

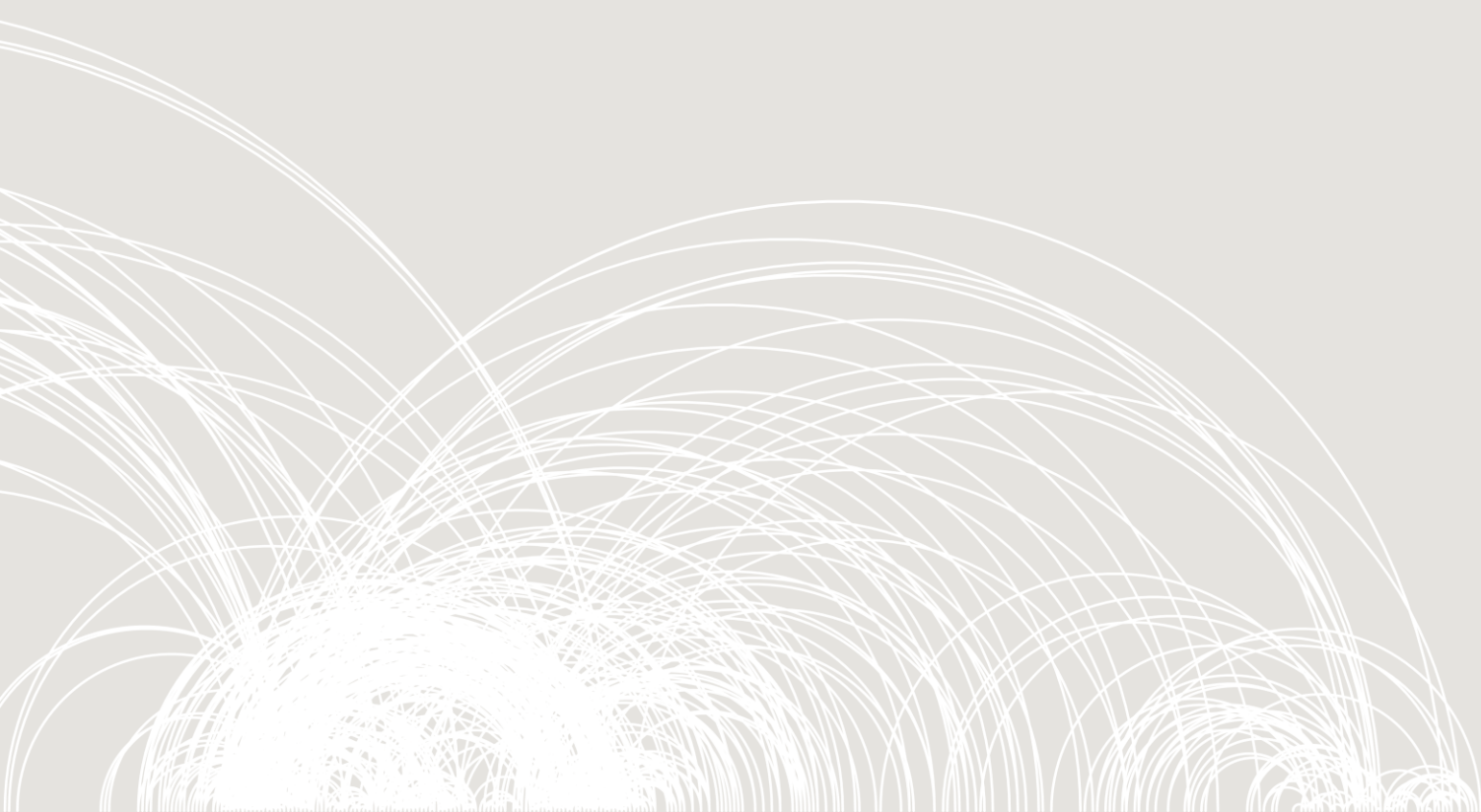
**TASK 2.3.3**  
**HEALTH AND ENVIRONMENTAL**  
**OUTCOMES CONTENT PANEL REPORT**  
**FINAL**

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# Contract Deliverable

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## Document Change Log

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## Introduction

The National Longitudinal Surveys (NLS) are a significant, long-running program of the United States (U.S.) Bureau of Labor Statistics (BLS), designed to support research into how Americans navigate changes in the economy and transition through various life course stages. As the youngest NLS cohort members are now entering their 40s, the BLS seeks to begin a new cohort of adolescents, targeted for fielding in 2026. This NLSY26 cohort will enable researchers to understand new trends in labor market experiences, education, and a wealth of other factors that are affecting this new generation.

BLS contracted with NORC at the University of Chicago and CHRR at The Ohio State University on an NLSY Needs Assessment to provide BLS with topical content and methodological inputs that a future design team can use to create an NLSY26 survey responsive to key research goals. As part of this Needs Assessment, NORC convened a content panel on the Health and Environment, comprised of federal and non-federal subject matter experts, to provide BLS with high-level recommendations that highlight emerging research themes, social trends, and policy changes relevant to consider for future data collection; alternative data sources that might supplement a new survey; and methodological issues that may impact data collection for the NLSY26. The content panel met multiple times between April and June 2022, to discuss recommendations and tradeoffs around content and survey design for BLS to consider for the new cohort.

Enhancing and expanding the health data collected in the NLSY26 provides a unique and exciting opportunity to better understand the relationship between health and the labor market. Health is an essential input into labor market performance, with research consistently documenting that the health status of an individual affects their ability to build human capital as well as their earnings, employment, and job opportunities. Yet many important, unanswered questions remain about both these long-standing relationships and the impacts from many important new developments and trends. Health data collection has been profoundly transformed recently, both in terms of the kinds of data collected, and the way in which it gets collected. Despite the limited health data within the current NLSY cohorts, health researchers are the fastest growing users of the NLSY, highlighting the tremendous value from improving the richness of health data. A state-of-the-art health data collection process that accounts for important health trends will substantially increase the usefulness and value of the NLSY26.

In preparing this report, the panel focused on defining important trends unique to this cohort (e.g. growing up amidst the COVID-19 pandemic and rising social, economic, and environmental inequalities) while also continuing to cover topics that remain pertinent for health formation and labor market outcomes. Since health data collection has undergone significant changes, the panel also focused on data collection techniques that improve the accuracy while also enhancing the scope of measures. To improve survey response rates and long-term retention, the panel also focused on data collection methods that minimized participant burden.

The rest of the report is organized as follows. Section 2 and Section 3 describe the panel's recommendations related to topical content and survey design considerations. Section 2 describes

content/topic-related considerations for future data collection with the new cohort, including (1) emerging research themes, social trends and policy changes that are relevant to consider (2) foundational data important for studying later life labor market and non-labor market outcomes, and (3) key areas of disparities and inequalities that may be important to measure. Section 3 describes survey design-related considerations relevant for the new cohort, including (1) the extent to which recommended topics are covered in existing NLSY questionnaires used for the 1979 and 1997 cohorts, (2) methodological issues that may impact future data collection on the recommended topics, and (3) relevant alternative data sources that might supplement a new survey. Section 4 concludes with a prioritization of the panel's recommendations (including the methodology used to arrive at that prioritization), and a description of the tradeoffs considered for this prioritization.

## Topic-Related Recommendations for the New Cohort

### Emerging research themes, social trends and policy changes that are relevant for the content area

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Several important trends emerged as particularly relevant for this cohort and that distinguishes it from previous cohorts.

#### **COVID-19 pandemic.**

NLSY26 subjects will have experienced the COVID-19 pandemic during childhood. Subjects will have been 6-10 years old when the pandemic started. Their exposure to the disease, whether directly or through impacts on a family member, as well as the disruptions to everyday life that it caused, likely had a strong impact on their human capital development.

#### **Digital environment.**

These subjects will have experienced a dramatically different immersion in the digital world. The advent of smartphones and social media have substantially altered the amount and kind of interactions with the digital environment. Such experiences affect the way these children interact with the world around them, and much concern has arisen about how this impacts both their physical and mental health.

#### **Rise in mental health conditions.**

Mental health conditions such as attention-deficit/hyperactivity disorder (ADHD), anxiety and depression have been on the rise. While these trends existed before COVID-19, the rise in mental health conditions has been exacerbated since COVID-19 and the disruptions it caused to everyday life. Many potential explanations for these trends exist – including the role of the digital environment – but much is unknown about causal factors.

### **Gun violence and school shootings.**

Increasing episodes of gun violence, particularly at schools, play an increased role in shaping this cohort. While school shootings occurred for prior cohorts, the strong rise since the Columbine High School shooting in 1999 make this a notable concern for this cohort. Evidence indicates that particular events, such as that in Parkland, FL in 2018, have been directly linked to poorer mental health.

### **Climate change.**

The increased threat of climate change is a factor contributing to the experiences of this cohort. While once a distant threat, climate change is now a stark reality. Children are exposed to climate related events, such as floods and heat waves, on a more regular basis. These events may cause damage to the exposed population and may lead to potential displacement, thereby disrupting daily life. Increased concerns over the threat of climate change and how this might affect their future may affect human capital investment decisions and mental health.

### **Social determinants of health.**

Although there has not been a change *per se* in the way that social determinants affect health, there has been an increased recognition in the role that it plays. Where someone lives and the world they interact with has a profound impact on their health, human capital and beyond.

## **Selected topics considered for data collection with the new cohort**

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Topics can be broadly divided into two categories: health outcomes and health determinants (or inputs). More details about these topics are provided in Section 4 of this report.

### **Health outcomes**

#### *Physical health.*

The panel recommends collecting standard measures of physical health, such as height and weight, presence of disability, and injuries, as well as new measures not previously collected that may nonetheless be informative, such as oral health, school absences and biomarkers.

#### *Mental health.*

The panel recommends collecting information on subjective well-being, stress exposure, and diagnosis and treatment for mental health conditions. Since their measurement has changed considerably over time, the panel encourages using the latest tools available to facilitate data collection and improve its validity.

### **Health determinants**

#### *Environmental exposures.*

Considerable progress has been made in measuring environmental exposures, and the panel recommends utilizing these new low-cost sensors to improve exposure assignment for this cohort. In addition, an

increased focus on behavioral responses to environmental risk episodes along with a greater understanding of attitudes toward the environment is recommended. These topics are covered in greater detail in Section 4.

#### *COVID-19.*

As noted above, COVID-19 exposure is a unique feature of this cohort. Collecting information on exposure to COVID-19 protocols during school (hybrid schooling, mask wearing, etc.) as well as any experiences with illness, whether for the child or a family member, will help to define this cohort's experience with COVID-19 and its impacts on health outcomes.

#### *Social determinants.*

Social determinants of health such as income, education, working conditions, food insecurity, housing stability and amenities, neighborhood characteristics, and more are now understood to play a more central role in affecting the health of an individual.

#### *Digital experience.*

This is another factor that has changed considerably over time in terms of both the number of interactions and the kinds of interactions. Much is unknown about how this may affect the health of youth.

#### *Risky behavior.*

Substance abuse is related to a wide range of problems, including mortality due to overdose, addiction, secondary health outcomes, mental illness, and many other social and behavioral problems.

#### *Sexual activity/fertility.*

This can put people at a direct risk for health issues, such as STIs, as well as mental and physical threats that can affect well-being. Events leading to conception or birth of a child can also dramatically alter the human capital trajectory of a subject.

#### *Healthcare access/usage.*

Access to insurance, including generosity of coverage, and the kinds of care utilized can have both immediate and lasting effects on health.

#### *Lifestyle.*

Lifestyle is an essential factor affecting health, and many lifestyles developed during childhood persist into adulthood. The ability to collect such information through wearable sensors has dramatically changed our ability to accurately measure certain components of lifestyle, including physical activity and sleep.

#### *Health of parents.*

Since health has strong intergenerational links, collecting information about parental physical and mental health would aid in understanding the health of cohort subjects.

## **Related foundational data important for studying labor market outcomes**

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Similar to education, health is a form of human capital. Ever since the pioneering work of Grossman (1972), health has been established as being inextricably linked with labor market outcomes, including worker productivity and labor supply. Health affects workers ability to perform on the job and complete work tasks. It also affects their ability to obtain and maintain employment as reliable workers. Health also plays a complementary role with other types of human capital investments, such as education, in determining total human capital. Such links include difficulty concentrating in the classroom due to lack of sleep or physical inactivity and increased school absences due to health conditions. (Center for Student Success Research, 2020).

Multiple dimensions of health, including physical and mental health, and access to health care to improve health play an important role in determining labor market outcomes interact. In addition to well-established effects of physical health on earnings and employment (Dillon, Friedman, Serneels, 2021; Gertler, et al, 2014), individuals with serious mental illnesses earned, on average, a third less than the median earner, and were less likely to work at all. (Levinson, 2010). Access to health care has also been shown to not only affect health outcomes but also affect labor market outcomes (Cohodes, et al, 2016); Brown, et al, 2020). These findings suggest that studying the role of health on labor market outcomes requires a broad focus on properly measuring health.

## **Related foundational data important for studying other later life outcomes**

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Health is a dynamic and cumulative construct. Investments in health can improve health outcomes now and, in the future, whereas lack of investments can lead to health depreciation. Negative health shocks that occur during critical periods, such as adolescence, can propagate over the life course. A negative shock may have enduring effects that persist for years after they occur or may lead to a cascade of follow-on shocks that continue to degrade health. Both courses of action will lead to long-standing impacts on later health and labor market experiences.

It is well understood that health and access to healthcare during childhood and adolescence plays an important role in shaping later life outcomes (Currie, 2009; Almond and Currie, 2011; Almond et al., 2018). Poor health in childhood and adolescence, and lack of access to health care, can lead to reduced educational attainment affecting labor market opportunities (Miller and Wherry, 2019). The strong connection between health, education and labor market outcomes, both in the short- and long-term, highlight the importance of studying health as it relates to later life outcomes.

## Key areas of disparities and inequalities that should be measurable

There is an increased recognition of the size and importance of health disparities. Health outcomes are not randomly distributed in society; rather, socially disadvantaged groups often show higher morbidity and mortality compared to more advantaged groups. These inequities are seen in various domains, such as education, race/ethnicity, gender, sexual orientation, immigration status, and geography. Moreover, there is evidence of “double jeopardy,” referring to health effects being amplified (i.e. statistical interactions) because they are not only exposed to more health insults, but a given insult has a larger marginal effect on health. For example, there are large differences in air pollution by socio-economic status and race (American Lung Association, 2020; Woo, et al, 2019), as well as differences in access to care to remediate the impacts from exposure.

Health inequality also plays a central role in determining income inequality. Furthermore, the feedback loop between income and health – where not only does health affect income but also income affects health – supports a strong link between growing income inequality and health disparities. This relationship exists as far back as the early 19<sup>th</sup> Century (Gould and Chappel, 2000), and continues to persist today all around the globe (Marmot, 1996; Chetty, 2016).

Additionally, it is important to measure membership in social groups (e.g. race), as well as the possible drivers that underlie these group differences (e.g. racism).

## Survey Design-Related Recommendations for the New Cohort

### Degree of inclusion of recommended topics in NLSY79 and NLSY97

The table below lists the degree to which our panel’s recommended topics have been collected within the NLSY79 and NLSY97, as well as recommendation notes.

EXHIBIT 1

Domain	Priority	Collection (order of importance)	Included NLSY79?	Included Child/YA?	Included NLSY97?	Panelist Notes
<b>Physical health</b>						
Standard measures	High	Direct Measure Admin Data Respondent Parent	X	X	X	Include direct/objective and subjective measures



Biomarkers	High	Direct Measure				Major opportunity to collect objective health data
Disabilities	High	Direct Measure Admin Data Respondent Parent	X	X	X	Important to focus on objective measures
Injuries	High	Admin Data Respondent Parent	X	X	X	
Oral health	High	Respondent Parent Admin Data		X	X	Include information on oral health outcomes
Vision, hearing	Medium	Direct Measure Respondent	X	X	X	Directly measure vision and hearing
Lifestyle	Medium	Direct Measure Respondent Parent	X	X	X	Includes diet, exercise, sleep, driving behavior, and health-related knowledge. Consider collection through wearable sensors to improve data reliability on exercise and sleep. Less interested in health knowledge, more focused on behavior.
Prescription usage	Medium	Admin Data Direct Measure Respondent Parent	X	X	X	Improve accuracy of data collection
School absences	Medium	Admin Data	X	X	X	Continue to include all absences, not just suspensions/expulsions
<b>COVID-19</b>						
Experience with illness	High	Parent Admin Data			X	Inquire about family experiences with COVID-19 in addition to self
Exposure to protocols	High	Parent Admin Data			X	Ask about schooling protocols
<b>Mental health</b>						
Measures	High	Respondent Parent	X	X	X	Collect more routinely
Stress exposure	High	Respondent Parent	X	X	X	
Subjective well-being	High	Respondent	X only age 60+		X	Collect more routinely, including between survey rounds

Diagnosis and treatment	High	Admin Data Respondent Parent	X	X	X	
<b>Digital experience</b>						
Social media	High	Respondent Parent Direct Measure				
Technology	High	Respondent Parent Direct Measure	X	X	X	More information about time spent and usage of wifi, along with various devices, especially computer and smartphone
<b>Environmental exposures</b>						
Experiences (with climate experiences/natural disasters)	High	Respondent Parent				
Measures of exposure (to heat/pollution)	High	Direct Measure				Leverage sensors
Attitudes	Medium	Respondent				
ACEs	Low	Respondent Parent	X	X	X	
<b>Healthcare access/usage</b>						
Healthcare Usage	High	Admin Data Respondent Parent	X	X	X	
Health insurance	Medium	Admin Data Respondent Parent	X	X	X	Collect more information on details of insurance coverage
Vaccinations	Low	Admin Data Respondent Parent		X	X	
<b>Risky behaviors</b>						
Substance use	High	Respondent Parent	X	X	X	
Criminal activity	Low	Admin Data Respondent Parent	X	X	X	

Discipline	Low	Admin Data Respondent Parent	X	X	X	
<b>Sexual activity/fertility</b>						
Sexual activity/fertility	High	Respondent	X	X	X	Increase focus on fertility/family formation as well as the role of dating violence
<b>Social determinants</b>						
Discrimination, oppression	High	Respondent Parent		X		
Relevant dimensions	High	Admin Data Respondent Parent		X	X	
<b>Parents</b>						
Physical, mental health history of parents	Medium	Parent Admin Data				
<b>Time use</b>						
Time use diary	Low	Respondent	X 40-50+ module only		X	

Many domains have been assessed in past surveys and should continue, albeit with updated instruments. Panelists recommend collecting more objective measures related to health, including direct measures of standard health markers (instead of self-reported), use of wearable sensors as well as in-home sensors, as well as collecting biomarkers.

There is also a lot of interest in conducting more frequent assessments of mental health.

There are several additional domains that interest health and environment researchers including social determinants of health, use of social media, experiences with COVID-19 illness/protocols, and experiences with climate change/natural disasters, along with measures of exposure to heat/pollution.

### **Methodological issues to consider on recommended topics**

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Two important methodological issues arose during panel discussions – there is a desire for collecting more objectively reported data and for collecting some data outside the large annual survey.

The first centers on collecting objectively reported data whenever possible. Recall error and other personal biases are a major concern for data quality in surveys. Access to care is also an important determinant of health outcomes. If a subject has inadequate access to care, they may never be diagnosed with a condition even if they have it. Finding ways to collect data that limits these concerns is essential for improving measurement and selection bias. Examples arose around taking physical health measurements directly and taking photographs of particular information. These techniques would require increased interviewer training, but would add significant value. A few examples:

- **Weight:** Asking subjects to self-report their body weight can lead to inaccurate measures; having interviewers use scales to directly measure subjects' weight would greatly improve the accuracy of this variable.
- **Asthma:** Asking subjects whether they have asthma involves both presence of the condition and access to a provider to diagnose the condition. Directly measuring lung function, such as through forced expiratory volume (FEV), would alleviate this concern; it would also enable more detailed information on the severity and progression of the condition. As a consideration, the FEV1 test lasts 1 second, though some do complain of discomfort.
- **Vision:** Students who are unable to clearly see written material often struggle in the classroom, but there are many children who suffer from vision impairment who forego corrective lenses because of high costs and lack of insurance coverage. Interviewers could perform simple, non-diagnostic tests that measure whether a certain threshold is met and whether they have what they need for functioning (i.e., measure if respondent needs glasses and doesn't have them).
- **Prescriptions:** Photographs could also be used to record pieces of information rather than relying on subjects to self-report. For example, rather than asking a subject about prescription medication usage, the interviewer could take a photograph of the pill bottle to obtain the precise name of the medication, dosage, and frequency of administration; a similar example arose for photographing a birth certificate to capture birth weight. This would involve post-interview processing of the image to extract the relevant data from the photograph. The panel also noted that taking direct measures in this way may also help "mix up" the interview to help hold the subject's attention. For example, taking a photograph or measures of lung functioning gives the subject a short break from answering questions while also provides a brief physical activity.

The second topic centered on off-survey data collection. Prior NLSY surveys have been administered on an infrequent basis (annually or biennially), and as such often miss important events during intervening periods. In the NLSY26, subjects could be briefly contacted at additional time periods to collect information at more regular intervals. Such data could be collected through an app designed for this survey or text messages. For example, data on mental health, including self-reported happiness, could be asked on a more periodic basis through simple questions; the use of wearable sensors to track activity patterns is another. Access to such data will be useful in its own right by providing more measures throughout time but will also enable researchers to better assess how these measures change over time.

## Relevant alternative data sources to capture recommended topics

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Several alternative data sources were discussed over the course of the health and environment panel’s meetings. These focus on linking to external sources to improve the availability and objectivity of data while decreasing the interview burden. Given the focus in this panel on environmental exposures, it would be useful for the BLS to link subjects to external sources, such as air pollution and temperature. Current NLSY data sets only provide county of residence, which can provide an inaccurate measure of exposure given that environmental exposures are measured at much finer spatial resolution. Furthermore, such data are only available in restricted-use files, thus limiting researcher access. Given the NLS knows the exact geographic residence of the subject and the school they attend, assigning environmental exposures on the back end before making data publicly available would improve measurement and access. To prevent “reverse-engineering” where users back-out the location using their own measures of environmental exposures, random noise can be added to these exposures.

Another set of external sources to link to include subjects’ social media accounts to obtain more accurate measures of content and exposure. This is important to measure because many studies indicate social media can negatively affect adolescents’ mental and physical health, with potential outcomes including chronic sleep deprivation, increased substance use, along with reduced cognitive control, academic performance and socioemotional functioning. However, this obviously requires a consent hurdle that may be difficult to overcome. This would also require pre-processing of the data to remove any potentially identifiable information or consider summary measures to condense the potentially large swaths of data collected.

Finally, linking to electronic health records (EHR) would provide another resource for obtaining objective measures of health care usage. Survey recommendations include asking subjects about health care usage, but such information may be inaccurate as to the timing of health care visits and amount of health care services utilized or may completely omit certain health care visits. By linking to EHR, we can obtain the exact details on health care consumption, while also freeing up interviewer time. An important issue to consider is that, even with consent of the subject, the process for obtaining consent from the EHR facility may be challenging.

## Top Ranked Topic- and Survey Design-Related Recommendations

### Prioritized recommendations

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Below we provide details on each of the topics considered by this panel, as well as a categorization of topics as high, medium, or low priority. Topics are not listed by rank order within each priority category.

## Higher Priority Topics

### *Physical Health – Standard Measures.*

The panel emphasizes the importance of collecting standard physical health measures. In addition to being important for individual well-being, health also directly shapes labor market outcomes and economic opportunity. The panel emphasizes the importance of objective measurement in addition to subjective measures of overall health, as well as the importance of regular measurement to track health over time. Direct measurement of outcomes can help to alleviate concerns that having a diagnosed health condition involves both having a condition and access to care. The panel recommends that questions elicit an overall health assessment and provide direct measurement of height, weight, waist circumference, and blood pressure. The panel also suggests that data on forced respiratory volume (FEV), a standard measure of lung capacity, be collected. FEV is useful for diagnosing asthma and avoids concerns with access to care; it also provides a continuous measure of lung health which may provide more useful information than a binary measure, such as disease severity, management and progression over time. As a subjective measure of physical health, the panel suggests asking if their health interferes with work, school, other routine activities.

### *Physical Health – Disabilities.*

The panel emphasizes the importance of gathering information on physical disabilities. The panel believes that it is critical that questions about physical disability and mental health not be comingled. In separate sections, the panel discusses the importance of mental health and learning disabilities. The panel emphasizes the importance of collecting objective measures because self-evaluated measures are subjective and may not be comparable across respondents. Furthermore, subjective differences may be a function of economic characteristics. In the context of disability, perceived stigma, or government policy (disability transfer benefits) may also influence responses. At the same time, self-reported measures are highly correlated with clinical measures, and objective measures tend to measure health rather than capacity. Researchers could investigate these concerns using a combination of subjective and objective measures. Where possible, questions should be related to specific health conditions and functional limitations. It is critical to determine the type and severity of physical disabilities, as well as the extent to which physical disability affects the respondent's ability to engage in economic activity (education, work), as well as general day-to-day life.

### *COVID-19 – Experience with Illness.*

The COVID-19 virus has killed over 6 million people and caused severe illness for millions more (Adam, 2022). Aside from direct health costs, the pandemic has put strain on the overall health-care system, disrupting the delivery of essential health-care services, and illuminated issues of health inequality. Understanding the effect of COVID-19 on illness, whether direct or indirect, is critical. The panel recommends gathering detailed information on personal illness and family member illness/death. COVID-19 has affected people in various ways, so detailed information on symptoms, long COVID diagnoses,

and hospitalization experience is valuable. Vaccination histories are also of interest. Data on mental health should also be collected.

#### *COVID-19 – Exposure to Protocols.*

For the last two years, the COVID-19 pandemic has shaped almost every aspect of life. In addition to understanding illness during the pandemic, it is critical to comprehend individuals' experiences with COVID-19 protocols and how these have affected economic activity as well as individual health and well-being. The panel recommends gathering information on schooling, mask use, parental work arrangements, and child-care arrangements. It would be interesting to elicit attitudes and beliefs about individual experiences. The impact of school closures and social isolation on children's mental health and well-being is of particular interest because they negatively impacted academic and socioemotional skills accumulation.

#### *Mental Health - Stress Exposure.*

Stress can be detrimental to many aspects of an adolescent's physical and mental health. Understanding stress in different domains on adolescents, and eventually adults, is important because stress affects educational attainment and labor market outcomes. (Levinson, 2010). While stress levels can be measured using cortisol levels from saliva (see 'biomarkers' below), understanding the factors that contribute to stress can be obtained through various questionnaires. Questionnaires can be time consuming, posing a tradeoff between time and quality. It is also important to find questionnaires particular to adolescents, at least for the earlier years of the survey, because sources of stress can be distinct for this age group. One standard tool is the Adolescent Stress Questionnaire (ASQ-S), where shortened versions that are less intensive have been well-validated, though other candidates exist and should be considered. Frequency of collection is important to consider since stress can rapidly change as children age, so we recommend collecting at each round.

#### *Mental Health – Measures.*

Most children and adolescents with mental health disorders and impairment do not receive a clinical diagnosis nor receive help via mental health services (Patton et al. 2016). Consequently, it is important to go beyond questions about diagnoses and treatment available in administrative records to collecting other measures of mental health, starting in early life and continuing into adulthood. Including such questions in the NLSY26 offers a powerful opportunity for assessing the long-term functional impacts of mental health issues on young people's development, educational and employment outcomes, and health (Chisholm et al. 2016).

A key starting point is self-reported mental health, including questions about symptoms of anxiety and depression, self-perceptions, suicidal ideation, as well indicators of subjective well-being (e.g. life satisfaction, happiness, hope for the future), and social isolation/loneliness that have been developed in other surveys. In addition, it would be essential to include questions about both sources of stress and

measures of perceived stresses and strains, along with measures of coping strategies and psychosocial resources and supports.

Standard measures that are available for incorporation in the NLSY26 include the following:

- Measure stress using standard tools such as Adolescent Stress Questionnaire (ASQ-S) and validated shortened versions (Anniko et al. 2018; Andretta et al. 2018)
- Measure mental health using standard measures such as the [12-Item Short Form Survey \(SF-12\)](#), the 7-item version of the CES-D, or [General Anxiety Disorder \(GAD-7\)](#).
- The 2021 [National Health Interview Survey \(NHIS\)](#) included questions that deal with anxiety, depression, and health so it may be a helpful resource for developing new questions in this area.
- [National Longitudinal Study of Adolescent to Adult Health \(Add Health\)](#) has robust questions about a broad range of mental health issues, and they specifically ask about somatic symptoms (pain, headache, stomachache) that are indicators of stress and might be easier for adolescents to articulate than mental health concerns.
- [Adolescent Brain Cognitive Development \(ABCD\) Study](#) launched in 2016 and participants considered the [list of questions](#) reasonably comprehensive.
- [National Survey on Drug Use and Health \(NSDUH\)](#) covers mental health and drug use, and serves as a helpful comparison study
- Validated measures of loneliness include the 3-item [UCLA Loneliness Scale](#) (Russell, 1996) or the 6-item de Jong Gierveld Scale (2006).

As mental health concerns can ebb and flow in response to life events and treatments, it would be useful to collect these measures prospectively at each wave, and with increased frequency, if possible.

#### *Mental Health - Subjective Well-being.*

Subjective well-being (SWB) is defined based on an individual's cognitive and effective evaluations of his or her life. SWB is measured using self-reported data and can fluctuate over time, and these evaluations are based on life satisfaction, fulfillment, happiness, and satisfaction with domains such as marriage and work. A growing body of evidence has demonstrated the importance of SWB for several health and behavioral outcomes, including mental and chronic health conditions. There is increasing recognition of SWB as a determinant for adolescents' optimal academic, emotional, and social functioning. In the workplace, raising individuals' SWB is significantly associated with improved performance and increasingly viewed as a key indicator for measuring job satisfaction. In addition, SWB can be influenced by external factors, such as climate-related natural disasters; among the millennial adolescent population, climate anxiety and eco-anxiety can influence SWB.

Data collection on self-reported SWB, including information on life satisfaction, happiness, hope for future, is recommended and questions aimed at tracking SWB can be modeled after the [British Household Panel Survey \(BHPS\)](#) and the UK's [Understanding Society](#) survey; both are good references for question development.



Given that mental health can fluctuate throughout the year, collecting information between survey waves would also be particularly useful. Some of the above surveys can be administered online. Alternative possibilities include a shorter series of questions delivered through a smartphone app or text messaging to inquire about general levels of happiness and satisfaction on a more day-to-day basis.

#### *Mental Health – Diagnosis and Treatment.*

Mental health problems are becoming a leading cause of disease burden amongst adolescents globally (Patton et al. 2016). Monitoring the prevalence of child mental health problems is important for understanding whether efforts to improve children’s mental health are successful and how these conditions impact education trajectories and labor and health outcomes later in the life course. Some of the most commonly evaluated outcomes that would be useful for NLSY26 to ask about include anxiety, depression; ADHD and associated impulsive and attention/focus related behaviors; Autism spectrum conditions; learning disabilities; eating disorders; substance abuse; and sleep disturbances (Olfson 2015; Patton et al. 2016). Prevalence of many of these mental health conditions had been on the rise in the past two decades (Odgers & Jensen 2020) and the COVID-19 pandemic may have exacerbated some trends (Magson et al. 2021; Panchal et al. 2021). Having baseline indicators of these diagnoses for members of the NLSY26 cohort will also be useful as a baseline for tracking mental health patterns over time.

Individuals are best positioned to report on their mental health, yet these are sensitive topics and asking about them should be approached with care. While adolescents may be able and willing to disclose these issues (particularly as stigma around mental health issues declines in some settings), with proper consent parents or medical records may also be reliable sources for accurate information on diagnoses, treatments, therapies, and coping strategies and accommodations used in various settings (e.g. at school). Participants could also be asked about their degree of comfort with disclosing or discussing such concerns in various settings.

As mental health concerns can ebb and flow in response to life events and treatments, it would be useful to have baseline measures of diagnoses and to ask about \*new\* diagnoses at subsequent waves. This is also useful to track treatments/therapies over time.

#### *Social Determinants of Health – Relevant Dimensions.*

Social determinants of health refer to socially produced factors that contribute to illness and disparities in illness. (Braveman and Gottlieb, 2014; Krieger, et al., 2010). The idea takes seriously the fact that most health problems are due to complex interactions between aspects of the built, work, home, and play environment that accumulate over time. A major insight of this perspective is that many policies and practices -- which may not be biomedical in nature -- nonetheless, have important indirect or indirect effects on health. For example, a child’s education is not a biomedical risk factor in the traditional sense. Nonetheless, their educational experience can contribute directly to health problems, such as in the case of schoolyard bullying leading to poor mental health, or indirectly, such as through labor market outcomes, access to health insurance, health behaviors, and decision-making patterns. (Ross and Wu, 1995; Cutler and Lleras-Muney, 2006; Davies, et al., 2018).

Social determinants of health remain a priority area for tracking, research, and intervention according to leading agencies including the World Health Organization and the U.S. Department of Health and Human Services. (Koh, et al., 2011; World Health Organization and Health WCoSDo, 2008). The list of these determinants is extensive; some that are especially relevant to NLYS26 populations include: Income, employment, poverty and debt (Adler, Glymour, Fielding, 2016; Walsemann and Ailshire, 2017; Haas and Fosse, 2008), food insecurity (Compton, 2014), homelessness (Stafford and Wood, 2017), foster care (Lloyd, 2018), housing conditions (Shaw, 2004), neighborhood conditions (e.g. local crime rates, access to public transportation, residential segregation) (Diez Roux and Mair, 2010; Meijer, et al., 2012; Williams and Collins, 2001), English proficiency and immigration status (NASEM, 2018), and interpersonal and structural discrimination. (Gee and Ford, 2011; Williams, Lawrence, Davis, 2019). Further, access to social programs is important for protecting vulnerable communities; these programs include: the Children’s Health Insurance Program (CHIP), Supplemental Nutrition Access Program (SNAP), Temporary Assistance to Needy Families (TANF), Medicaid, and Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). These factors are all relevant to health and other outcomes across the entire life course. (Gee, et al., 2019; Berger, et al., 2019; Vandecasteele, 2011).

*Social Determinants – Discrimination, Oppression.*

Discrimination is a manifestation of structural racism at the intrapersonal, interpersonal, and institutional (systemic) level. Given the difficulty in measuring structural racism, survey research has predominantly focused on capturing individuals’ experiences of interpersonal discrimination (Williams et al. 2019). A 2010 systematic review identified 24 instruments for measuring discrimination with published evidence of psychometric validity (Bastos et al. 2010). Of these, the Everyday Discrimination Scale (EDS), a nine-item scale developed to measure exposure to overt discrimination among African American populations, is among the most commonly used (Paradies 2006), but other scales have been developed and modified to particular subpopulations in the United States, including multiple populations of color as well as white populations. NLYS26 should include questions that allow for capturing discrimination experiences for a wide range of diverse respondents, and sampling strategies should be mindful of including populations that are disproportionately likely to experience discrimination as disproportionately likely to be under-represented in surveys (e.g. people experiencing homeless and/or people living in institutional settings or hard-to-reach geographies).

The panel recommends collecting data on both personal experiences and perceptions of discrimination (e.g. being treated unfairly, or experiencing hostile and intimidating behaviors from others) on the basis of a wide range of factors including race/ethnicity, nativity/immigration status, language proficiency and accent, class/socioeconomic status, gender identity and sexual orientation, age, weight/height, religion. Questions should also probe respondents’ beliefs about equity in the world and about their own sense of being accepted and accepting others. These questions can be used to probe the association of experiences and perceptions of discrimination with subsequent education, labor market, and health outcomes.

At baseline, it would be useful to ask “have you ever experienced” questions. In subsequent waves, it would be good to ask specifically about the time between surveys, to allow an understanding of emerging, exacerbating/waning experiences and cumulative exposures.

### *Sexual Activity/Fertility.*

The panel recommends that NLSY26 continue to ask questions about participants romantic and intimate relationships, dating experiences, sexual behaviors, and reproductive health. Questions should pay particular attention to both sexual orientation and gender identity, a range of partnered (same or other-sex) sexual activities (including but not limited to intercourse) with attention to experiences that are both wanted and unwanted (either forced or about which participants report mixed feelings). The use of contraceptives can reduce adolescents’ risk of pregnancy and sexually transmitted diseases, but there is a lot of heterogeneity in both preferences and access to different types of contraceptive methods. It would be useful to ask questions about what methods are being used, as well as about the needs, priorities, and supply/service access issues that influence the use of different types of contraceptives.

Access to adequate sexual and reproductive healthcare services is not equally available to all Americans, so questions that probe access to health care services that are inclusive of all gender identities and expression and that encompass a full range (including abortion) of family planning and reproductive health services (with or without parental consent) would be extremely useful. As the sample ages, it will be useful to have questions about pregnancies, childbirth, and childrearing that will allow the construction of reproductive histories.

- Young people aged 15–24 account for half of the 26 million new cases of sexually transmitted infections (STIs) in the United States annually, which reflects biological differences as well as likely age-based disparities in accessing preventive information and services (CDC, 2022). NLSY26 should consider asking about past infections and/or vaccinations (e.g., HPV).
- Other emerging issues merit the addition of new questions exploring adolescent attitudes towards sex, e.g., in light of statistics showing that the proportion of high school students who ever had sexual intercourse declined from 47% -40% between 2013-2017 (Guttmacher, 2019) and estimates of exposure to pornography among adolescents ranging from 19% -32% for unintentional exposures and 34% -66% for intentional exposures, with variation by gender (Hornor, 2020).
- Sexual activity and health are also a function of the timing of puberty and menstruation. Given the age of the NLSY26 sample at baseline and research suggesting changes in puberty onset (Eckert-Lind, et al., 2020), the survey offers an important opportunity to better understand both the socio-biological causes and consequences of differential puberty timing. Prior research has suggested that earlier puberty (particularly for girls) is associated with higher risks of mental, emotional, and physical health conditions including depression, eating disorders, substance use, risky sexual activities, early sexual debut, and underage pregnancy in addition to later-life reproductive cancers and cardiovascular disease (Golub, et al., 2008;

Laube, et al., 2020; Ullsperger and Nikolas, 2017). There are known disparities in pubertal timing by race/ethnicity, and studies linking puberty timing to nutrition and obesity, family structure and composition, and other social and environmental determinants of health (Aghaee, et al., 2020).

- Finally, dating violence among adolescents and young adults is a key element of physical, mental, and sexual health that ought to be captured in the survey (Taquette and Monteiro, 2019; Duval, et al., 2020)

Questions about fertility desires, expectations and history (outcomes and whether pregnancy was intentional) are important to understanding family formation decision-making and trends, making these measurements particularly important for demographers. Desires reflect how many children respondents wish they had, and expectations indicates how many children the respondent anticipates having, which may not be the same due to health, financial or other reasons.

Questions about “first experiences” (dating, romantic partnership, first intercourse, etc.) need only be asked once. Questions about relationships and about reproductive health, and fertility desires, expectations and history should be collected at multiple waves.

#### *Environmental Exposures – Experiences.*

The direct and indirect impacts associated with exposure to environmental hazards, such as air pollution, extreme weather events, and natural disasters can negatively impact the health and well-being of populations. As climate change intensifies, most of these environmental exposures are becoming more frequent, more severe, and longer. In addition, environmental and climate-sensitive exposures can have immediate and long-term adverse health consequences resulting from forced displacement and migration, traumatic experiences, and even disruption of livelihoods. Extant scientific literature suggests a link between early life experiences shaped by environmental factors and chronic health disorders later in life. (Olvera Alvarez, 2018). Furthermore, environmental exposures affect all Americans but have disproportionate consequences for communities that have a high proportion of minority, poor, tribal, and indigenous populations. These under-resourced and over-burdened communities are more likely to be impacted by environmental exposures and more likely to live near sources of pollution.

Data collection aimed at understanding respondents’ experiences during environmental events and climate disasters can inform existing knowledge gaps. For instance, questions related to life experiences and evacuations during adverse weather events and natural hazards can help track changes in risk perception based on hazard severity. In addition, information related to property damages, economic losses, and other measurable impacts can shed light on the effect of disasters on people’s lives and the economy at large.

#### *Environmental Exposures - Measures of Exposure.*

Tracking environmental and climate-sensitive exposures over time provides a firm basis to evaluate many aspects of respondents’ physical and mental health status. Specifically, deriving exposure gradients for respondents over time by linking residential histories with routinely collected environmental data sources can address research questions that connect hazard levels with adverse health outcomes. In situations

where routinely collected environmental data might be inadequate to characterize exposure, onsite measurements can be helpful. For instance, measurements can be taken when visiting the respondent for various hazards that are location-specific and time invariant (e.g., lead in interior and exterior walls and/or in soil). And for those exposures that vary with time and location, such as air pollution and temperature, low-cost sensors can be installed and left at respondent's residence for an extended period. In addition to measuring pollutant levels, questions that get at sources of exposure in indoor environments can be helpful in building a comprehensive pollutant profile for respondents. Information on factors that modify exposure risk such as time spent outdoors, awareness of pollutant levels or heeding to alerts issued by local, state, and federal agencies can be helpful in constructing exposure-response profiles. Lastly, detailed information on structural adaptations that mitigate environmental exposures such as the use of HEPA filters, air conditioning, fans, and protective devices can shed light on effectiveness of interventions and risk avoidance behaviors.

#### *Digital Experience – Social Media.*

NLSY26 is a key opportunity for learning more about participants' online lives – particularly their development and engagement with online social networks, which are increasingly understood to have long-ranging impacts on education, labor, and health outcomes. Social media can affect adolescents' self-perceptions, interpersonal relationships, and behaviors through social comparison and negative interactions (e.g., cyberbullying), yet online interactions can also be a source of support, community connections, and a particularly powerful avenue for disseminating health-promoting information and behaviors (Kranzler & Bleakly, 2019). This underscores the importance of learning not only how much time youth spend on different platforms, but also the nature of experiences and interactions on specific media. Our panel notes that gleaned data on total screen time and particular app use and websites visited from participants' devices could yield the most accurate data, if possible.

It is also useful to collect information in the survey about social network size and characteristics (e.g. number of connections on various apps, close or distant ties), the nature of interactions on various platforms and their socio-emotional impact, as well as about limitations on social media (self-imposed or imposed by parents).

A high proportion of youth engage in heavy social media use and multitasking, with potential outcomes including chronic sleep deprivation (Vernon, et al., 2018), and reduced cognitive control, academic performance and socioemotional functioning (van der Schuur, et al, 2015; Chen and Yan, 2018; Abi-Jaoud, et al., 2020). Spending more time on social media has also been linked with feelings of social envy (Chou and Edge, 2012), stress due to a “fear of missing out” (Beyens et al. 2016), increased consumption of alcohol, e-cigarettes, and other substances (Kranzler and Bleakly, 2019), and body image concerns and disordered eating (Holland and Tiggemann, 2016). A growing number of studies suggest that social media is implicated in the increase in mental distress, self-injurious behavior, and suicidality among adolescents and university students (Sampasa-Kanyinga, et al. 2014; Shakyia and Christakis, 2017).

Taken together, these findings highlight the complex relationship between social media use and health outcomes among youth and young adults, calling for research that uses novel approaches to examine the

multifaceted nature of this relationship including different modes of engagement and their influences on attitudes and behaviors.

#### *Digital Experience - Technology.*

Youth are exposed to a wide range of technologies, which includes devices such as cell phones, tablets, computers, and gaming consoles. These technologies are an integral part of modern-day life, and youth education. A Pew Research poll showed that 58% of 8<sup>th</sup> grade students rely on the internet *almost every day* to complete their homework in 2020. (Auxier and Anderson, 2020). However, access to such technologies is not uniform. About 9% of white children do not have access to a home computer, compared with 18% of Hispanic. (Auxier and Anderson, 2020).

Moreover, access to technology is related to health. Youth can learn about healthy habits and medical conditions via the internet. (Skopelja, Whipple, Richwine, 2008). At the same time, youth can also develop problems from these technologies. These include issues such as sleep disturbances due to blue light; suicidal ideation from cyberbullying; lowered physical activity; greater intake of sugar-sweetened beverages, and obesity; computer gaming addiction; and repetitive stress disorders from poor ergonomic conditions. (Grønli, et al., 2016; Van Geel, Vedder, Tanilon, 2014; Hakala, et al., 2006; Kenney and Gortmaker, 2017; Kuss and Griffiths, 2012).

#### *Physical Health – Biomarkers.*

The social determinants of health framework emphasize linkages between cumulative exposures to social, economic, and environmental stresses and their biological manifestation in poor health outcomes throughout the life course (Krieger 2005 Geronimus et al. 2006; Crimmins & Vasunilashorn 2010; Evans et al. 2021). Reflecting the growing recognition of the multiple, complex determinants of health and well-being throughout the life course, a growing number of surveys (e.g. the Health and Retirement Study (HRS) and its international counterparts; Midlife in the United States; the National Social Life, Health, and Aging Project; and the National Longitudinal Study of Adolescent to Adult Health (AddHealth), among others) have adopted a biosocial perspective and integrated biomarker data collection with traditional demographic, social, and economic survey questions (Hauser et al. 2010). Biomarkers are valuable to these studies as early (often pre-clinical) markers of health that may influence educational, employment, and career trajectories, as well as potential outcomes of cumulative social and economic exposures. Given the potential for bidirectional impacts, having multiple biomarker measures throughout the survey follow-up period allows analysts to establish temporality and causal direction in the relationships. All the aforementioned studies follow older cohorts, and the NHANES is a national cross-sectional sample, so including biomarkers in the NLSY is a unique opportunity for understanding the distribution of health biomarkers in this younger cohort, and the impact of both manifest and potentially subclinical markers of poor health on participants' human capital development. It will also be of tremendous value in establishing baseline measures that can be updated as the NLSY cohort ages, creating an invaluable resource for tracking exposures, health outcomes, and their implications for labor market outcomes throughout the life course.

Biomarkers are objectively measured characteristics that are used as an indicator of normal biological processes, the presence of disease, or biological responses to an exposure or an intervention. Allostatic load, telomere length, inflammation, and altered stress response have all been considered as biological indicators of weathering – measures that could demonstrate how the stresses associated with various deleterious experiences becomes embodied. Social epigenetics represents the current frontier in bridging social science and biology, aiming to more clearly understand the pathways linking the physical, built, and social environments with differential gene expression and health disparities (Evans, et al, 2021). Epigenetic changes are increasingly considered a mechanism contributing to differential aging and life expectancy and may be one mechanism by which deleterious social and economic exposures alter immune function, increase systemic inflammation, and influence other markers of complex chronic diseases with well-documented health disparities. Weathering is a marker of accelerated aging – a decline in health that proceeds faster than the wear and tear expected over time. Those who are experiencing weathering may have less energy or capacity to engage productively in labor market activities or may spend less total time in the labor market as a result of physical and mental health challenges.

For the purposes of the NLSY26, it would be particularly useful for data collection to focus on biomarkers that capture susceptibility and risk of poor health. These can be early signals of health conditions that will impede future educational, occupational, and financial attainment. Biomarkers can be molecular, histologic, radiographic, or physiologic characteristics. Using biomarkers to measure health, functioning, and exposure to risk is particularly useful as an indicator of equilibrium (or non-equilibrium) between individuals and their social and physical environments. Biomarker research can support better measurement of health and functioning, which are important also for understanding the extent to which individuals are flourishing (or not) within their communities and social/economic environments (NASEM, 2020).

Our panel recommends that NLSY consider collecting and storing saliva and whole blood (which will facilitate a range of genetic and epigenetic analyses). If collecting whole blood is not possible, dry blood spots (which are less expensive to collect but cannot facilitate epigenetic analyses) are the next best option. These can be used to measure a range of biomarkers, including indicators of stress (e.g., cortisol, c-reactive protein), and systemic health conditions that have been linked with chronic stress exposures, including metabolic syndrome (associated with stress-related issues including obesity, cardiovascular disease, type-two diabetes, and polycystic ovarian syndrome) and immune function. (Ryan, 2014)

#### *Healthcare Access/Usage - Healthcare Usage.*

Healthcare usage is a term used to denote access to medical services for diagnosing, treating, and preventing health problems. Self-reported healthcare usage is a valid access to care measure and could help ascertain healthcare seeking behavior among youth. Data collection on the frequency of visits to routine care practitioners (e.g., pediatrician, dentist, optometrist, etc.), specialists (e.g., allergist, orthopedist, etc.), and mental health care providers (psychiatrist, therapist, mental health counsellors, etc.) is recommended for the NLSY26. In addition, the number of visits to urgent care clinics, emergency

rooms and hospitals are useful morbidity measures that can be linked with various risk factors. It would be essential to explore questions on difficulty finding appropriate care and medical bill-paying habits.

#### *Risky Behaviors – Substance Use.*

Substance use continues to be a major concern among young persons. (Zolopa, et al., 2022; Roberts, et al., 2021). These substances include tobacco use, alcohol use, misuse of prescription medications and other substances (e.g. glue), and illicit drug use. (Schepis, Teter, McCabe, 2018; Halladay, et al., 2020). Even though illicit drugs are by definition illegal, a large fraction of youth report using them. According to the 2021 Monitoring the Youth Survey, 10.2% of 8<sup>th</sup> grade youth, 18.7% of 10<sup>th</sup> grade youth, and 32.0% of 12<sup>th</sup> grade youth report use of illicit drugs within the past year. (Miech, 2021). The types of drugs used by youth continue to evolve over time and are related to many factors, including social norms, supply, and social policies. An example is the emergence of vaping (electronic cigarettes). (Huynh, et al., 2021). Use of alcohol, tobacco, and other substances are related to a wide range of problems, including mortality due to overdose, addiction, secondary health outcomes (e.g. liver cancer, sleep disorders), mental illness, and many other social and behavioral problems (e.g. social withdrawal, intimate partner violence, school dropout). (Mathers, et al., 2006; Ryan, et al., 2019; Macleod, et al., 2004).

#### *Physical Health – Injuries.*

People experience injuries that are intentionally caused by violence, or they may experience unintentional injuries caused by accident, but both are important to capture. Unintentional injuries (accidents) are the leading cause of death for people age 1 to 44. (Heron, 2021). These include motor vehicle accidents, falls, accidental discharge of firearms, drowning, exposure to smoke and fire, and accidental poisoning. Further, deaths are just the tip of the iceberg; these accidents result in many more people who suffer disability, hospitalizations, discomfort, and inconvenience. (Mytton, et al., 2009). These injuries are preventable, and of major significance for policy and interventions. (Bou-Karroum, et al., 2022).

#### *Physical Health – Oral Health.*

Oral health, as measured by dental caries, is an objective and sensitive measure of physical health that reflects many important health inputs, such as diet (sugar consumption), health practices (brushing teeth), and access to care (dental care). The CDC estimates the prevalence of caries among adolescents at 57%, indicating it is a common occurrence. (CDC, 2019). Oral health has been linked with educational and labor market outcomes (Glied and Neidell, 2008; Aggeborn and Ohman, 2021), thus suggesting merit as a variable to include in a longitudinal survey. Large disparities in oral health by income and race/ethnicity have been well-established. (CDC, 2019). Standard measures of oral health exist, such as the Decayed, Missing, and Filled Teeth (DMFT) index, which is the predominant population-based measure of caries experience worldwide and is low cost to administer. Since oral health is a cumulative measure, this does not need to be asked at every survey but can be asked every other.



## Medium Priority Topics

### *Environmental Exposures – Attitudes.*

While exposure to some environmental risks is apparent, exposure to other risks can be less salient. The NLSY has an opportunity to provide a better understanding of how aware individuals are about their exposure to environmental risks, which combined with objective measurement of environmental exposures, can provide insight into gaps in knowledge. In addition to questions on attitudes and beliefs relating to environmental risks (air pollution, flood risk, etc.) the panel recommends that data is collected on individuals' expectations about climate change.

### *Prescription Medication Usage.*

Prescription medication usage is a measure of healthcare consumption for particular health conditions, thus reflecting a measure of morbidity. In contrast to asking about the existence of a particular condition, prescription usage is an objective measure of morbidity that is less prone to recall error. In order to ensure accurate collection of prescription usage, including the particular medication, dosage and frequency, interviewers can upload a picture of a pill bottle. This will also save on subject's attention. A downside is that prescriptions can also reflect access to care, so even if children have particular conditions, they may not have appropriate care or resources for obtaining prescription medication. It would be essential to use prescription data in conjunction with existence of conditions, recognizing that existence of conditions may also reflect access to care. Since medication needs and access change frequently, this should be asked at each round.

### *Healthcare Access/Usage - Insurance Coverage.*

By lowering the cost of healthcare, health insurance is vital to timely access to care. (White House, 2021). There is also significant variation in the generosity of insurance, especially given the rapid rise in high deductible plans following the Affordable Care Act, which may affect the ability to afford healthcare. Since health insurance is most frequently obtain through employment, it can also affect employment decisions. (Garthwaite, Gross, Notowidigdo, 2014). In addition to obtaining a binary response about access to insurance, it is key to obtain details on cost-sharing (deductibles, co-payments, etc.) and other attributes of the insurance available to the child. Taking a photo of the insurance card is one way to obtain reliable information while sparing the subject's attention. It is also important to recognize regional differences in affordability of healthcare, so merging information on local healthcare costs (with noise added to ensure confidentiality) would be particularly useful. During the earlier survey years, interviewers should rely on parents for information about health insurance, but it is essential to ask the respondent directly as they begin to manage their own healthcare to identify at what point they obtain their own healthcare insurance. Since health insurance can change suddenly with changes in employment, this should be collected at each survey round.

### *Physical Health - Vision and Hearing.*

Students who are unable to clearly see written material or adequately hear their teachers suffer considerably in their classroom experience. Many children suffer from vision impairment (NHIS, 2016), though many forego corrective lenses because of high costs and lack of insurance coverage. Furthermore, roughly a quarter of children are not regularly screened for vision problems such that their vision status is unknown. (Child and Adolescent Health Measurement Initiative, 2017). Although such data exist in health surveys, the ability to link to educational and labor market outcomes is a particular strength of this longitudinal survey. NLSY interviewers could perform simple tests, which are available for a wide range of accuracy and costs. These measurements do not need to be diagnostic level but instead measure whether a certain threshold is met and whether they have what they need for functioning (i.e., measure if respondent needs glasses and doesn't have them). Eyesight and hearing do not decline rapidly and are not generally influenced by environmental factors so these variables could be collected during the first round to obtain a baseline, and one additional time to assess any changes.

### *Physical Health – Lifestyle.*

Alongside standard measures of physical health and disability, it is also important to collect information on lifestyle. The panel recommends that data is collected on daily activities, such as physical activity, diet and nutrition, and sleep (quality and duration). Also of interest is data on lifestyle behaviors related to risk, such as driving behavior (frequency, seatbelt use), sunscreen usage, and other routine actions to protect from risk. The group discussed the value of “health knowledge” as collected in previous surveys, but rejected its inclusion because knowledge is only a part of a factor affecting health behaviors, whereas health behaviors are an action that encompasses knowledge (among other things).

A main topic of discussion with lifestyle centered on how to collect the data. Survey questions asking details about physical activity and sleep may be onerous on the subject and unreliable. One possibility for improving data collection is to use wearable sensors that track activities and require minimal effort by the subject beyond remembering to wear them. Instead of providing a sensor for each subject to wear for an extended period of time, sensors could be given to subjects at various points throughout the year and worn for a shorter period of time, such as 2-4 weeks. This would provide more accurate measures of activity levels while keeping an eye on costs. For subjects with smartphones, a possibility is to use the built-in activity tracking features, although this may lead to bias in data collection.

### *Health of Parents.*

Since health has a strong inter-generational component, and many learned health behaviors come from parents, collecting information on health of parents would provide a useful platform for obtaining such data. Such data could be collected during the parent survey, which would obtain detailed information on typical health behaviors (activity levels, diet, etc.) and a range of health conditions. During follow-up interviews, information could be collected on health-related events that have occurred to parents, such as the onset of a new condition or disease. One concern with this topic is the amount of time it might require

collecting this information. Parents could be given a standard “checksheet” about the existence of conditions, but this may miss some nuances in their health.

#### *School Absences.*

School absences are an important proxy for health. (Allison, Attisha, et al., 2019). They can capture more subtle changes in physical or mental health than formal healthcare usage, and thus may be a more sensitive measure of health. They are also a discrete event and thus have the potential to be accurately and reliably measured, at least over short periods of time. Parents or the child may be able to accurately recall recent absences (“in the past 2 weeks, how many times have you been absent from school?”), but concerns arise about how to record absences further in the past. The possibility of linking to school records to obtain more detailed absence history, assuming it is consistently recorded, would facilitate the process and require less effort from the subject. Previous efforts were done to obtain transcripts from NLSY97 respondents; if this were to continue, then adding school absences may be low cost. Since this is a summary health measure that can change over time, this should be collected each survey round.

### **Lower Priority Topics**

#### *Healthcare Access/Usage – Vaccinations.*

Vaccines are recommended for the adolescent population as prophylaxis for serious infectious diseases. For instance, vaccines for COVID-19, Human Papillomavirus, and other conditions are recommended at the earliest possible opportunity to achieve immunity and increase the chances of avoiding disease. In addition, vaccine hesitancy is a public health issue and understanding barriers to vaccination uptake among adolescents and also among parents of adolescents are integral to improving coverage for all recommended vaccines in the population. NLSY26 can pose questions related to vaccine uptake, vaccine hesitancy, and if possible, obtain a copy of school immunization records from participants. In addition, data collected on vaccine uptake coupled with information on sexual activity can be used to compare prevalence of sexually transmitted infections among the vaccinated and unvaccinated respondents at various adult life stages. Since vaccine information is routinely collected by other administrative sources, the panel had some hesitations about whether measures obtained here were particularly relevant for health and labor market outcomes.

#### *Time Use Diary.*

How children spend their time outside of school has important impacts on their health and well-being. Obtaining details on after-school activities, transportation, working, studying/homework, screen time, exercise, sleep, etc., with a time use module similar to ATUS’ 24-hour time diary to understand what a typical day for a respondent looks like. Time use diaries can be expensive and time-consuming (for the subject) to collect and could be administered more periodically. There was a time use study in the first round of NLSY97, but it wasn’t widely used. An alternative is categorical responses for amount of time

spent on particular activities that might be more useful. If wearable sensors are deployed, this would circumvent much of the need for time use data.

*Risky Behaviors – Criminal Activity.*

Youth engage in a spectrum of behaviors that may lead to harm to themselves or others. In 2019, about 722,600 delinquency cases were handled by the U.S. juvenile court system. (Hockenberry and Puzzanchera, 2021). Of course, the court cases represent the more serious offences, primarily those where if the behavior had been committed by an adult instead of a child, could result in criminal prosecution. It would be important for NLSY to assess factors such as involvement with the criminal justice system and gang membership. Further, it is important to recognize the racial inequities that are evident in sentencing where people of color are disproportionately affected; often they are given harsher sentences than whites for similar offenses. (Sentencing Project, 2018). For example, one study showed that African males had a higher probability of receiving a sentence, and a longer sentence, compared to a white male, for similar drug related crimes. (Schmitt, Reedt, Blackwell, 2017). One concern with data on criminal activity was whether this fit within the focus of this panel on health outcomes.

*Risky Behaviors - Discipline.*

School disciplinary actions, including suspensions and expulsions, are implemented to foster a safe learning environment. However, these actions are controversial because they are also related to poor youth outcomes. (Lacoe and Steinberg, 2019). Debates exist regarding whether these relations are causal or due to selection bias. For example, one study showed that young adults had higher rates of being arrested and lower educational attainment twelve years after being suspended compared to a set of matched peers, and that these poor outcomes were not due to selection effects. (Rosenbaum, 2020). Yet, other studies suggest that selection effects are still important drivers of these relationships. (Anderson, Ritter, Zamarro, 2019). Regardless of the directionality, it is important to measure and understand youth experiences with these disciplinary actions.

Further, research shows that school disciplinary actions are disproportionately applied to youth of color, and in a manner that appears racially biased. (Fadus MC, et al., 2021; NASEM, 2019; Okonofua, Walton, Eberhardt, 2016). For example, a study of 24,204 middle and high school found that Black students had a 9 times greater likelihood of being expelled without services compared to a white student, even after accounting for a variety of person-level and school level factors. (Ksinan, et al., 2019). Moreover, another study found that black-white disparities in school disciplinary actions were related to increased rates of county-level implicit racial bias. (Riddle and Sinclair, 2019). Further, disciplinary actions may have spillover effects among those who are not disciplined. For example, black school kids suffer higher rates of depressive symptoms when they vicariously witness other black kids being disciplined. (Perryman, Platt, Ishino, 2021). And beyond the school proper, aggressive policing policies in neighborhoods appear to have negative effects on educational outcomes among Black male youth. (Legewie and Fagan, 2019). Despite the interest in such outcomes, one question was whether they may be better captured in the schooling panel.

### *Environmental exposures – ACEs.*

A large body of research identifies the harmful effects that Adverse Childhood Experiences (ACEs) have on health and well-being throughout life, especially impeding individuals' ability to be a productive part of the workforce. ACEs continue to have health effects in adulthood; some of the health outcomes in adulthood and later life that are associated with ACEs include infections from needle use, risky sexual behavior, alcoholism, and mortality from chronic diseases. In addition, children with multiple ACEs suffer from anxiety, depression, and substance abuse disorders, and have a higher risk of attempting suicide later in life. Furthermore, adolescents who experience natural disasters, violence and trauma, or an act of terrorism are particularly at risk because the toxic stress associated with ACEs affects learning, behavior, and both physical and mental well-being.

Most of the standard questions that are designed to capture ACEs are already included in the current NLSY, but the panel suggests adding questions on additional topics, such as, sexual abuse / assault, parental death (or that of other close family members), online bullying, self-harm, violence in school environment, violent crime in neighborhood, homelessness, climate-related disasters, and toxic stress. In addition, it can be helpful to add information about the parents' mental health history and the parents' history of addiction to disentangle actionable mental health measures from genetic conditions in members of NLSY26. While ACEs are important to collect, perhaps these questions are better suited for the "family background" panel.

## **Tradeoffs that informed the ranking of recommendations**

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The panel obtained a list of recommendations through an active brainstorming session in which all panel members took turns sharing ideas. After curating a list of topics, panel members individually provided a priority ranking for each topic. The rankings were summarized and split into high, medium and low priority. Since all topics on the list were considered high priority on an absolute scale, these categorizations reflect the relative priority of each topic. That is, a topic ranked as low priority simply reflects that it was lower on the list and not that it is low per se. We provide specific details above when describing the individual topics on why a particular item is not in the highest category.

Several considerations went into prioritizing topics. One consideration was how closely the topic related to labor market outcomes. Another consideration was how health and environment topics related to inequities and emerging trends with unknown but potentially substantial labor market consequences. A third consideration related to the ease of data collection, with a focus on participant burden. A final consideration focused on the quality of data collection, exploiting new technologies when available while also recognizing their potential cost to use. While few topics met all criteria, the high priority topics were either particularly important for one of the criteria or met multiple criteria.

## References

- Abi-Jaoude, E., Naylor, K.E., and Pignatiello, A. (2020 February 10). Smartphones, social media use and youth mental health. *Canadian Medical Association Journal*, 192 (6) E136-E141; DOI: <https://doi.org/10.1503/cmaj.190434>
- Adam, D. (05 May 2022). 15 million people have died in the pandemic, WHO says. *Nature*, 605, 206, doi: <https://doi.org/10.1038/d41586-022-01245-6>
- Adler, N.E., Glymour, M.M., Fielding, J. (2016). Addressing social determinants of health and health inequalities. *Journal of the American Medical Association (JAMA)*, 316(16):1641-1642.
- Aggeborn, L. and Ohman, M. (2021). The Effects of Fluoride in Drinking Water. *Journal of Political Economy*, Volume 129, Number 2, DOI <https://doi.org/10.1086/711915>
- Aghaee, S., Deardorff, J., Greenspan, L. C., Quesenberry, C. P., Kushi, L. H., & Kubo, A. (2020). Early life household intactness and timing of pubertal onset in girls: a prospective cohort study. *Boston Medical Center Pediatrics*, 20(1), 1-9.
- Allison, M., Attisha, E., et al. (2019). The Link Between School Attendance and Good Health. *Pediatrics*, 143 (2): <https://doi.org/10.1542/peds.2018-3648>
- Almond, D., & Currie, J. (2011). Killing Me Softly: The Fetal Origins Hypothesis. *Journal of Economic Perspectives*, 25(3), 153-172
- Almond, D., Currie, J., & Duque, V. (2018). Childhood Circumstances and Adult Outcomes: Act II, *Journal of Economic Literature*, 56(4), 1360-1446.
- American Lung Association. (2020). Disparities in the Impact of Air Pollution. *American Lung Association*, <https://www.lung.org/clean-air/outdoors/who-is-at-risk/disparities>
- Anderson, K.P., Ritter, G.W., Zamarro, G. (2019). Understanding a vicious cycle: The relationship between student discipline and student academic outcomes. *Educational Researcher*, 48(5):251-262.
- Andretta, J. R., McKay, M. T., and Byrne, D. G. (2018). Psychometric properties of the adolescent stress questionnaire-short form scores and association with self-efficacy. *Journal of Psychiatry and Behavioral Sciences*, 2, 1-6.
- Anniko, M. K., Boersma, K., van Wijk, N. P. L., Byrne, D., Tillfors, M. (2018 July 10). Development of a Shortened Version of the Adolescent Stress Questionnaire (ASQ-S): construct validity and sex

invariance in a large sample of Swedish adolescents. *Scandinavian Journal of Child Adolescent Psychiatry and Psychology*. 6(1):4-15. doi: 10.21307/sjcapp-2018-001.

Auxier, B. and Anderson, M. (2020 March 16). As schools close due to the coronavirus, some U.S. students face a digital ‘homework gap’. *Pew Research Center*, <https://www.pewresearch.org/fact-tank/2020/03/16/as-schools-close-due-to-the-coronavirus-some-u-s-students-face-a-digital-homework-gap/>

Bastos, J. L., Celeste, R. K., Faerstein, E., et al. (2010). Racial discrimination and health: a systematic review of scales with a focus on their psychometric properties. *Social Science Medicine*, 70(7):1091–9.

Beyens, I., Frison, E., Eggermont, S. (2016). “I don’t want to miss a thing”: Adolescents’ fear of missing out and its relationship to adolescents’ social needs, Facebook use, and Facebook related stress. *Computers in Human Behavior*, 64:1–8.

Berger, E., Castagné, R., Chadeau-Hyam, M., et al. (2019). Multi-cohort study identifies social determinants of systemic inflammation over the life course. *Nature Communications*, 10(1):1-10.

Bou-Karroum, L., El-Jardali, F., Jabbour, M., et al. (2022). Preventing unintentional injuries in school-aged children: a systematic review. *Pediatrics*, 149(Supplement 6).

Braveman, P. and Gottlieb, L. (2014). The social determinants of health: it's time to consider the causes of the causes. *Public Health Reports*, 129(1\_suppl2):19-31.

Brown, D., Kowalski, A., and Lurie, I. (2020). Long-Term Impacts of Childhood Medicaid Expansions on Outcomes in Adulthood. *Review of Economic Studies*, 87, no. 2: 792– 821.

Center for Student Success Research. (2020). How many students with disabilities are there? Measuring disability on college campuses. *Center for Student Success Research*, 3. Report No. CSSR 2020-102, [https://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1002&context=cfssr\\_reports](https://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1002&context=cfssr_reports)

Centers for Disease Control and Prevention (CDC). (2019). Oral Health Surveillance Report: Trends in Dental Caries and Sealants, Tooth Retention, and Edentulism, United States, 1999–2004 to 2011–2016. Atlanta, GA: *Centers for Disease Control and Prevention, US Dept of Health and Human Services*, <https://www.cdc.gov/oralhealth/publications/OHSR-2019-dental-caries-permanent-teeth.html>

Centers for Disease Control and Prevention (CDC). (2022). CDC Fact Sheet: Information for Teens and Young Adults: Staying Healthy and Preventing STDs. *Centers for Disease Control and Prevention*, <https://www.cdc.gov/std/life-stages-populations/stdfact-teens.htm>

- Chen, Q. and Yan, Z. (2016). Does multitasking with mobile phones affect learning? A review. *Computers in Human Behavior*, 64:938. doi: 10.1016/j.chb.2016.07.023.
- Chetty, R., Stepner, M., Abraham, S., et al. (2016). The Association Between Income and Life Expectancy in the United States, 2001-2014. *Journal of the American Medical Association (JAMA)*, 315(16):1750–1766. doi:10.1001/jama.2016.4226
- Child and Adolescent Health Measurement Initiative. (2017). 2016-2017 National Survey of Children’s Health (NSCH) data query. *Data Resource Center for Child and Adolescent Health supported by the U.S. Department of Health and Human Services, Health Resources and Services Administration (HRSA), Maternal and Child Health Bureau (MCHB)*, <https://www.nschdata.org/browse/survey/results?q=5450>
- Chisholm, D., Sweeny, K., Sheehan, P., et al. (2016). Scaling-up treatment of depression and anxiety: a global return on investment analysis. *Lancet Psychiatry*, 3:415–424.
- Chou, H-T.G. and Edge, N. (2012). “They are happier and having better lives than I am”: the impact of using Facebook on perceptions of others’ lives. *Cyberpsychology, Behavior, and Social Networking*, 15:117–21.
- Cohodes, S., Grossman, D., Kleiner, S., and Lovenheim, M. (2016). The Effect of Child Health Insurance Access on Schooling: Evidence from Public Insurance Expansions. *Journal of Human Resources*, 51, no. 3: 727–59.
- Compton, M.T. (2014). Food insecurity as a social determinant of mental health. *Psychiatric Annals*, 44(1):46-51.
- Crimmins, E., Kim, J. K., and Vasunilashorn, S. (2010). Biodemography: new approaches to understanding trends and differences in population health and mortality. *Demography*, 47(Suppl 1), S41-S64.
- Currie, J. (2009). Healthy, wealthy, and wise: Socioeconomic status, poor health in childhood, and human capital development. *Journal of Economic Literature*, 47(1), 87-122.
- Cutler, D.M. and Lleras-Muney, A. (2006). Education and health: evaluating theories and evidence. *National Bureau of Economic Research*, Cambridge, Mass.
- Davies, N.M., Dickson, M., Davey Smith, G., Van Den Berg, G.J., and Windmeijer, F. (2018). The causal effects of education on health outcomes in the UK Biobank. *Nature Human Behaviour*, 2(2):117-125.



- de Jong Gierveld, J. and Tilburg, T. V. (2006). A 6-Item Scale for Overall, Emotional, and Social Loneliness: Confirmatory Tests on Survey Data. *Research on Aging*, 28(5):582-598.  
doi:10.1177/0164027506289723
- Diez Roux, A.V. and Mair, C. (2010). Neighborhoods and Health. *Annals of the New York Academy of Sciences*, 1186(1):125-145.
- Dillon, A., Friedman, J., Serneels, P. (2021 April). Health Information, Treatment, and Worker Productivity. *Journal of the European Economic Association*, Volume 19, Issue 2, Pages 1077–1115, <https://doi.org/10.1093/jeea/jvaa024>
- Duval, A., Lanning, B. A., & Patterson, M. S. (2020). A systematic review of dating violence risk factors among undergraduate college students. *Trauma, Violence, & Abuse*, 21(3), 567-585.
- Eckert-Lind, C., Busch, A. S., Petersen, J. H., Biro, F.M., Butler, G., Bräuner, E.V., and Juul, A. (2020). Worldwide secular trends in age at pubertal onset assessed by breast development among girls: a systematic review and meta-analysis. *Journal of the American Medical Association (JAMA) Pediatrics*, pp. 1-11, 10.1001/jamapediatrics.2019.5881
- Evans, L., Engelman, M., Mikulas, A., and Malecki, K. (2021). How are social determinants of health integrated into epigenetic research? A systematic review. *Social Science & Medicine*, 273, 113738.
- Fadus, M.C., Valadez, E.A., Bryant, B.E., et al. (2021). Racial disparities in elementary school disciplinary actions: findings from the ABCD study. *Journal of the American Academy of Child & Adolescent Psychiatry*, 60(8):998-1009.
- Garthwaite, C., Gross, T., and Notowidigdo, M.J. (2014 May). Public Health Insurance, Labor Supply, and Employment Lock. *The Quarterly Journal of Economics*, Volume 129, Issue 2, Pages 653–696, <https://doi.org/10.1093/qje/qju005>
- Gee, G.C. and Ford, C.L. (2011). Structural racism and health inequities: old issues, new directions. *Du Bois Review*, 8(1):115-132.
- Gee, G.C., Hing, A., Mohammed, S., Tabor, D.C., Williams, D.R. (2019). Racism and the Life Course: Taking Time Seriously. *American Journal of Public Health*, 109(S1):S43-S47.
- Geronimus, A. T., Hicken, M., Keene, D., and Bound, J. (2006). “Weathering” and age patterns of allostatic load scores among blacks and whites in the United States. *American Journal of Public Health*, 96(5), 826-833.
- Gertler, P. et al. (2014). Labor market returns to an early childhood stimulation intervention in Jamaica. *Science*, Vol 344, Issue 6187, pp. 998-1001, DOI: 10.1126/science.1251178

- Glied, S. and Neidell, M.. (2008). The Economic Value of Teeth. *National Bureau of Economic Research, Working Paper 13879*, [https://www.nber.org/system/files/working\\_papers/w13879/w13879.pdf](https://www.nber.org/system/files/working_papers/w13879/w13879.pdf)
- Golub, M. S., Collman, G. W., Foster, P. M., Kimmel, C. A., Rajpert-De Meyts, E., Reiter, E. O., Sharpe, R. M., Skakkebaek, N. E., Toppari, J. (2008). Public health implications of altered puberty timing. *Pediatrics*, 121(Suppl 3):218–30.
- Gould, E.M. and Chappel, D.B. (2000). Graveyard gleanings: socio-economic, geographical and gender inequalities in health at Tynemouth, UK, 1833-1853. *Journal of Public Health Medicine*, 22(3):280-6. doi: 10.1093/pubmed/22.3.280.
- Grønli J, Byrkjedal IK, Bjorvatn B, Nødtvedt Ø, Hamre B, Pallesen S. (2016). Reading from an iPad or from a book in bed: the impact on human sleep. A randomized controlled crossover trial. *Sleep Medicine*, 21:86-92.
- Grossman, M. (1972). On the Concept of Health Capital and the Demand for Health. *Journal of Political Economy*, 80(2), 223–255. <http://www.jstor.org/stable/1830580>
- Guttmacher Institute. (2019). Adolescent Sexual and Reproductive Health in the United States. *Guttmacher Institute*, <https://www.guttmacher.org/sites/default/files/factsheet/adolescent-sexual-and-reproductive-health-in-united-states.pdf>
- Haas, S.A. and Fosse, N.E. (2008). Health and the educational attainment of adolescents: Evidence from the NLSY97. *Journal of Health and Social Behavior*, 49(2):178-192.
- Hakala PT, Rimpelä AH, Saarni LA, Salminen JJ. (2006). Frequent computer-related activities increase the risk of neck–shoulder and low back pain in adolescents. *The European Journal of Public Health*, 16(5):536-541.
- Halladay J, Woock R, El-Khechen H, et al. (2020). Patterns of substance use among adolescents: A systematic review. *Drug and Alcohol Dependence*, 216:108222.
- Hauser, R., Weinstein, M., Pool, R., and Cohen, B. (2010). Conducting biosocial surveys. Washington (DC): *National Academy of Sciences*.
- Heron, M. (2021 July 26). Deaths: Leading Causes for 2019. *National Vital Statistics Reports*, Volume 70, Number 9, <https://www.cdc.gov/nchs/data/nvsr/nvsr70/nvsr70-09-508.pdf>
- Hockenberry, S. and Puzanchera, C. (2021 June). Juvenile Court Statistics 2019. *National Center for Juvenile Justice*, <https://www.ojjdp.gov/ojstatbb/njcda/pdf/jcs2019.pdf>

- Holland, G. and Tiggemann, M. (2016). A systematic review of the impact of the use of social networking sites on body image and disordered eating outcomes. *Body Image*, 17:100–10.
- Hornor, G. (2020). Child and adolescent pornography exposure. *Journal of Pediatric Health Care*, 34(2), pp. 191-199.
- Huynh EM, Ghazala Z, Jagana R, Gokarakonda S. (2021). Cannabis Vaping in Adolescents: A Review of Prevalence, Comorbidities, Appraisal of Lung Injury, and Long-Term Complications. *Journal of the American Academy of Child and Adolescent Psychiatry*, S232-S232.
- Kenney, E.L. and Gortmaker, S.L. (2017). United States adolescents' television, computer, videogame, smartphone, and tablet use: associations with sugary drinks, sleep, physical activity, and obesity. *The Journal of Pediatrics*, 182:144-149.
- Koh HK, Piotrowski JJ, Kumanyika S, Fielding JE. (2011). Healthy people: a 2020 vision for the social determinants approach. *Health Education & Behavior*, 38(6):551-557.
- Kranzler, E. C., and Bleakley, A. (2019). Youth social media use and health outcomes: #diggingdeeper. *Journal of Adolescent Health*, 64(2), 141-142.
- Krieger, N. (2005). Embodiment: a conceptual glossary for epidemiology. *Journal of Epidemiology & Community Health*, 59(5), 350-355.
- Krieger, N., Alegría, M., Almeida-Filho, N., et al. (2010). Who, and what, causes health inequities? Reflections on emerging debates from an exploratory Latin American/North American workshop. In. Vol 64: *BMJ Publishing Group Ltd*, 747-749.
- Ksinan AJ, Vazsonyi AT, Jiskrova GK, Peugh JL. (2019). National ethnic and racial disparities in disciplinary practices: A contextual analysis in American secondary schools. *Journal of School Psychology*, 74:106-125.
- Kuss DJ and Griffiths MD. (2012). Internet gaming addiction: A systematic review of empirical research. *International Journal of Mental Health and Addiction*, 10(2):278-296.
- Lacoe J and Steinberg MP. (2019). Do suspensions affect student outcomes? *Educational Evaluation and Policy Analysis*, 41(1):34-62.
- Laube, C., Lorenz, R., van den Bos, W. (2020). Pubertal testosterone correlates with adolescent impatience and dorsal striatal activity. *Developmental Cognitive Neuroscience*, 42, Article 100749, 10.1016/j.dcn.2019.100749

- Legewie J, Fagan J. (2019). Aggressive policing and the educational performance of minority youth. *American Sociological Review*, 84(2):220-247.
- Levinson, D, et al. (2010). Associations of serious mental illness with earnings: results from the WHO World Mental Health surveys. *British Journal of Psychiatry*, 197(2):114-21. doi: 10.1192/bjp.bp.109.073635.
- Lloyd MH. (2018). Health determinants, maternal addiction, and foster care: Current knowledge and directions for future research. *Journal of Social Work Practice in the Addictions*, 18(4):339-363.
- Macleod J, Oakes R, Copello A, et al. (2004). Psychological and social sequelae of cannabis and other illicit drug use by young people: a systematic review of longitudinal, general population studies. *The Lancet*, 363(9421):1579-1588.
- Magson, N. R., Freeman, J. Y., Rapee, R. M., Richardson, C. E., Oar, E. L., & Fardouly, J. (2021). Risk and protective factors for prospective changes in adolescent mental health during the COVID-19 pandemic. *Journal of Youth and Adolescence*, 50(1), 44-57.
- Marmot, M. G. and Shipley, M. J. (1996). Do socioeconomic differences in mortality persist after retirement? 25 Year follow up of civil servants from the first Whitehall study. *The BMJ*, 313 :1177 doi:10.1136/bmj.313.7066.1177
- Mathers M, Toumbourou J, Catalano R, Williams J, Patton GC. (2006). Consequences of youth tobacco use: a review of prospective behavioural studies. *Addiction*, 101(7):948-958.
- Meijer M, Röhl J, Bloomfield K, Grittner U. (2012). Do neighborhoods affect individual mortality? A systematic review and meta-analysis of multilevel studies. *Social Science & Medicine*, 74(8):1204-1212.
- Miech RA, Johnston LD, O'Malley PM, Bachman JG, Schulenberg JE, Patrick ME. (2021). Monitoring the Future National Survey Results on Drug Use, 1975-2020. Volume I, Secondary School Students. *Institute for Social Research*.
- Miller, S., and Wherry, L. (2019). The Long-Term Effects of Early Life Medicaid Coverage. *Journal of Human Resources*, 54, no. 3: 785-824
- Mytton J, Towner E, Brussoni M, Gray S. (2009). Unintentional injuries in school-aged children and adolescents: lessons from a systematic review of cohort studies. *Injury Prevention*, 15(2):111-124.
- National Health Interview Survey (NHIS). (2016). QuickStats: Percentage of Children Aged 6-17 Years Who Wear Glasses or Contact Lenses, by Sex and Age Group. *Morbidity and Mortality Weekly Report*, 2017;66:917. DOI: <http://dx.doi.org/10.15585/mmwr.mm6634a7External>.

- National Academies of Sciences Engineering and Medicine (NASEM). (2018). Immigration as a social determinant of health: Proceedings of a workshop. *National Academies of Sciences Engineering and Medicine (NASEM)*.
- National Academies of Sciences Engineering and Medicine (NASEM). (2019). Monitoring educational equity. *National Academies Press*.
- National Academies of Sciences, Engineering, and Medicine (NASEM). (2020). Examining the Use of Biomarkers in Establishing the Presence and Severity of Impairments: Proceedings of a Workshop. Washington, DC: *The National Academies Press*. <https://doi.org/10.17226/25926>.
- Odgers, C. L., & Jensen, M. R. (2020). Annual Research Review: Adolescent mental health in the digital age: facts, fears, and future directions. *Journal of Child Psychology and Psychiatry*, 61(3), 336-348.
- Okonofua JA, Walton GM, Eberhardt JL. (2016). A vicious cycle: A social–psychological account of extreme racial disparities in school discipline. *Perspectives on Psychological Science*, 11(3):381-398.
- Olfson, M., Druss, B. G., Marcus, S. C. (2015). Trends in mental health care among children and adolescents. *New England Journal of Medicine*, 372(21):2029–2038.
- Olvera Alvarez, H.A., et al. (2018). Early life stress, air pollution, inflammation, and disease: An integrative review and immunologic model of social-environmental adversity and lifespan health. *Neuroscience Biobehavioral Review*, 92:226-242. doi: 10.1016/j.neubiorev.2018.06.002.
- Panchal, U., Salazar de Pablo, G., Franco, M., Moreno, C., Parellada, M., Arango, C., & Fusar-Poli, P. (2021). The impact of COVID-19 lockdown on child and adolescent mental health: systematic review. *European Child & Adolescent Psychiatry*, 1-27.
- Paradies, Y. (2006). A systematic review of empirical research on self-reported racism and health. *International Journal of Epidemiology*, 35(4):888–901.
- Patton, G. C., et al. (2016). Our future: a Lancet commission on adolescent health and wellbeing. *The Lancet*, 387:2423–2478.
- Perryman C, Platt S, Ishino FM. (2021). Identifying the Mental Health Profiles of Black Adolescents Who Experience School Policing and School Discipline: A Person-Centered Approach. *Journal of the American Academy of Child & Adolescent Psychiatry*.

- Riddle T, Sinclair S. (2019). Racial disparities in school-based disciplinary actions are associated with county-level rates of racial bias. *Proceedings of the National Academy of Sciences*, 116(17):8255-8260.
- Roberts A, Rogers J, Mason R, et al. (2021). Alcohol and other substance use during the COVID-19 pandemic: A systematic review. *Drug and Alcohol Dependence*, 229:109150.
- Rosenbaum, J. (2020). Educational and criminal justice outcomes 12 years after school suspension. *Youth & Society*, 52(4):515-547.
- Ross CE, Wu C-l. (1995). The links between education and health. *American Sociological Review*, 719-745.
- Russell, D. W. (1996). UCLA Loneliness Scale (Version 3): Reliability, Validity, and Factor Structure. *Journal of Personality Assessment*, 66(1):20-40. doi:10.1207/s15327752jpa6601\_2.
- Ryan, K. K. (2014 September 22). Stress and Metabolic Disease. In: Committee on Population; Division of Behavioral and Social Sciences and Education; National Research Council; Weinstein M, Lane MA, editors. *Sociality, Hierarchy, Health: Comparative Biodemography: A Collection of Papers*. Washington (DC): *National Academies Press, National Library of Medicine*, 11, <https://www.ncbi.nlm.nih.gov/books/NBK242443/>
- Ryan SA, Kokotailo P, Camenga DR, et al. (2019). Alcohol use by youth. *Pediatrics*, 144(1).
- Sampasa-Kanyinga, H., Roumeliotis, P., Xu, H. (2014). Associations between cyberbullying and school bullying victimization and suicidal ideation, plans and attempts among Canadian schoolchildren. *PLOS One by Public Library of Science*, 9:e102145.
- Schepis TS, Teter CJ, McCabe SE. (2018). Prescription drug use, misuse and related substance use disorder symptoms vary by educational status and attainment in US adolescents and young adults. *Drug and Alcohol Dependence*, 189:172-177.
- Schmitt, G.R., Reedt, L., Blackwell, K. (2017). Demographic Differences in Sentencing: An Update to the 2012 Booker Report. *United States Sentencing Commission*, <https://www.ussc.gov/research/research-reports/demographic-differences-sentencing>
- Sentencing Project. (2018 March). Report of The Sentencing Project to the United Nations Special Rapporteur on Contemporary Forms of Racism, Racial Discrimination, Xenophobia, and Related Intolerance - Regarding Racial Disparities in the United States Criminal Justice System. *The Sentencing Project*, <https://www.sentencingproject.org/publications/un-report-on-racial-disparities/>

- Shakya, H. B. and Christakis, N. A. (2017). Association of Facebook use with compromised well-being: a longitudinal study. *American Journal of Epidemiology*, 185:203–11.
- Shaw M. (2004). Housing and public health. *Annual Review of Public Health*, 25:397.
- Skopelja EN, Whipple EC, Richwine P. (2008). Reaching and teaching teens: Adolescent health literacy and the internet. *Journal of Consumer Health on the Internet*, 12(2):105-118.
- Stafford, A. and Wood, L. (2017). Tackling health disparities for people who are homeless? Start with social determinants. *International journal of environmental research and public health*, 14(12):1535.
- Taquette, S. R., and Monteiro, D. L. M. (2019). Causes and consequences of adolescent dating violence: a systematic review. *Journal of injury and violence research*, 11(2), 137.
- Ullsperger, J. M. and Nikolas, M. A. (2017). Supplemental material for a meta-analytic review of the association between pubertal timing and psychopathology in adolescence: are there sex differences in risk? *Psychological Bulletin Journal*, 143, pp. 903-938, 10.1037/bul0000106.supp
- van der Schuur, W. A., Baumgartner, S. E., Sumter, S. R., et al. (2015). The consequences of media multitasking for youth: a review. *Computers in Human Behavior*, 53:204–15. doi: 10.1016/j.chb.2015.06.035.
- Van Geel M, Vedder P, Tanilon J. (2014). Relationship between peer victimization, cyberbullying, and suicide in children and adolescents: a meta-analysis. *Journal of the American Medical Association (JAMA) Pediatrics*, 168(5):435-442.
- Vandecasteele L. (2011). Life course risks or cumulative disadvantage? The structuring effect of social stratification determinants and life course events on poverty transitions in Europe. *European Sociological Review*, 27(2):246-263.
- Vernon, L., Modecki, K. L., Barber, B. L. (2018). Mobile phones in the bedroom: trajectories of sleep habits and subsequent adolescent psychosocial development. *Child Development*, 89:66–77.
- Walsemann KM, Ailshire JA. (2017). Student debt spans generations: Characteristics of parents who borrow to pay for their children’s college education. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 72(6):1084-1089.
- White House, The. (2021 June 22). The Effects of Earlier Medicaid Expansions: A Literature Review. *The White House*, <https://www.whitehouse.gov/cea/written-materials/2021/06/22/the-effects-of-earlier-medicaid-expansions-a-literature-review/>

Williams DR, Collins C. (2001). Racial residential segregation: a fundamental cause of racial disparities in health. *Public Health Report*, 116(5):404-416.

Williams, D. R., Lawrence, J. A., Davis, B. A. (2019). Racism and health: evidence and needed research. *Annual Review of Public Health*, 40:105–25.

Woo, B., et al. (2019). Residential Segregation and Racial/Ethnic Disparities in Ambient Air Pollution. *Race & Social Problems Journal*, 11(1):60-67. doi: 10.1007/s12552-018-9254-0. Epub 2018 Oct 15.

World Health Organization and Health WCoSDo. (2008). Closing the gap in a generation: health equity through action on the social determinants of health: Commission on Social Determinants of Health final report. *World Health Organization*, <https://www.who.int/publications/i/item/WHO-IER-CSDH-08.1>

Zolopa C, Burack JA, O'Connor RM, et al. (2022). Changes in Youth Mental Health, Psychological Wellbeing, and Substance Use During the COVID-19 Pandemic: A Rapid Review. *Adolescent Research Review*, 1-17.