



Maximizing research on the adverse effects of child poverty through consensus measures

Seth D. Pollak¹ | Barbara L. Wolfe²

¹Department of Psychology and Waisman Center, University of Wisconsin, Madison, WI, USA

²Departments of Economics, Population Health Sciences and Public Affairs, University of Wisconsin, Madison, WI, USA

Correspondence

Seth D. Pollak, Department of Psychology, University of Wisconsin-Madison, Madison, WI 53706, USA.
Email: seth.pollak@wisc.edu

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Abstract

A variety of new research approaches are providing new ways to better understand the developmental mechanisms through which poverty affects children's development. However, studies of child poverty often characterize samples using different markers of poverty, making it difficult to contrast and reconcile findings across studies. Ideally, scientists can maximize the benefits of multiple disciplinary approaches if data from different kinds of studies can be directly compared and linked. Here, we suggest that individual studies can increase their potential usefulness by including a small set of common key variables to assess socioeconomic status and family income. These common variables can be used to (a) make direct comparisons between studies and (b) better enable diversity of subjects and aggregation of data regarding many facets of poverty that would be difficult within any single study. If kept brief, these items can be easily balanced with the need for investigators to creatively address the research questions in their specific study designs. To advance this goal, we identify a small set of brief, low-burden consensus measures that researchers could include in their studies to increase cross-study data compatibility. These US based measures can be adopted for global contexts.

KEYWORDS

assessment, child poverty, poverty measurement, ses, socioeconomic status

1 | INTRODUCTION

Even with the recent drop in the poverty rate, nearly one in five children in the United States lives in a household whose income is below the official federal poverty line, and nearly 40% of children live in poor or near-poor households¹ (Child Trends Databank, 2018). Other Developed Countries tend to have lower rates of poverty but

still substantial numbers of children living below 50% of their national median income. According to UNICEF, among 35 economically advanced nations, the rate of children living in poverty ranged from 4.7% in Iceland to 25.5% in Romania. Using this measure, the US rate was 23.1%; that of Canada 13.3% (UNICEF, 2012). In the developing world, UNICEF estimates that extreme child poverty (living on less than US \$1.90 per day) describes 19.5 per cent of children, compared

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to 9.2 per cent of adults. This translates into almost 385 million children living in extreme poverty across the globe (UNICEF & World Bank Group, 2016).

Research on the effects of poverty on children's development has been a focus of study and policy for many decades, and is now increasing as we accumulate more evidence about the societal and public health implications of poverty. Driving the need for new knowledge in this area are observations that children living in poverty are more likely to have poor health compared to peers not living in poverty, and emerging evidence that the income gap in health widens as children age (Case, Lubotsky, & Paxson, 2002; Fletcher & Wolfe, 2014). Moreover, world-wide, in terms of both cognitive and social development, children from impoverished families do worse on early school readiness, school retention, standardized tests, have poorer grades, and lower levels of academic attainment than their financially better-off counterparts (Duncan & Murnane, 2011; McKinney, 2014; Schuetz, Ursprung, & Woessman, 2005) and also have high incidence rates for behavioral and emotional problems (Ackerman, Brown, & Izard, 2004; Brooks-Gunn & Duncan, 1997; Duncan, Brooks-Gunn, & Klebanov, 1994). Taken together, these developmental gaps persist into adulthood and frequently translate to lower lifetime earnings, worse health, and reduced psychological well-being (Guralnik, Butterworth, Wadsworth, & Kuh, 2006; Minkler, Fuller-Thomson, & Guralnik, 2006; Wadsworth, Evans, Grant, Carter, & Duffy, 2016; Zeki Al Hazzouri, Haan, Galea, & Aiello, 2011).

Although the associations between child poverty and these negative outcomes are well-documented, the specific mechanisms causing these sequelae—especially physiological, cognitive, and social factors—are not currently well-understood. A limitation on our ability to combine insights from multiple scientific approaches is that researchers tend to use common words, such as “poverty” or “socioeconomic status”—but often define and measure these constructs differently. Thus, it is difficult to synthesize results across studies, especially those using different methodologies. However, harnessing multi-disciplinary approaches holds tremendous promise for advancing theory and empirically supported policies to improve children's well-being.

2 | NEW CROSS-DISCIPLINARY INSIGHTS CAN AUGMENT KNOWLEDGE ABOUT POVERTY AND CHILD DEVELOPMENT

In 2013, the American Academy of Pediatrics added “Poverty and Child Health” to its *Agenda for Children* (American Academy of Pediatrics, 2014) to recognize what has now been established as broad and enduring effects of poverty on child health and development. Similarly, UNICEF and the World Bank have called for an end to extreme poverty by 2030 (UNICEF & World Bank Group, 2016). A relatively recent addition to the field has been the application of neuroscience-based methods to better understand the developmental consequences of child poverty (Cf., Katsnelson, 2015).

Research Highlights

- New ways of conceptualizing and measuring poverty will enhance the impact of developmental science to address this public health issue for children.
- With a core set of common measurements, studies can address individual differences to better understand effects on development.
- Unconfounding socioeconomic status, family income, and poverty can help us to better understand environmental effects on children's development and allow direct comparisons between studies.

Various techniques including neuroimaging, endocrinology, cognitive psychophysiology, and epigenetics are beginning to document aspects of brain development and functioning associated with early experiences of living in poverty. The addition of these disciplines to the social science disciplines that traditionally address poverty holds tremendous promise. A review of this new literature is beyond the scope of this paper, but a number of recent, comprehensive reviews of these studies have been published (see Blair & Raver, 2016; Farah, 2018; Johnson, Riis, & Noble, 2016). This new focus on biobehavioral mechanisms underlying poverty is poised to guide empirically based and targeted interventions and policies for these children and their families (Brody et al., 2017; Brito & Noble, 2014; Dreyer, Chung, Szilagyi, & Wong, 2016; Evans, 2016; Hair, Hanson, Wolfe, & Pollak, 2015; Jensen, Berens, & Nelson, 2017; Johnson et al., 2016; Krishnadas et al., 2013; Lawson, Duda, Avants, Wu, & Farah, 2013; Lipina & Segretin, 2015).

There are many good reasons for considering neuroscience and related biological methods alongside social science approaches to study child poverty (See Pollak & Wolfe, in press, for extended discussion). For example, it is well-established that early experiences are critical for shaping many aspects of brain development related to children's behavioral functioning (Birn, Roeber, & Pollak, 2017; Fox, Levitt, & Nelson, 2010; Johnson, 2001; Romens, McDonald, Svaren, & Pollak, 2015; Wismer Fries, Ziegler, Kurian, Jacoris, & Pollak, 2005). In humans, maturation of the brain regions responsible for higher cognitive functioning continues throughout childhood and adolescence, leaving a long window of opportunity and vulnerability for environments to influence brain plasticity (Blakemore & Choudhury, 2006; Bunge, Dudukovic, Thomason, Vaidya, & Gabrieli, 2002). Although research on poverty and brain development in humans is relatively recent, the cumulative evidence thus far is yielding new and highly convergent perspectives on how and why poverty may be linked to myriad behavioral outcomes throughout the life course. These techniques also offer promise about ways to evaluate the effectiveness of various anti-poverty programs and policies focusing on children's development.

Traditionally, much of the research on child development in the context of poverty has focused on reduced stimulation and reduced



opportunities for learning compared to children in higher-income homes (Jensen et al., 2017). But it is not obvious how environments marked by poverty influence developmental mechanisms. For example, poverty is also characterized by an overabundance of types of stimulation that can negatively affect development. These factors include the presence of enduring stressors such as ambient noise (including background noise such as that associated with ongoing and unmonitored television), persistent household chaos, recurring conflicts among family members, exposure to environmental toxins, and neighborhood violence—any of which might possibly alter physiologic systems involved in stress regulation, comfort, and perceived security/stability (Coley, Lynch, & Kull, 2015; Deater-Deckard, Sewell, Petrill, & Thompson, 2010; Evans & Kim, 2013; Hair et al., 2015; Miller & Chen, 2013). Thus, there may be numerous (and not mutually exclusive) potential chronic effects on neural activity that can influence brain and behavioral development (McEwen & Gianaros, 2010). For these reasons, the use and integration of a variety of behavioral, cognitive, and neuroscience measures permits researchers to better understand exactly how and why poverty reduces the potential of children. Such knowledge could lead to more effective policies aimed at reducing the negative sequelae of poverty.

Thus, there is much to be learned by synthesizing results from a variety of survey, behavioral, neuroscience, epigenetic, and other biomarker methods into the study of child poverty. A recent issue of this journal highlighted the potential for using neuroimaging methods in new global contexts (Lloyd-Fox et al., 2019; Perdue et al., 2019; Wijekumar, Kumar, M. Delgado Reyes, Tiwari, & Spencer, 2019). Yet, each method come with their own set of challenges. For example, some methods, such as fNIRS (Functional Near-Infrared Spectroscopy) is far less expensive than MRI (Jasińska & Guei, 2018). But even results from traditional survey methodologies can be difficult to compare without common linking variables.

Practical constraints such as costs and methodological constraints such as necessary equipment for data collection results in smaller sample sizes in some methods compared to others. As an example, a neuroimaging study with 100 child participants would be considered robust by most neuroscientists. Even a large multi-site brain imaging study across six laboratories supported by the US National Institutes of Health had only 114 children from birth through age 4 and 433 children aged 4–18 (see The NIH MRI study of Normal Brain Development Clinical/Behavioral White Paper-Release 5, March 28, 2012, for a detailed description of these data). The single largest neuroimaging study of child poverty to date had about 1,000 children and adolescents, but the sample covered an extremely broad age range from 3 to 20 years (Noble et al., 2015). Even these two largest neuroimaging samples stand in sharp contrast with the much larger samples used by most social scientists, such as the Current Population Survey, the Census, the Panel Study of Income Dynamics, the National Longitudinal Survey of Youth, the National Longitudinal Study of Adolescent to Adult Health (Add Health), or the Retirement History Survey to name just a few. Some of these samples include over 10,000 participants.

Of primary concern is that the kinds of sample sizes that are feasible for some kinds of research methods constrain opportunities to examine some of the most germane and critical issues about the effects of poverty on children. These include limited opportunities to deeply interrogate issues such as individual differences in children's responses to poverty. In addition, there are constrained opportunities to test potential mediator/moderator variables likely to influence child development. These may include a host of factors such as (but not limited to) parents' marital status, earnings, schooling, race/ethnicity, stress, environmental toxins, rural versus urban locations, receipt of means tested benefits, and the developmental timing of when in a child's life the family moves in and out of poverty. From a developmental perspective, families may experience income fluctuations that occur at different developmental phases for the child, but this is an issue that has remained relatively unexamined yet may well-provide explanatory power in terms of child outcomes. And it may be hard to assess or contextualize poverty in the absence of information such as how many sources of income are available to the child, how many individuals are dependent upon those resources, and the extent to which families may have "underground sources of income" that they tend not to report.

The above paragraph suggests the crux of why progress in understanding child poverty can be accelerated by drawing direct connections between the strengths offered by different disciplinary approaches. Larger scale social science approaches allow stronger characterization of children's environments and the testing of specific features of those environments, but do not address developmental mechanisms within individual children. In a complementary pattern, biological approaches are well-poised to test processes and mechanisms affected by children's experiences, but are not oriented to parametrizing environmental factors with the precision of the social sciences. Combining these approaches provides a potentially useful way to assess and understand individual differences in children's responses to their environments. While we highlight the value of common measures to translate across levels of analyses, it is also the case that some uniform measures would benefit comparison from one purely behavioral study to another, and, from one biological study to another.

3 | OPPORTUNITIES AND CHALLENGES OF DATA HARMONIZATION

Poverty—especially in a global context—is a complex issue: much has been published about what constitutes poverty, how to define it, and how to measure it (Institute for Research on Poverty, 2016; Short, 2016). Issues range from whether to include only income or also in-kind benefits; the length of time under consideration; whether the measure should be absolute or relative to the median income in a given community; and whether the measure should go beyond income to include broader factors such as parent's human capital and/or social isolation. From a developmental science perspective, the effects of child poverty are likely to be multi-determined. Such

factors might include-- but are not limited to-- stress, nutrition, toxin exposure, school experiences, financial subsidies, and health (Duncan, Magnusson, & Votruba-Drzal, 2017). No single study will be able to engage all of these issues. But critical steps forward can emerge if data across studies can be more easily compared.

Data sets need not be combined to advance knowledge about the effect of poverty on developmental processes. Rather, studies could be designed so that the results can be more directly contrasted with other studies focused on different neural systems, demographic factors, developmental domains, ages, or diverse subpopulations. A minimal step involves ensuring just a few common descriptive variables exist between projects. Fortunately, such a goal is feasible because it dovetails with recent emphases on making data publicly available in a timely fashion in order to improve reliability and increase use of expensive data. Below, we suggest a few key questions that can serve as common linkages between studies.

4 | CLARIFYING THE MEASUREMENT OF "POVERTY"

There are two general issues that make it difficult to compare studies of child poverty: one concerns the range of different variables that researchers use to characterize their samples and operationally define "poverty," and the second is a lack of clarity between a family's income and their socioeconomic status (See Farah, 2018). Our proposed questions aim to address both of these issues, while still leaving researchers broad latitude in how they conceptualize their own studies.

There are many ways in which contemporary researchers collect and measure data about poverty. Some research teams use questionnaires to target income. For example, researchers in the United States might identify families living below the federal poverty line; researchers in most other Organization for Economic Co-operation and Development (OECD) countries might use families living below 40% or 50% of median income, while those in developing countries tend to use dollars per day below a set benchmark. Other researchers focus on specific aspects of the experience of poverty, such as food insecurity, availability of stable housing, or minimum standards in housing. Indeed, recently published reports have used a vast array of different kinds of questions for research participants to characterize a child's family as living in poverty. These range from varied and idiosyncratic ways to ask research participants about their family income, to asking about the mothers' level of education. This latter issue of maternal education is problematic in that it is often used as a single index of a child's family environment. Moreover, maternal education is more a measure of socioeconomic status, which is a different construct from poverty or family income.² Globally, there are a number of new approaches being used, but each of them also taps different aspects of poverty. These include the Social Metrics Commission Report on Measuring Poverty, which employed numerous experts to propose a measure for the UK. Statistics Canada produces four measures that vary in terms of whether income

is assessed pre or post tax or whether other benefits received by the family are included in the poverty assessment (Family Services Toronto, 2016).

Frequently in developmental science, parent education is used as the sole proxy for children's socioeconomic environments. But parent education, alone, provides little precision or insight into how children experience poverty (Duncan & Magnusson, 2012). It is not yet clear whether low family income has the similar developmental effects on children as low family socioeconomic status. Unfortunately, there is no single, simple measure of family income or parent education that is sufficient to index the developmental context of poverty for a child. Even while objective indices such as the federal poverty line may provide a useful parameter for recruiting a study sample, there is no evidence that a child living marginally above the federal poverty level is appreciably better off than one marginally below. In sum, both poverty and socioeconomic status are separate, albeit overlapping, constructs (Darin-Mattsson, Fors, & Kåreholt, 2017).

A simple example illustrates some of the problems incurred through the use of imprecise measurement of child poverty. Imagine a child growing up in a family in which both parents are graduate students. This child may live in a family that has an income that is below the U.S. federal poverty line or below 50% of a community's median income. But when viewed over a life course, this family's income is only below the federal poverty line (or 50% of median income) for a relatively short period of time. A child in this family is more likely to have access to a higher permanent and stable income in the future, to interact regularly with college educated adults who use complex language, to have parents who read regularly to the child, to attend an experimental childcare program with educated childcare providers, and to be exposed to publicly available child-oriented cultural and arts events. In other words, this child is temporarily living in a family that is income poor, but not a family that is poor in other dimensions. A bit further away is a child growing up in a single parent household with a caregiver who did not finish high school. This child might attend Head Start (public pre-school) for part of the day, but then returns home, where there are limited developmentally stimulating/appropriate activities or activities supervised by adults. This child might have a parent whose time is spent working multiple jobs, and the child likely does not regularly interact with people who have benefitted from post-secondary education. Both children may be recruited at the same time to participate in the same study. If gross family income at the time of recruitment is the sole measure of poverty, it is accurate that both children are technically growing up in a family whose income is below the official poverty line at a point in time-- but the children's experiences across development are very different.

Meaningful comparisons of developmental data across studies will require researchers to more deeply understand the nature of group differences reported in individual studies. To do so will require differentiating the effects of various indicators such as income, education, participation in publicly available means-tested benefits (e.g. in the United States SNAP, the Supplemental Nutrition Assistance Program; in the U.K., Employment and Support Allowance.; in

Australia, Social Housing); and stability in living arrangements (such as marital status of parents, the family's access to housing and the quality of that housing). For these reasons, we propose a set of brief, easily measured items that can be added to nearly all studies with minimal impact. These questions are intentionally not meant to be comprehensive, as any given research project will want to add hypotheses-specific questions. But this set of questions carries minimal participant burden: In the context of a research visit or interview, these items should take just a few minutes to collect and can be completed by research participants, by their parent(s), or read aloud to them if there are concerns about a participant's reading ability.

5 | STANDARD QUESTIONS TO INCLUDE IN STUDIES OF POVERTY

We propose the following set of questions that could be asked consistently across a variety of studies. The goal of this initiative is not to be fully comprehensive; we intentionally kept this list of questions minimal to allow individual projects to add many of their own study-specific questions consistent with the goals, design, and hypotheses of those studies while also respecting the time burden on research participants. Nor is this a domain where it makes sense to develop a formal questionnaire with tested psychometric properties; economic factors and public benefit programs are always changing in ways that differentially impact families and children. Instead, we draw upon consensus measures, selecting key variables that have consistency in poverty studies and that tap the range of factors most often discussed as relevant to children's experience of poverty.

These questions allow for separate assessment of poverty versus socioeconomic status, and should be construed as simply a minimal, basic set of questions to measure poverty and SES that would be consistent across projects. Here, the focus is on questions designed to capture the direct experience of the child. Researchers might wish to add additional questions to measure other issues relevant to a given research project, such as, for example, parent-child interactions, specifics about food availability, detailed housing conditions, healthcare, neighborhood or school poverty rates, or children's subjective experience of poverty (Since our focus is on parent responses, we do not include subjective poverty questions that could be asked of a child, though these issues warrant research attention. And, since our focus is on children of all ages, we do not include school or pre-school based measures).

There are opportunities and challenges associated with a move toward even a small subset of common data elements. On the opportunities side, the use of some common measures of poverty and SES will support the aggregation of data sets of various types (e.g. structural and functional imaging, behavioral measures, epigenetics, etc.) that might then have greater power to detect, for example, interactions between demographic and individual poverty. Such data aggregation will allow greater power in exploratory studies where the challenges of multiple comparison correction for many statistical tests can often preclude the generation of informative results that

can guide future research. Even without data aggregation, a small set of common measures enables opportunities for future meta-analyses of data from the field and direct comparison of results across different published reports.

On the challenges side, sometimes a push toward common data elements can encourage investigators to restrict themselves to relying only on minimal measures, or cause scientists to worry that their studies will be criticized for deviating from standard norms. We hope that researchers will take the basic items we propose here only as a starting point. Our goal is that researchers will build upon these items in such a way as to fully tailor each new study to test specific hypotheses. Most data sets in this field can have impactful secondary uses if common linking variables are included in the initial design with the goal of future comparisons across studies. If conducted in this manner, like chicken soup, these items cannot hurt and might well help.

6 | SELECTION OF CORE QUESTIONS

We propose a set of 12 core questions that can be easily integrated into studies of child poverty, regardless of sample size. These items are presented in Appendix 1. This set of questions is not intended to be the only poverty-related items researchers include in their data plans. Rather, this is a base set that can be supplemented with additional questions; for example, if a study targets a particular subpopulation such as Hispanics or Asians from particular countries, then additional questions will be needed. And, they can be readily adapted in other countries (for example, by using the largest means tested benefit program in place of SNAP and the local currency). The questions are aimed at capturing primary caregiver characteristics. They will work robustly unless a child is in an extended placement. In this latter case, researchers will need to determine if the relevant data for their particular study is the child's lifetime or current environment. We adapted items from a variety of sources to maximize their utility across a wide range of research studies, as detailed below.

6.1 | What is not included

We do not include questions about programs such as Early Head Start, Head Start, or WIC, because they are not core measures of poverty but rather the take-up of benefits, are targeted at only infants or very young children, and family participation can change frequently over time. But studies focused specifically on infants and younger children may want to include these items in a broader set of questions if the focus is on what policies are effective. Many studies in the field of child poverty do not consider benefits such as free/reduced school breakfast or lunches for a variety of reasons. This is because at the time of data collection for a particular study, children may not yet be school-aged, families may be queried in the summer months or vacation time when the benefit is not available or on the

mind of the parent, and because, in numerous school districts in the United States with high proportions of children below the poverty line, program eligibility is based not on a family's income but the percentage of children at the school who might benefit. Some poverty measures include these benefits when calculating poverty, though they are not included in the official federal poverty measure. Yet, food benefits are direct replacements for income; therefore, we include other food benefit programs as described below.

6.2 | Adaptation to global studies

These questions are focused on US-based programs, but can be easily adapted to work well for international comparisons. For means tested type programs, researchers can include questions about the largest program targeted on families with children in a region. Researchers can also convert currencies using PPP (purchasing power parity), a method that compares different countries' currencies through a market "basket of goods" approach. International researchers can also modify the poverty rate using a standard database like the Organization for Economic Co-operation and Development (OECD), a benchmark of income inequality across countries (www.oecd.org).

6.3 | Common measures are consistent with flexibility

Every project will need to add items depending upon the focus of the study, so a fully comprehensive survey is not possible or desirable. This set is only intended to constitute a common minimal link between independently conducted studies.

7 | CONTENT AREAS OF QUESTIONS

7.1 | Demography

The first item captures race and ethnicity—important factors to consider in that they may be tied to aspects of culture, including child-care practices, diet, and the experience of discrimination.

7.2 | Socioeconomic status

Many studies confound or confuse the construct of socioeconomic status with poverty. When only a single index is used to characterize a sample (such as years of maternal education), it will prevent other researchers from disentangling these issues when reading a published paper or attempting to reconcile findings that emerged in one study with those reported in another (where authors might rely on an index such as family income below the Federal Poverty Line). The next three questions address socioeconomic status. A

query about whether English is the primary language (or, if used in other countries, if the dominant language of the country is spoken at home) is included because children who do not speak English at home could face additional challenges at school or have parents with limited employment opportunities (Hoff, 2013; Turney & Kao, 2009). Majority versus minority language use questions can be adapted for other global contexts. Knowledge about marital status provides an estimate of the number of adults supporting and drawing on family resources, and can also serve as estimation of parental time available for children. For these reasons, marital status is frequently found to be an important determinant of children's well-being and human capital (McLanahan & Sandefur, 1994). Parental education has long been used as a measure of parental effectiveness, and consistently influences children's educational and behavioral outcomes (Haveman & Wolfe, 1995). We include a question about parent disability because this might limit family financial potential and also make the cost of living higher for a family (Smith, 1999). These initial questions are all consistent with the data gathered through the Current Population Survey (CPS), sponsored jointly by the U.S. Census Bureau and the U.S. Bureau of Labor Statistics (BLS), the primary source of statistics for the population of the United States (US Census, 2016).

7.3 | Poverty

Items five through 12 tap poverty directly. These questions ask about family income using established response categories, including the exact income bins used by the Current Population Survey (US Census, 2016). Here, we have worded the questions to encourage research participants to consider *all* sources of their income—a task that can be especially difficult in families where these sources of income might not be stable or consistent— or even considered as income. Additional items are designed to help determine issues such as the number of people living off of that income, which combined with income, permits calculation of an income to needs ratio for a child. Since many individuals have inconsistent sources of income, we also suggest asking whether the current year income is representative of income the previous year. As noted above, receipt of free/reduced school breakfast or lunches is not a robust indicator of child poverty for research purposes. Yet, food benefits are direct replacements for income and ought to be included in studies because they make a family and the child better off (Short, 2016). For this reason, we include Question 6 about food stamps (SNAP; Supplemental Nutrition Assistance Benefits), the most common means tested benefit in the U.S. and a more reliable measure than school lunches. Gathering data about a family's use of food stamps also provides essentially the same information that would be gained from querying most other cash in-kind programs. One challenge about selecting questions to include in this set is that public programs can be added, removed, and changed over time. We selected SNAP because it is the largest anti-poverty program and has been in place since the 1960s, so it is stable across time. We drew these questions from the US Census Bureau's American Community Survey (ACS), but modified



the questions to ask about children's experiences. (The ACS is conducted every year to determine how federal and state funds will be distributed to address the economic needs of communities; this supplements the Census, which is conducted every 10 years).

Through the remaining questions, we ask about a child's health insurance coverage as an important index of the resources available to a child. Having health insurance increases access to health care and is tied to having a regular provider and to prevention of illness and earlier diagnosis of illness allowing for more timely treatment (DeNavas-Walt, 2010). (The question on health insurance coverage might be omitted in countries with universal coverage.) Next, we ask about consumption of housing (and housing stability) and food security. These are important aspects of daily life that influence a child's well-being (Bhattacharya, Currie, & Haider, 2004; Cutts et al., 2011). For example, both inadequate housing and frequent housing relocation negatively influences children. Researchers could also modify the list of items to reflect the housing quality in the country of interest. The list might include type of flooring, type of roof, etc. When families regularly endure food insecurity, children may be too hungry to concentrate in school. Because food insecurity is emerging as an important component of the experience of living in poverty, it is now queried as part of the Census Bureau's Current Population Survey. Here, we use the CPS measure of food insecurity but query two time-frames to help determine the duration of family poverty. Finally, we recommend asking if at least one of the child's parents is involved in any paid work to get a sense of parental participation in the work force, which would indicate greater economic stability for a child and, in many states, family eligibility for many means tested benefit programs.³

8 | CONCLUSION AND RECOMMENDATIONS FOR FUTURE DIRECTIONS

Despite significant research progress, current understanding of how, why, when, and in whom poverty shapes children's development remains incomplete. There is much to be learned about how links between behavioral development, neurobiology, and children's experiences of poverty can and should inform social policies. It is already accepted that children living in poverty have poorer health and do worse in critical domains, including educational progress; new research methods hold tremendous potential to uncover some of the mechanisms behind these outcomes as well as ways to test effectiveness of programs designed to benefit these children. Similarly, combining new methods may lead to better insights about whether an intervention shows initial promise of leading to the intended results in the short-term (as compared to waiting and measuring children's adult outcomes).

It is imperative that researchers build a body of evidence in the area of poverty to reach the level of certainty needed to put ideas into practice at the policy level. A critical first step in this endeavor is increasing standardization across studies by collecting strong data that characterize children's environments. There are certainly other

steps that researchers can take, including other methodological, statistical, and sampling practices that advance this area of study. However, these changes might overly constrain or drastically change how individual investigators wish to pursue their studies. In contrast, many problems in this field (such as a lack of clarity between developmental effects of SES vs. poverty, the effects of relative vs. absolute poverty on child development, and individual differences in developmental outcomes) could be easily addressed, and developmental science of poverty studies greatly advanced, if researchers were better able to compare and integrate findings across various types of studies, as well as link their datasets.

Consistently including these measures could greatly expand the amount of data available to researchers with negligible additional costs. Use of these common measures also has the added benefits of helping researchers to both (a) use data from more than one sample to better test their hypothesis and (b) understand how differences in samples could lead to variations in results across studies. At present, inconsistencies across published studies are difficult to reconcile. Addressing these issues will identify new ways that research can be used to understand more about the basic science of how environments affects children's development, to develop more effective antipoverty policies in response to these insights, and to generate a stronger basis for researchers to communicate relevant findings to policymakers.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this paper.

ORCID

Seth D. Pollak  <https://orcid.org/0000-0001-5184-9846>

ENDNOTES

- ¹ For 2017, 17.5% or 12.8 million children in the US were living in households with incomes below the official poverty line; 39% were living in households with incomes below twice the poverty line (Child Trends Databank, 2010). The percentage of children in the United States who spend some portion of their childhoods living in households with incomes below the official poverty line is far higher than any single year estimate, with the youngest children at greatest risk (see Jiang et al., 2016).
- ² A recent article that compares income and SES effects on the health of older adults finds that income is a separate and indeed more closely tied gauge than other measures of SES (Darin-Mattsson, Fors & Kåreholt, 2012).
- ³ While individual researchers or teams may elect to combine some of these measures using factor analysis, we recommend that they also use individual components in robustness tests that would encourage straightforward comparisons with other studies.
- ⁴ The questions can be read aloud to participants with limited reading skills and can be readily modified if being asked by an interviewer.
- ⁵ This question can be asked separately of each caregiver if a longer survey, but disaggregated data, is relevant for a particular study.
- ⁶ Researchers could modify this list to reflect the housing quality in the country of interest. The list might include type of flooring, type of roof, etc.

REFERENCES

- Ackerman, B. P., Brown, E. D., & Izard, C. E. (2004). The relations between persistent poverty and contextual risk and children's behavior in elementary school. *Developmental Psychology, 40*(3), 367–377. <https://doi.org/10.1037/0012-1649.40.3.367>
- American Academy of Pediatrics. (2014). AAP Agenda for Children Strategic Plan: Poverty and child health. Available at: <https://www.aap.org/en-us/about-the-aap/aap-facts/AAP-Agenda-for-Children-Strategic-Plan/Pages/AAP-Agenda-for-Children-Strategic-Plan-Poverty-Child-Health.aspx> [last accessed 15 August 2019].
- Bhattacharya, J., Currie, J., & Haider, S. (2004). Poverty, food insecurity, and nutritional outcomes in children and adults. *Journal of Health Economics, 23*(4), 839–862. <https://doi.org/10.1016/j.jhealeco.2003.12.008>
- Blair, C., & Raver, C. C. (2016). Poverty, stress, and brain development: New directions for prevention and intervention. *Academic Pediatrics, 16*(3), S30–S36. <https://doi.org/10.1016/j.acap.2016.01.010>
- Blakemore, S. J., & Choudhury, S. (2006). Development of the adolescent brain: Implications for executive function and social cognition. *Journal of Child Psychology and Psychiatry, 47*(3–4), 296–312. <https://doi.org/10.1111/j.1469-7610.2006.01611.x>
- Brito, N. H., & Noble, K. G. (2014). Socioeconomic status and structural brain development. *Frontiers in Neuroscience, 8*, 276. <https://doi.org/10.3389/fnins.2014.00276>
- Birn, R. M., Roeber, B. J., & Pollak, S. D. (2017). Early childhood stress exposure, reward pathways, and adult decision making. *Proceedings of the National Academy of Sciences, 114*, 13549–13554.
- Brody, G. H., Joshua, C. G., Tianyi, Y., Allen, W. B., Steven, R. H. B., Adrianna, G., ... Lawrence, H. S. (2017). Protective prevention effects on the association of poverty with brain development. *JAMA pediatrics, 171*, 46–52.
- Brooks-Gunn, J., & Duncan, G. J. (1997). The effects of poverty on children. *The Future of Children, 7*(2), 55–71. <https://doi.org/10.2307/1602387>
- Bunge, S. A., Dudukovic, N. M., Thomason, M. E., Vaidya, C. J., & Gabrieli, J. D. (2002). Immature frontal lobe contributions to cognitive control in children: Evidence from fMRI. *Neuron, 33*(2), 301–311. [https://doi.org/10.1016/S0896-6273\(01\)00583-9](https://doi.org/10.1016/S0896-6273(01)00583-9)
- Case, A., Lubotsky, D., & Paxson, C. (2002). Economic status and health in childhood: The origins of the gradient. *American Economic Review, 92*(5), 1308–1334. <https://doi.org/10.1257/000282802762024520>
- Child Trends Databank. (2018). Children in poverty. Available at: <https://www.childtrends.org/?indicators=children-in-poverty>
- Coley, R. L., Lynch, A. D., & Kull, M. (2015). Early exposure to environmental chaos and children's physical and mental health. *Early Childhood Research Quarterly, 32*, 94–104. <https://doi.org/10.1016/j.ecresq.2015.03.001>
- Cutts, D. B., Meyers, A. F., Black, M. M., Casey, P. H., Chilton, M., Cook, J. T., ... Frank, D. A. (2011). US housing insecurity and the health of very young children. *American Journal of Public Health, 101*(8), 1508–1514. <https://doi.org/10.2105/AJPH.2011.300139>
- Darin-Mattsson, A., Fors, S., & Kåreholt, I. (2017). Different indicators of socioeconomic status and their relative importance as determinants of health in old age. *International Journal for Equity in Health, 16*, 173. <https://doi.org/10.1186/s12939-017-0670-3>
- Deater-Deckard, K., Sewell, M. D., Petrill, S. A., & Thompson, L. A. (2010). Maternal working memory and reactive negativity in parenting. *Psychological Science, 21*, 75–79. <https://doi.org/10.1177/0956797609354073>
- DeNavas-Walt, C. (2010). *Income, poverty, and health insurance coverage in the United States (2005)*. Diane Publishing, Washington, DC.
- Dreyer, B., Chung, P. J., Szilagyi, P., & Wong, S. (2016). Child Poverty in the United States Today: Introduction and Executive Summary. *Academic Pediatrics, 16*(3), S1–S5. <https://doi.org/10.1016/j.acap.2016.02.010>
- Duncan, G. J., Brooks-Gunn, J., & Klebanov, P. K. (1994). Economic deprivation and early childhood development. *Child Development, 65*(2), 296–318. <https://doi.org/10.2307/1131385>
- Duncan, G. J., & Magnuson, K. (2012). Socioeconomic status and cognitive functioning: Moving from correlation to causation. *Wires Cognitive Science, 3*(3), 377–386. <https://doi.org/10.1002/wcs.1176>
- Duncan, G. J., Magnuson, K., & Votruba-Drzal, E. (2017). Moving beyond correlations in assessing the consequences of poverty. *Annual Review of Psychology, 68*, 413–434. <https://doi.org/10.1146/annurev-psych-010416-044224>
- Duncan, G., & Murnane, R. (2011). *Whither opportunity?: Rising inequality, schools, and children's life chances*. Russell Sage Foundation, New York, NY.
- Evans, G. W. (2016). Childhood poverty and adult psychological well-being. *Proceedings of the National Academy of Sciences of the United States of America, 113*(52), 14949–14952. <https://doi.org/10.1073/pnas.1604756114>
- Evans, G. W., & Kim, P. (2013). Childhood poverty, chronic stress, self-regulation, and coping. *Child Development Perspectives, 7*(1), 43–48. <https://doi.org/10.1111/cdep.12013>
- Family Service Toronto. (2016). A Road Map To Eradicate Child And Family Poverty. Available at: <http://campaign2000.ca/wp-content/uploads/2016/11/Campaign2000NationalReportCard2016Eng.pdf>
- Farah, M. J. (2018). Socioeconomic status and the brain: Prospects for neuroscience-informed policy. *Nature Reviews Neuroscience, 19*, 428–438. <https://doi.org/10.1038/s41583-018-0023-2>
- Fletcher, J., & Wolfe, B. (2014). Increasing our understanding of the health-income gradient in children. *Health Economics, 23*(4), 473–486. <https://doi.org/10.1002/hec.2969>
- Fox, S. E., Levitt, P., & Nelson, C. A. III (2010). How the timing and quality of early experiences influence the development of brain architecture. *Child Development, 81*(1), 28–40. <https://doi.org/10.1111/j.1467-8624.2009.01380.x>
- Guralnik, J. M., Butterworth, S., Wadsworth, M. E. J., & Kuh, D. (2006). Childhood socioeconomic status predicts physical functioning a half century later. *Journals of Gerontology - Series A Biological Sciences and Medical Sciences, 61*(7), 694–701. <https://doi.org/10.1093/geron/a61.7.694>
- Hair, N. L., Hanson, J. L., Wolfe, B. L., & Pollak, S. D. (2015). Association of child poverty, brain development, and academic achievement. *JAMA Pediatrics, 169*(9), 822–829. <https://doi.org/10.1001/jamapediatrics.2015.1475>
- Haveeman, R., & Wolfe, B. (1995). (1995) The determinants of children's attainments: A review of methods and findings. *Journal of Economic Literature, 33*, 1829–1878.
- Hoff, E. (2013). Interpreting the early language trajectories of children from low-SES and language minority homes: Implications for closing achievement gaps. *Developmental Psychology, 49*(1), 4.
- Institute for Research on Poverty, University of Wisconsin-Madison. (2016). How is poverty measured in the United States?. Available at: <http://www.irp.wisc.edu/faqs/faq2.htm> [last accessed 15 August 2019].
- Jasińska, K. K., & Guei, S. (2018). Neuroimaging field methods using functional near infrared spectroscopy (fNIRS) neuroimaging to study global child development: Rural sub-saharan africa. *JoVE (Journal of Visualized Experiments), 132*, e57165.
- Jensen, S. K., Berens, A. E., & Nelson, C. A. (2017). Effects of poverty on interacting biological systems underlying child development. *The Lancet Child & Adolescent Health, 1*, 225–239. [https://doi.org/10.1016/S2352-4642\(17\)30024-X](https://doi.org/10.1016/S2352-4642(17)30024-X)
- Jiang, Y., Ekono, M., & Skinner, C. (2016). *Basic Facts about Low-Income Children Under 18 Years, 2014*. New York: National Center for Children in Poverty. Available at: http://www.nccp.org/publications/pub_1145.html (accessed 1/8/2017).
- Johnson, M. H. (2001). Functional brain development in humans. *Nature Reviews Neuroscience, 2*(7), 475–483. <https://doi.org/10.1038/35081509>

- Johnson, S. B., Riis, J. L., & Noble, K. G. (2016). State of the art review: Poverty and the developing brain. *Pediatrics*, *137*, e20153075. <https://doi.org/10.1542/peds.2015-3075>
- Katsnelson, A. (2015). News feature: The neuroscience of poverty. *Proceedings of the National Academy of Sciences of the United States of America*, *112*(51), 15530–15532. <https://doi.org/10.1073/pnas.1522683112>
- Krishnadas, R., McLean, J., Batty, G. D., Burns, H., Deans, K. A., Ford, I., ... Cavanagh, J. (2013). Socioeconomic deprivation and cortical morphology: Psychological, social, and biological determinants of ill health study. *Psychosomatic Medicine*, *75*(7), 616–623. <https://doi.org/10.1097/PSY.0b013e3182a151a7>
- Lawson, G. M., Duda, J. T., Avants, B. B., Wu, J., & Farah, M. J. (2013). Associations between children's socioeconomic status and prefrontal cortical thickness. *Developmental Science*, *16*(5), 641–652. <https://doi.org/10.1111/desc.12096>
- Lipina, S. J., & Segretin, M. S. (2015). Strengths and weakness of neuroscientific investigations of childhood poverty: Future directions. *Frontiers in Human Neuroscience*, *9*, 53. <https://doi.org/10.3389/fnhum.2015.00053>
- Lloyd-Fox, S., Blasi, A., McCann, S., Rozhko, M., Katus, L., Mason, L., Elwell, C. E. (2019). Habituation and novelty detection fNIRS brain responses in 5- and 8-month-old infants: The Gambia and UK. *Developmental Science*, *22*(5), e12817. <https://doi.org/10.1111/desc.12817>
- McEwen, B. S., & Gianaros, P. J. (2010). Central role of the brain in stress and adaptation: Links to socioeconomic status, health, and disease. *Annals of the New York Academy of Sciences*, *1186*, 190–222. <https://doi.org/10.1111/j.1749-6632.2009.05331.x>
- McKinney, S. (2014). The relationship of child poverty to school education. *Improving Schools*, *17*(3), 203–216. <https://doi.org/10.1177/1365480214553742>
- McLanahan, S., & Sandefur, G. (1994). *Growing Up with a Single Parent. What Hurts, What Helps*. Cambridge, MA: Harvard University Press.
- Miller, G. E., & Chen, E. (2013). The Biological residue of childhood poverty. *Child Development Perspectives*, *7*(2), 67–73. <https://doi.org/10.1111/cdep.12021>
- Minkler, M., Fuller-Thomson, E., & Guralnik, J. M. (2006). Gradient of disability across the socioeconomic spectrum in the United States. *New England Journal of Medicine*, *355*(7), 695–703. <https://doi.org/10.1056/NEJMsa044316>
- Noble, K. G., Houston, S. M., Brito, N. H., Bartsch, H., Kan, E., Kuperman, J. M., ... Sowell, E. R. (2015). Family income, parental education and brain structure in children and adolescents. *Nature Neuroscience*, *18*(5), 773–778. <https://doi.org/10.1038/nn.3983>
- Perdue, K. L., Jensen, S. K. G., Kumar, S., Richards, J. E., Kakon, S. H., Haque, R., Nelson, C. A. (2019). Using functional near-infrared spectroscopy to assess social information processing in poor urban Bangladeshi infants and toddlers. *Developmental Science*, *22*, e12839. <https://doi.org/10.1111/desc.12839>
- Pollak, S. D., & Wolfe, B. (in press). How developmental neuroscience can help address the problem of child poverty. *Development & Psychopathology*.
- Romens, S. E., McDonald, J., Svaren, J., & Pollak, S. D. (2015). Associations between early life stress and gene methylation in children. *Child Development*, *86*(1), 303–309. <https://doi.org/10.1111/cdev.12270>
- Schuetz, G., Ursprung, H., & Woessman, L. (2005). "Education Policy and Equality of Opportunity", CESifo Working Paper 1518.
- Short, K. S. (2016). Child poverty: Definition and measurement. *Academic Pediatrics*, *16*(3), S46–S51. <https://doi.org/10.1016/j.acap.2015.11.005>
- Smith, J. P. (1999). Healthy bodies and thick wallets: The dual relation between health and economic status. *Journal of Economic Perspectives*, *13*(2), 145–166. <https://doi.org/10.1257/jep.13.2.145>
- Turney, K., & Kao, G. (2009). Barriers to school involvement: Are immigrant parents disadvantaged? *The Journal of Educational Research*, *102*(4), 257–271. <https://doi.org/10.3200/JOER.102.4.257-271>
- UNICEF and WORLD BANK GROUP. (2016). Ending Extreme Poverty: A Focus on Children. Available at: https://www.unicef.org/publications/files/Ending_Extreme_Poverty_A_Focus_on_Children_Oct_2016.pdf [last accessed 15 August 2019].
- UNICEF Innocenti Research Centre. (2012). 'Measuring Child Poverty: New league tables of child poverty in the world's rich countries', Innocenti Report Card 10. UNICEF Innocenti Research Centre, Florence.
- US Census. (2016). Current Population Survey Questionnaire. Available at: <http://www2.census.gov/programs-surveys/cps/techdocs/questionnaires/Labor%20Force.pdf> [last accessed 15 August 2019].
- Wadsworth, M. E., Evans, G. W., Grant, K., Carter, J. S., & Duffy, S. (2016). Poverty and the development of psychopathology. In D. Cicchetti (Ed.), *Developmental psychopathology* (3rd edn, pp. 136–179). New York: Wiley.
- Wijekumar, S., Kumar, A., M. Delgado Reyes, L., Tiwari, M., & Spencer, J. P. (2019). Early adversity in rural India impacts the brain networks underlying visual working memory. *Developmental Science*, *22*, e12822. <https://doi.org/10.1111/desc.12822>
- Wisner Fries, A. B., Ziegler, T. E., Kurian, J. R., Jacoris, S., & Pollak, S. D. (2005). Early experience in humans is associated with changes in neuropeptides critical for regulating social behavior. *Proceedings of the National Academy of Sciences of the United States of America*, *102*(47), 17237–17240. <https://doi.org/10.1073/pnas.0504767102>
- Zeki Al Hazzouri, A., Haan, M. N., Galea, S., & Aiello, A. E. (2011). Life-course exposure to early socioeconomic environment, education in relation to late-life cognitive function among older Mexicans and Mexican Americans. *Journal of Aging and Health*, *23*(7), 1027–1049. <https://doi.org/10.1177/0898264311421524>

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APPENDIX 1

Questions to ask parents in studies of child poverty⁴

(1) Please indicate which categories best describe what you consider to be your child's race/ethnicity. Please select more than one category if you feel that best describes your child:

- a. White non-Hispanic
- b. Black or African American non-Hispanic
- c. Hispanic or Latinx
- d. American Indian or Alaska Native
- e. Asian
- f. Native Hawaiian or other Pacific Islander

Are you, and the other parent of the child, of the same race/ethnicity as your child?

- a. Yes
- b. No

- k. 40,000–49,999
- l. 50,000–59,999
- m. 60,000–74,999
- n. 75,000–99,999
- o. 100,000–149,999
- p. 150,000 or more

(2) What is your marital status?

- a. Now married or living in long-term partnership with the other parent of the child in this study
- b. Now married or living in long-term partnership with adult who is not the parent of the child in this study
- c. Widowed
- d. Divorced or Separated – joint/shared custody of child
- e. Divorced or Separated – primary/sole custody of child
- f. Never married

(6) How many people live in your household and depended on that income over the past 12 months-- that is, since last (*name of current month*)? Include everyone who is living or staying here for more than 2 months, including yourself.

Number of people: _____

(3) Is English the primary language spoken in your home?

- a. Yes
- b. No

(7) Is the household's income this year (*N.B. we suggest that researchers include actual year, e.g., 2020*) more than, less than, or about the same as the income last year (*N.B. we suggest that researchers include actual year, e.g., 2019*)?

- a. Less than last year
- b. About the same as last year
- c. More than last year

(4) How many years of schooling have you completed?

Elementary/Middle school = 1–8 years

High school = 9–12 years

Community college = 13–14 years

College/University = 13–16 years

Graduate school = 17–20+ years

Your years of schooling: _____

What is the highest degree you completed: _____

If there is an additional parent who lives in your household, how many years of schooling has that person completed: _____

(8a) In the past 12 months, did you or any member of your household ever receive benefits from the Food Stamp Program or SNAP? (Do not include WIC, the school lunch program, or assistance from food banks).

- a. Yes
- b. No

(8b) Has your family received any of these benefits over the past 4 years?

- a. Yes
- b. No

(5) Thinking about ALL of the money earned by ALL adults in your household living with you combined over the past 12 months (including money from various jobs; net income from a business, farm or rental; pensions; dividends or inheritance; interest; social security payments; earned income tax credits; child support; welfare benefits or other money from the government; and any other money income received) which category best describes your total household income⁵:

- a. Less than \$5,000
- b. 5,000–7,499
- c. 7,500–9,999
- d. 10,000–12,499
- e. 12,500–14,999
- f. 15,000–19,999
- g. 20,000–24,999
- h. 25,000–29,999
- i. 30,000–34,999
- j. 35,000–39,999

(9) Is the child included in this study currently covered by any of the following types of health insurance or plans? Indicate as many answers as apply.

- a. Insurance through a current or former employer or union from any family member
- b. Insurance purchased directly through a health exchange
- c. Medicaid, medical assistance or any kind of government assistance plan for those with low incomes or a disability
- d. Indian health service
- e. Any other type of health insurance (specify):
- f. The children are not covered by any insurance plan

(10) In the past 12 months-- that is, since last (*name of current month*) did you have the experience that the food that you bought just didn't last long enough, and you didn't have money to get more.

- a. Often true
- b. Sometimes true
- c. Never true

(11) Have you lived in the same place for the last three months?

- a. Yes
- b. No

(11a) If so, does that place have (circle all that apply)⁶:

- a. hot or cold running water?
- b. A bathtub or shower
- c. A sink with a faucet
- d. A stove or range

- e. A refrigerator
- f. Telephone service from which you can both make and receive calls (include cell phones)
- g. Electricity, heating/gas that are currently functioning

(12) Last week, did either (or both) of the child's parents do ANY work for which you/they were paid?

- a. Yes, one (both) worked full time
- b. Yes, one (both) worked part-time
- c. No, one (both) unemployed or laid off
- d. No, one (both) currently looking for work
- e. One (both) Keeping house or raising children full-time
- f. One (both) Retired
- g. One (both) Disabled or unable to work