Table B3.d. Biomarker Collections in Population-Representative Studies: Chemical Exposures and Drug Tests

Study	Ages	Year	Chemical Exposures	Drug Tests
ABCD	19-Sep	2016-2025	Yes	Yes
ACL	58+	2019	No	No
Add Health	18-26; 24-32; 33-44; 39-51	2001-02, 2008-09, 2016-18, 2022-25	No	No
Add Health Parent	65+	2026-27*	No	No
FF Child	9, 15, 22	2007; 2013; 2020	Yes	No
FF Parent	27-53 (mothers)	2012	No	No
GSMS-RA	9-16; 19-30; 40-50	1990s-2000s, 2020s*	No	No
HRS	51+	2006-present	No	No
HRS HCAP (60+ in 2026)	65+	2016-present	No	No
HSB 80	58	2021	Yes	No
Mid-Life HIRS	31-56	2026-27*	No	No
NHATS	67+	2017	No	No
NLS 72	72	2026	Yes	No
NSHAP	57-85, 62-90, 50-95, 55-100, 47+	2005, 2010, 2015, 2021, 2027	No	No
PSID CDS	5-17 & caregivers	CDS-2014	No	No
UAS	18+	2025	No	No
WLS	69-70	2008	No	No
*Planned				

Appendix Table B3.e. Biomarker Collections in Population-Representative Studies: Metabolomics, Hormones, Nutrition, Imaging

Study	Ages	Year	Metabolomics	Hormones	Nutrition	Imaging
ABCD	9-19	2016-2025	No	Yes	No	No
ACL	58+	2019	No	No	No	No
Add Health	18-26; 24-32; 33-44; 39-51	2001-02, 2008-09, 2016-18, 2022-25	No	No	No	No
Add Health Parent	65+	2026-27*	No	No	No	No
FF Child	9, 15, 22	2007; 2013; 2020	No	No	No	Yes
FF Parent	27-53 (mothers)	2012	No	No	No	No
GSMS-RA	9-16; 19-30; 40-50	1990s-2000s, 2020s*	Yes	No	No	No
HRS	51+	2006-present	Yes*	No	Yes	No
HRS HCAP	65+ (60+ in 2026)	2016-present	Yes	No	Yes	No
HSB 80	58	2021	No	Yes	Yes	No
Mid-Life HIRS	31-56	2026-27 *	Yes*	No	No	No
NHATS	67+	2017	No	No	No	No
NLS 72	72	2026	Yes	No	Yes	Yes
NSHAP	57-85, 62-90, 50-95, 55-100, 47+	2005, 2010, 2015, 2021, 2027*	No	Yes	No	No
PSID CDS	5-17 & caregivers	CDS-2014	No	No	No	No
UAS	18+	2025	No	No	No	No
WLS	85+	2025-26	Yes	No	No	Yes
*Planned						

Appendix Table B4.a. Geocoded Data in Population-Representative Studies

Study	Ages	Years	Lowest Geocode Study Has	Lowest Geocode Study Shares
ABCD	5-9 to 15-19	2015-2025	Street address	None
ACL	25+ to 60+	1986, 1988, 1995, 2000, 2010, 2019; 2021	Lat/Long	None
Add Health	12-19 to 39-51	1994 to present	Lat/Long	None
Add Health Parent	35-59 to 65+	1995; 2015-17; 2026-27	Lat/Long	None
FF Child	0-4 to 25-29	1998-2025	Lat/Long	None
FF Parent	18-44 to 40-64	1998-2024	Lat/Long	None
GSMS-RA	9-13 to 42-46	1993 - present*	Tract	Zip code
HRS	51+	1992 onwards	Lat/Long	Census tract
HRS HCAP	65+ (60+ in 2026)	2016, 2022, 2026	Lat/Long	Census block
HSB 80	16-19 to 55-59	1980-2021	Lat/Long	Census block
Mid-Life HIRS	30-55	2025*	Tract	Zip code
MTF Long	18--65	1976-present	Zip code	Zip code
NHATS	65+ to 67+	2011-present	Lat/Long	Census tract
NLS 72	18-19 to 72-73	1972-2026	Lat/Long	Census block
NLSY 79	14-22 to 60 to 68	1979 - present	None	None
NSHAP	57-85 to 50+	2005-06, 2010-11, 2015-16, 2020, 2021-23, 2024, 2025	Street Address	Census tract
PSID CDS	0-17	1997, 2002, 2007, 2014, 2019, 2020, 2021, 2024	Street Address	None
PSID Core	18+	1968-2025	Street Address	Census block
PSID TAS	18-28	Biennially from 2005-2025	Street Address	None
PT	10-19 to 70-79	1960-2020	None	None
UAS	18+ to 18+	2014-present	Street address	Lat/long
WLS	18-19 to 85+	1957-current	Lat/Long	Census block

*Planned

Appendix Table B4.b. Contextual Linkages in Population-Representative Studies

Study	Ages	Years	Census	State policy	Nghbrhd	Pollut	Weather
ABCD	5-9 to 15-19	2015-2025			x	x	x
ACL	25+ to 60+	1986, 1988, 1995, 2000, 2010, 2019; 2021	x		x	x	
Add Health	12-19 to 39-51	1994 to present	x	x	x	x	x
Add Health Parent	35-59 to 65+	1995; 2015-17; 2026-27	x	x	x	x	x
FF Child	0-4 to 25-29	1998-2025	x	x	x	x	
FF Parent	18-44 to 40-64	1998-2024	x	x	x	x	
GSMS-RA	9-13 to 42-46	1993 - present*	x	x	x		
HRS	51+	1992 onwards	x	x	x	x	x
HRS HCAP	65+ (60+ in 2026)	2016, 2022, 2026*	x	x	x	x	x
HSB 80	16-19 to 55-59	1980-2021	x	x	x	x	x
Mid-Life HIRS	30-55	2025*	x	x	x		
MTF Long	18-65	1976-present	x	x	x		
NHATS	65+ to 67+	2011-present	x	x	x	x	x
NLS 72	18-19 to 72-73	1972-2026	x	x	x	x	x
NLSY 79	14-22 to 60 to 68	1979 - present					
NSHAP	57-85 to 50+	2005-2006, 2010-2011, 2015-2016, 2020, 2021-2023, 2024, 2010-2021	x	x	x	x	x
PSID CDS	0-17	1997, 2002, 2007, 2014, 2019, 2020, 2021, 2024					
PSID Core	18+	1968-2025	x	x	x	x	
PSID TAS	18-28	Biennially from 2005-2025					
PT	10-19 to 70-79	1960-2020					
UAS	18+ to 18+	2014-present	x	x	x	x	x
WLS	18-19 to 85+	1957-current	x				
*Planned							

Appendix Table B4.c. Residence History Collection in Population-Representative Studies

Study	Collect Res History	Lowest Geocode Study Has
ABCD	Yes	Street address
ACL	No	-
Add Health	No	Lat/Long
Add Health Parent	No	-
FF Child	Yes	Lat/Long
FF Parent	Yes	Lat/Long
GSMS	Yes	Zip
HRS	Yes	Lat/Long
HRS HCAP	Yes	Lat/Long
HSB 80	Yes	Lat/Long
Mid-Life HIRS	Yes	Zip code
MTF Long	No	-
NHATS	Yes*	City
NLS 72	Yes	Lat/long
NLSY 79	No	-
NSHAP	No	-
PSID CDS	Yes	Lat/Long
PSID Core	Yes	Street Address
PSID TAS	Yes	Lat/Long
PT	No	-
UAS	Yes	Street Address
WLS	No	-
*Planned		

Appendix Table B5. Administrative Linkages to Population-Representative Studies

Study	Ages	Years	Death records	CMS files	Birth records	Soc Sec	Historic Census	Other medical records	Educational records
ABCD	5-9 to 15-19	2015-2025							
ACL	25+ to 60+	1986, 1988, 1995, 2000, 2010, 2019; 2021							
Add Health	12-19 to 39-51	1994 to present	x		x				x
Add Health Parent	35-59 to 65+	1995; 2015-17; 2026-27							
FF Child	0-4 to 25-29	1998-2025			x				
FF Parent	18-44 to 40-64	1998-2024	x		x				
GSMS-RA	9-13 to 42-46	1993 - present*							
HRS	51+	1992 onwards	x	x		x	x		
HRS HCAP	65+ (60+ from 2026)	2016, 2022, 2026	x	x		x	x		
HSB 80	16-19 to 55-59	1980-2021	x					x	x
Mid-Life HIRS	30-55	2025*							
MTF Long	18-65	1976-present	x						
NHATS	65+ to 67+	2011-present		x			x		
NLS 72	18-19 to 72-73	1972-2026	x					x	x
NLSY 79	14-22 to 60 to 68	1979 - present							
NSHAP	57-85 to 50+	2005-2006, 2010-2011, 2015-2016, 2020, 2021-2023, 2024, 2025	x	x			x		
PSID CDS	0-17	1997, 2002, 2007, 2014, 2019, 2020, 2021, 2024	x		x				x
PSID Core	18+	1968-2025	x	x		x	x (Men)		
PSID TAS	18-28	Biennially from 2005-2025	x						x
PT	10-19 to 70-79	1960-2020	x			x			
UAS	18+ to 18+	2014-present		x					
WLS	18-19 to 85+	1957-current	x	x		x	x		x
*Planned									

Appendix C. Workgroup Membership

Workgroup 1. Wearables
Facilitators: Jennifer Schrack, Kira Birditt
Vicki Freedman, Tania Gutsche, Colm O'Muircheartaigh, Alicia Carmichael, Brandon Labbree, Shanna Breil, Janine Simmons

Workgroup 2. Biomarker A
Facilitators: Colter Mitchell, Allison Aiello
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Workgroup 3: Biomarker B
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