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Lifetime Disadvantages after Childhood Adversity: Health Problems Limiting Work and Shorter Life

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Abstract

We examine how childhood adversity relates to work disability and life expectancy, using 1999–2015 data from the Panel Study of Income Dynamics. We estimate the probabilities of work disability and death, adjusting for age, sex, race/ethnicity, and education in a nationally representative sample of African American, Hispanic, and white women and men. We find that people in all these groups who experienced high adversity childhoods (individuals with four or more of six adversity indicators) had significantly more work disability and shorter lives than those who experienced no adversity. These findings provide evidence that childhood adversity is associated with substantial disability, and a reduction in life expectancy of at least a decade. Childhood adversity was generally associated with more lost years of life for men than for women, and more disability for women than for men. The results are robust, even when controlling for diabetes, heart disease, depression, obesity, and sedentary behavior.

Keywords

African Americans; demography; epidemiology; Hispanics; life course analysis; Panel Study of Income Dynamics; work disability

Researchers have linked adverse circumstances during childhood (childhood adversity) with adult functional impairments, chronic diseases, and behaviors associated with poor health (e.g., Haas, Krueger, and Rohlfen 2012; J. N. Laditka and Laditka 2017; Luo and Waite 2005; Montez and Hayward 2014; Pavea and Latham 2016; Schüssler-Fiorenza et al. 2016; Smith et al. 2016; Turner, Thomas, and Brown 2016). Childhood adversity may affect adult health directly by limiting relationships and trust, and increasing stress (Umberson et al. 2014). Those factors may also affect the ability to work when chronic diseases, functional impairments, or emotional problems make work difficult (S.B. Laditka and Laditka 2018). For example, people who experience more stress than others in the workplace may be more likely to leave the workforce. People who have difficulty navigating relationships may be

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The data used for this study are available from the Panel Study of Income Dynamics, <http://psidonline.isr.umich.edu/default.aspx>.

less able to arrange workplace accommodations for disabling conditions. There is also evidence that childhood adversity has negative effects on cognitive function (Olofson 2017). Thus, biological, affective, behavioral, and cognitive mechanisms may link childhood adversity with difficulty working in adult life.

Only a few studies have examined the association of childhood adversity with the ability to work. Studies in this area have typically been limited to only younger or only older persons, relatively small samples followed for limited periods, and models that do not consider mortality. We study the association of childhood adversity and work disability using data and methods that address those limitations.

Childhood Adversity and Health throughout Adult Life

Researchers have used several conceptual models linking childhood adversity with adult health, acknowledging that it may not be possible for a single model to represent all links (Pudrovska and Anikputa 2014). We adopt two of the models that are most relevant for the present study. The accumulation model emphasizes risk from persistent, recurring, or multiple childhood adversities (e.g., Ben-Schlomo and Kuh 2002). The pathways model emphasizes the relationship of childhood adversity with biological risks and health behaviors, which may mediate the association of childhood adversity with later health, functional status, and mortality (e.g., Pudrovska and Anikputa 2014).

Little research has examined whether the association of childhood adversity with adult health may differ for women and men, although one recent study suggests it may be larger for women (S.B. Laditka and Laditka 2018). More knowledge in this area may help us to better understand differences between women and men in life course disability patterns and work force participation.

The context for examining variation in associations of childhood adversity with adult health among African Americans, Hispanics, and whites includes the fact that African American children are more likely than white children to experience several types of childhood adversity including poor neighborhoods, family poverty, less education, and violence (Haas Krueger, and Rohlfen 2012; Smith et al. 2016). Hispanics have more functional impairment than whites, although they may have longer lives (e.g., Angel, Angel, and Hill 2014; Hayward et al. 2014; Hummer and Hayward 2015). High rates of functional impairment among Hispanics may result from childhood poverty, limited education, or other childhood adversities, or from work in occupations with relatively high health risks such as meat processing, construction, cleaning, and domestic service (Hummer and Hayward 2015).

It is also possible that equal exposures to childhood adversity may be differently associated with adult health for African Americans and whites. However, relatively few studies of childhood adversity have included African Americans or Hispanics. Studies have variously found no differences in associations of childhood adversity with adult health among those groups (Smith et al. 2016); or limited evidence of differences (Luo and Waite 2005); a more negative association with adult health for Hispanics than for African Americans or non-Hispanic whites (J.N. Laditka and Laditka 2017); or a more negative association with adult

health for African American men than for white men (Umberson et al. 2014). Thus, evidence that the association of childhood adversity with work disability may vary by race or ethnicity is mixed.

Work Disability: A Measure of Population Health

The Social Security Administration defines work disability as a “medical condition [that] must significantly limit your ability to do basic work activities—such as lifting, standing, walking, sitting, and remembering—for at least 12 months” (Social Security Administration 2018). Researchers more often define work disability using self-reports of physical, emotional, or mental conditions that limit the type or amount of work a person can do (Burkhauser et al. 2002; Clarke and Lathem 2014). One recent study found that nearly 55 percent of people in the United States reported a work disability at least once between ages 25 and 60, nearly one-quarter a severe work disability (Rank and Hirschl 2014). Another study had similar findings (J.N. Laditka and Laditka 2018). Workforce aging and the growing prevalence of chronic conditions increase the importance of understanding causes and patterns of work disability (Clarke and Lathem 2014; Pransky et al. 2016; Toossi 2012). It is also useful to recognize that the social context of the workplace may affect whether an individual has or reports a work disability, consistent with the definition of disability in the World Health Organization’s International Classification of Functioning, Disability, and Health (ICF) (WHO 2017).

Study Objectives and Hypotheses

Ours is the first study to examine dynamic life course associations of childhood adversity with work disability and mortality. Childhood adversity may reduce life expectancy (Montez and Hayward 2014; Pudrovska and Anikputa 2014), so it is useful to include mortality in the model. We studied these associations using data that were nationally representative of African American, Hispanic, and non-Hispanic white (hereafter white) women and men.

Consistent with the expectation that risks to health can accumulate in childhood, our first hypothesis was that women and men reporting high levels of childhood adversity would have significantly more work disability throughout adult life than those reporting none of the adversities, and shorter lives.

To contribute to knowledge about the pathways model, we examined how adult diabetes, heart disease, obesity, depression, and sedentary behavior may mediate the association of adversity with work disability (J.N. Laditka and Laditka 2014, 2016b, 2017; S.B. Laditka and Laditka 2015, 2018; Pavea and Latham 2016). We hypothesized that the association of high adversity with the outcomes would be reduced after controlling for each of those pathway factors, since we expected that the pathway factors would account for a considerable proportion of the variation linking high adversity with the outcomes. However, we also hypothesized that health behaviors and chronic diseases would account for only some of the variation associating adversity with work disability, i.e., that the link between high adversity and the outcomes would persist with controls for the pathway factors.

African Americans (e.g., J.N. Laditka and Laditka 2014, 2016b; S.B. Laditka and Laditka 2009) and Hispanics (e.g., Angel, Angel, and Hill 2014; Hayward et al. 2014) have more functional impairment than whites. Researchers have associated childhood adversity with poorer adult relationships, particularly for African American men (Umberson et al. 2014), which may be linked with poorer health. Childhood adversity may also be associated with occupational choices or the development of occupational skills, which in turn may be linked with work disability. Although the greater risks to adult health for groups with more childhood adversity are of interest, an equally important question is whether health outcomes of childhood adversity may differ among groups with the same adversity exposures. We hypothesized that equally high exposure to childhood adversity would be associated with more work disability for African Americans and Hispanics than for whites.

Methods

Data source and study sample

We used data from the Panel Study of Income Dynamics (PSID), from household heads and their spouses or partners, who represent adults living in the community in the United States. Following the approach established before the first survey wave in 1968, the PSID designated men as household heads, when present. Consistently across the five decades of PSID surveys about 30 percent of household heads were women (J.N. Laditka and Laditka 2018). The study maintains national representativeness by following children, ex-spouses, and other adults of sampled households who form new households, including coresidents (Fitzgerald 2011; McGonagle et al. 2013). Response rates have typically ranged from 96 percent to 98 percent, following initial rates of 76 percent and 88.5 percent in 1968 and 1969, respectively (Schoeni et al. 2013).

We followed participants through nine survey waves, from 1999 through 2015, a period when surveys were conducted every other year. The PSID began measuring the chronic conditions and health behaviors that we study in this analysis in 1999. Household heads provided information representing 11,464 heads and their wives or partners with nonzero sampling weights in 1999; 10,876 met our inclusion criterion requiring at least two waves of work disability data.

Parental death during childhood was among the adversities that we studied. Of the 10,876 participants 9,748 had parents who were themselves PSID participants; mortality information from the National Death Index (NDI), compiled by the National Center for Health Statistics (NCHS) from state vital records, showed that 472 of those participants experienced the death of a parent during childhood (age less than 18). Of the remaining 1,128 participants, 508 had been PSID household heads or their wives/partners in 1988, when they provided information about their parents' survival or mortality that also allowed us to identify parental deaths during childhood; of these, 33 experienced the death of a parent during childhood. We excluded the remaining 620 individuals, for whom we did not have information about parents' survival or mortality. Thus, the final analytic sample represented 10,256 individuals.

Dependent variables: Measuring work disability and death

In each survey wave, the PSID asked household heads, “Do you have any physical or nervous condition that limits the type of work or the amount of work you can do?” Those responding “yes” were asked: “Does this condition keep you from doing some types of work?” Participants could respond: “yes,” “no,” or “can do nothing.” We considered participants who said they could “do nothing” to have a severe work disability. If participants responded “yes,” the survey asked how much the condition limited the amount of work they could do. Response options were: “a lot,” “somewhat,” “just a little,” or “not at all.” We considered participants who responded “a lot” to have a severe work disability, and those who responded “somewhat” to have a moderate work disability. We also used responses to the same questions about spouses or partners. A recent study examined whether reports of work disability for women differed depending on whether the household head or a spouse/partner provided the report and found little difference (J.N. Laditka and Laditka 2018). The NDI provided comprehensive death data, including participants lost to follow-up.

Childhood adversities and other measures

We measured adversities using an index of six childhood indicators of socioeconomic status (e.g. J.N. Laditka and Laditka 2017; Montez and Hayward 2014), family characteristics (e.g. Haas 2007; Umberson et al. 2014), and health status (e.g. Turner, Thomas, and Brown 2016). Socioeconomic adversities were: (1) parents were poor; (2) mother’s education no more than grade 8; and (3) father’s education no more than grade 8. Family adversities were: (4) mother or father died before the participant was age 18; and (5) participant not raised by both biological parents. Adverse health was represented by (6) self-reports of fair or poor childhood health, compared with good, very good, or excellent health. Preliminary analyses associated each of these circumstances with more work disability throughout life. Few participants reported more than four adversities; we used a single categorical variable representing 0, 1, 2, 3, or 4 or more, estimating the models using all data representing all adversity levels. We refer to 4 or more adversities as high adversity.

We also examined the association of childhood adversity with work disability at ages 65 and older after controlling for diabetes, heart disease, depression, obesity, or sedentary behavior. The PSID asked, “Has a doctor or other health professional ever told you that you had diabetes or high blood sugar?” Similar questions asked about heart disease, and “emotional, nervous, or psychiatric problems.” Beginning in 2005, related questions asked about specific problems in the latter category; we used the responses for depression. Participants reported height and weight in all waves. We measured obesity with body mass index guidelines from the Centers for Disease Control and Prevention. Also in all waves, participants reported how often they had light, moderate, or vigorous physical activity; we considered those responding “never” for all three levels to be sedentary. We updated all values just described for each survey wave.

The model included covariates for age in years and age-squared. We controlled for education: less than high school graduation, high school graduation or receipt of the General Educational Development credential, or postsecondary education. We controlled for sex and

included dummy variables representing African Americans and Hispanics, with whites as the reference category due to the large size of that population group.

Analytical approach

We first examined response rates for the work disability questions. We also examined whether the 620 excluded individuals differed systematically from those included, using logistic regression to compare work disability and other characteristics in our models between those groups. Our primary methods used a multinomial logistic Markov chain regression model, estimated by maximum likelihood, and dynamic microsimulation (e.g., J.N. Laditka and Laditka 2016a, 2016b, 2016c, 2017, 2018; S.B. Laditka 1998; S.B. Laditka and Laditka 2009, 2014, 2017; S.B. Laditka and Wolf 1998). The model estimated work disability transition probabilities specific to each age beginning at 20, adjusting the probability of each transition type for the time between interviews and accommodating any pattern or number of unrecorded work disability transitions between interviews (S.B. Laditka and Wolf 1998). In addition to death, transitions were from and to: not work disabled, moderately work disabled, or severely work disabled. Interaction terms provided transition probabilities specific to sex and race/ethnicity.

Using the probabilities estimated by the Markov models, which summarized the work disability experiences of the nationally representative sample, we used dynamic microsimulation to create large simulated populations of individual lives. Each simulated individual had a complete annual history of work disability: none, moderate, or severe. Details of the method are published elsewhere (S.B. Laditka 1998; S.B. Laditka and Laditka 2009, 2014; S.B. Laditka and Wolf 1998). We created 100,000 lives in a microsimulation for each population, such as Hispanic men with high childhood adversity, each life simulated through death. For moderate and severe work disability we calculated: the population experiencing disability at ages 20–65; the percentage with disability at age 65; the percentage of life at ages 20–65 with disability; and the percentage of years lived with disability at ages 65 and older. We estimated two measures of life expectancy: the average age at death conditional on survival to age 20, and the analogous measure conditional on survival to age 65. We examined whether the differences in the outcomes associated with childhood adversity varied by race/ethnicity or sex. To contribute to knowledge about the pathways model we also conducted microsimulations in which all individuals separately had diabetes, heart disease, depression, obesity, or sedentary behavior at ages 65 and older, or none of those conditions, focusing on results associated with childhood adversity for women and men. To provide adequate statistical power, this second model did not stratify by race/ethnicity.

We examined the sensitivity of the results to the use of the 1988 parental survival and mortality data by also estimating a model using only data beginning with the 1999 baseline. Estimating the models with a small set of control variables allowed us to include mortality in the model despite a limited number of deaths.

We estimated variation in the results with bootstrapping, repeating each microsimulation 1,000 times, each with parameters randomly selected from their 95 percent confidence intervals (CIs). The point estimates for the microsimulation results were the means of those

repetitions; the 95 percent CIs ranged from the 2.5 to the 97.5 percentiles. We also estimated analogous 99 percent CIs. When comparing results between groups defined by the level of childhood adversity, 95 and 99 percent CIs that did not overlap indicated statistically significant results at $p<0.05$ and $p<0.01$, respectively. We created the software for the Markov models and the microsimulations using SAS IML (Cary, North Carolina). For all other analyses we used SAS 9.4 (Cary, North Carolina). The Institutional Review Board (IRB) at the University of North Carolina at Charlotte determined that this research did not require IRB review.

Results

Sample characteristics

Participants had 67,502 recorded work disability status and death transitions through 119,678 person-years, each participant averaging 6.6 transitions (standard deviation, SD 2.1). The mean age in 1999 was 44.5 years (SD 15.1 years); weighted for national representativeness and accounting for the survey design the mean age was 41.3 years (CI 40.9–41.8). Women were 55.6 percent of the sample (49.6 weighted, CI 47.1–52.0). The PSID oversampled African Americans, 11.4 percent of the sample (9.2 weighted, CI 7.0–11.3). Hispanics were 6.8 percent of the sample (7.4 weighted, CI 5.4–9.3). As for childhood adversities, 28.3 percent reported none, 37.0 percent one, 20.8 percent two, 9.2 percent three, 4.7 percent four or more. As shown in Table 1, the weighted sample proportions reporting high adversity for women and men, respectively, were 4.3 percent and 1.6 percent for Hispanics, 3.5 percent and 3.0 percent for whites. For African Americans, the weighted results were: 8.5 percent for women, 7.9 percent for men ($p<0.001$ for comparisons with Hispanics and whites). Table 1 provides additional descriptive results by sex and race/ethnicity.

Not shown, the sample used to examine pathways represented 4,135 participants with 28,084 functional status transitions. Characteristics of this sample were similar to those in Table 1. The data for both models indicated that participants at all ages responded to the work disability questions; responses coded “don’t know,” “not applicable,” or “refused” were rare even at older ages.

Transition probabilities from the Markov model

In results not shown in a table, all of the Markov model parameter estimates associated childhood adversity with a higher likelihood of becoming disabled, or more severely disabled, or dying, and a lower likelihood of recovering from disability; eight of the nine parameters for the adversity index were statistically significant ($p<0.01$).

Work disability and life expectancy

Table 2 shows the microsimulation results for African American, Hispanic, and white women. For all except two of the twenty-four work disability comparisons, women with high adversity had significantly more moderate and severe work disability than those without adversity (all $p<0.01$). For example, white women with high adversity could expect moderate work disability for 8.3 percent of the years at ages 20–65, severe for 6.8 percent;

comparable results without adversity were 3.4 percent and 2.4 percent. Analogous results were: for Hispanics, 9.3 percent and 8.3 percent, 3.9 percent and 3.1 percent; for African Americans, 8.2 percent and 7.1 percent, 3.5 percent and 2.8 percent. White women with high adversity could expect moderate work disability for 19.5 percent of remaining life from age 65, and severe disability for 18.7 percent; comparable results without adversity were 10.7 percent and 9.3 percent. Analogous results were: for Hispanics, 20.0 percent and 21.4 percent, compared with 11.0 percent and 11.2 percent; for African Americans, 19.2 percent and 22.1 percent, compared with 10.7 percent and 11.9 percent. Life expectancy was much shorter with high adversity than without adversity (all $p<0.01$). For example, given survival to age 65, the average age at death for white women was 78.6 with high adversity, 85.5 without adversity; analogous results were: for Hispanics, 80.2 and 86.7; for African Americans, 77.5 and 83.4 (all $p<0.01$).

The microsimulation results for men are shown in Table 3. For nineteen of the twenty-four work disability comparisons, men with high adversity had significantly more moderate and severe work disability than those without adversity (all $p<0.01$). For example, white men with high adversity could expect moderate work disability for 14.9 percent of remaining life from age 65, and severe work disability for 23.9 percent; comparable results without adversity were 8.7 percent and 11.9 percent. Analogous results were: for Hispanics, 15.2 percent and 27.7 percent compared with 8.9 percent and 14.5 percent; for African Americans, 15.1 percent and 29.4 percent compared with 8.9 percent and 16.0 percent. Men with high adversity also lived much shorter lives than those without adversity (all $p<0.01$). Given survival to age 65, the average age at death for white men was 75.9 with high adversity, 81.9 without adversity; analogous results were: for Hispanics, 77.3 and 83.1; for African Americans, 74.7 and 79.6 (all $p<0.01$). High adversity was associated with at least 10 years lower life expectancy from age 20 for all groups studied.

There was little evidence that the associations of childhood adversity with life expectancy or work disability varied by race or ethnicity. However, most measures of both moderate and severe disability increased significantly more with high adversity for women than for men (not shown). An exception to the latter result was that the increase in the percentage of remaining life from age 65 with severe work disability associated with high adversity was generally greater for men than for women. High adversity was associated with more lost years of life for men than for women.

Childhood adversity, chronic conditions and sedentary behavior, and work disability

Table 4 shows results comparing high adversity to none, for men with and without adult diabetes, heart disease, depression, obesity, or sedentary behavior, for ages 65 and older. The comparisons of high adversity with no adversity were statistically significant for twelve of the eighteen comparisons ($p<0.01$). For example, among men with heart disease, those without childhood adversity averaged age 78.0 at death compared with age 73.1 for those with high adversity ($p<0.01$); the percentage of years lived with severe work disability was 24.0 percent without childhood adversity and 41.8 percent with high adversity ($p<0.01$). Controlling for the adult pathways reduced the association of childhood adversity with work disability. For example, for people with none of the adult pathways the percentage of life age

65 and older with severe work disability was 105 percent greater for those with high adversity than for those without adversity (percent difference not shown). The corresponding increase among people with adult depression was 50 percent, suggesting that adult depression is a pathway linking high adversity to the outcome; however, the association of high adversity with the outcome remained substantial after controlling for the adult depression pathway. The pattern of results for women, not shown, was similar to that for men.

Sensitivity of results to sample selection associated with use of 1988 parental survival data

Regarding the 5.7 percent of individuals who were excluded due to a lack of information about parental survival or mortality during the participant's childhood, results of the analysis comparing those who were excluded to those included showed that older individuals were less likely than others to be excluded (odds ratio, OR 0.20 for each additional 10 years of life, CI 0.18–0.22, not shown), as were African Americans (OR 0.63, CI 0.51–0.78), Hispanics (OR 0.53, CI 0.37–0.77), and women (OR 0.61, CI 0.50–0.73). There was no evidence that exclusions were systematically associated with either moderate or severe work disability, or with childhood adversity. There also were no meaningful differences between the principal results described above and the results of the analysis that estimated the Markov model and conducted the microsimulations using only data beginning with the 1999 baseline (i.e., excluding the information on parental deaths during childhood from the 1998 PSID).

Discussion

We examined associations of childhood adversity with life expectancy and work disability throughout adult life. Consistent with the accumulation of risk model and our first hypothesis, African American, Hispanic, and white women and men with high adversity had shorter lives and more moderate and severe work disability throughout adult life than those reporting no adversities. These results are largely consistent with studies linking childhood adversity with functional status (e.g., J.N. Laditka and Laditka 2017; Montez and Hayward 2014; Smith et al. 2016) and with several recent studies that examined associations of childhood adversity with work disability (S.B. Laditka and Laditka 2018; Schüssler-Fiorenza et al. 2016; Shuey and Willson 2017). However, no previous study examined life expectancy in the context of work disability, estimated work disability throughout adult life, or included Hispanics.

Adult diabetes, heart disease, depression, obesity, and sedentary behavior may be pathways linking childhood adversity with work disability and mortality. Among people with each of those factors, those with high adversity had significantly shorter lives and more disability. Consistent with our hypothesis, the increase in severe work disability associated with high adversity was significantly lower when these pathways were controlled. Consistent with the related hypothesis, the association of high adversity with poorer adult health persisted after controlling for the pathway factors, although with reduced effect. Given the well-established links between the pathway factors and the outcomes, even for people without childhood

adversity, these residual effects are notable. They suggest that high adversity may be directly associated with work disability in addition to its association through the pathways.

The results also suggested that childhood adversity may be differently associated with work disability and life expectancy for women and men. Although women and men with high adversity both had shorter lives with more work disability than those who reported no adversity, high adversity was associated with more lost years of life for men than for women, and generally more disability for women than for men. While we are not aware of comparable research our findings are generally consistent with studies finding that women live longer than men, with more impairment (e.g., S.B. Laditka and Laditka 2009). The results of this study suggest that women with high childhood adversity may have particularly high risks for work disability.

In the descriptive results, African Americans were much more likely than Hispanics or whites to report high adversity. However, there were no notable differences in the association of childhood adversity with work disability among African Americans, Hispanics, and whites in the microsimulation results. This result is consistent with some previous studies in this area (Luo and Waite 2005; Smith et al. 2016), although other studies found a greater association for Hispanics than for African Americans or whites (J.N. Laditka and Laditka 2017), or a more negative effect on adult health for African American men than for white men (Umberson et al. 2014). Differences among these results may be due to different measures of childhood adversity, or different methods.

Limitations

Self-reports of work disability may be subject to measurement error (see, for example, Burkhauser et al. 2002; Clarke and Latham 2014). However, work disability is not limited to objectively measured functional limitations (WHO 2017). The work disability measure is consistent with current theory about disability, described by the World Health Organization's ICF model, where work disability can be influenced, for example, by workplace accommodations (Pransky et al. 2016), or by support from families and communities.

The measurement of childhood adversities may be subject to recall bias as participants reported adversities retrospectively, similar to most related studies (e.g. Haas, Krueger, and Leah Rohlfen 2012). However, recollections of childhood socioeconomic status and health are typically valid (Batty et al. 2005; Haas 2007; Smith 2009).

The index assumed that the adversities were equally associated with work disability, consistent with previous research (e.g., J.N. Laditka and Laditka 2017; Montez and Hayward 2014). Adversities may interact to modify those associations. Given that we defined high adversity consistently across groups, comparisons among African Americans, Hispanics, and whites tested the hypothesis that equal exposures to childhood adversity may be differently associated with adult health among those groups. A limitation is that specific childhood adversities may be differently associated with adult health across the groups (S.B. Laditka and Laditka 2018). It would be desirable to measure the total exposure to adversity throughout childhood, including measures of duration and intensity, rather than only the number of adversities.

We did not examine abuse during childhood, mental illness, violence, environmental risks, substance abuse, or involvement with the criminal justice system. The models did not control for adult socioeconomic circumstances, including occupation, although the control for education addressed socioeconomic circumstances in part. A portion of the negative health outcomes that our model attributed to childhood adversity may be linked with other health risks, some of which may be present before the individual experiences adversity in childhood, or which may occur separately from those experiences. It is also possible that some exposure to childhood adversity may promote emotional growth or resilience, which may be associated with better adult health (Schafer, Ferraro, and Mustillo 2011).

We acknowledge that the results for the pathways analysis were not directly comparable with those of our primary analysis; sample sizes were not adequate to support separate estimates for the pathways model by race/ethnicity. Also, many factors affect risks of disability and death at older ages, and many of those factors may also be associated with childhood adversity; unmeasured variables may affect the pathways models.

Education is likely a pathway linking childhood adversity with work disability and mortality. However, educational attainment is strongly associated with both disability and mortality without regard to childhood adversity (e.g., S.B. Laditka and Laditka 2009). Moreover, as noted above, controlling for education provides a degree of control for the roles of occupational choice and environmental risks in work disability, as well as for many unmeasured factors affecting adult health. Educational attainment differs among African Americans, Hispanics, and whites. Therefore, meaningful comparisons of associations between childhood adversity and adult health among these groups require a control for educational attainment.

Attrition can affect panel studies. If attrition is greater for those in poor health, results over time may be biased by increasingly better average health among remaining participants. Researchers have found that attrition in the PSID was not associated with health status (Fitzgerald 2011; J.N. Laditka and Laditka 2018).

Although the PSID and other nationally representative surveys including the Health and Retirement Study, the Current Population Survey, and the National Health Interview Survey have asked older participants about work disability, researchers have generally not reported on these data in detail. Little is known about how older persons interpret questions about work disability. Their interpretations may be influenced by changing work patterns; the Department of Labor predicts that labor force participation at ages 75 and over will be 10.8 percent by 2026, up from 6.4 percent in 2006 (United States Department of Labor 2018). Many older adults who have been retired for many years say they would like to work (Ameriks et al. 2017). These trends and evidence support surveying older persons about work disability.

Strengths of the PSID for life course research

The majority of Americans experience multiple spells of work disability before midlife (J.N. Laditka and Laditka 2018); the PSID allowed us to track those spells for people of all ages. The PSID also allows researchers to link participants across generations and families, with

information for all participant deaths. In the current study the majority of participants' parents were also PSID participants, enabling the identification of parental deaths during childhood.

Conclusion and Implications for Policy and Research

Ours is the first study of which we are aware to examine associations of childhood adversity with work disability and life expectancy. We used a nationally representative sample of African American, Hispanic, and white women and men. Childhood adversity was associated with more lost years of life for men than for women, and generally more disability for women than for men. The substantially lower life expectancy and the greater proportions of life with moderate or severe work disability for women and men with high childhood adversity in all race and ethnic groups underscore the heavy toll of childhood adversity. Collectively, the findings provide evidence that family, social, and health adversities during childhood are associated with substantial disability. High adversity was associated with a reduction in life expectancy at age 20 of at least a decade for all groups studied. These results argue strongly for strengthening safety net programs and policies supporting families and children (McLaughlin and Rank 2018; National Academies of Sciences, Engineering, and Medicine 2016).

It would be useful to field a PSID supplement to examine: the types and levels of functional limitations, emotional problems, or chronic conditions that participants associate with work disability; ways that older individuals and persons with those limitations, problems, or conditions interpret and respond to questions about work disability; participation in rehabilitation and adherence to prescribed treatments; expectations for recovery; work life expectancy and propensity to exit the workforce or to seek public insurance benefits in response to work disability; effects of work disability on relationships and well-being; and ways that employers, co-workers, and family promote or inhibit work when an individual has functional limitations or chronic conditions. Our increasing recognition that health, functional status, and work limitations develop throughout life and can be influenced across generations and families makes the PSID a particularly important national resource for understanding the dynamic associations of those factors. A supplementary study to better understand work disability would be a useful investment in the health and productivity of American workers, and a foundation for improved disability policies.

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References

- Ameriks John, Briggs Joseph S., Caplin Andrew, Lee Minjoon, Shapiro Matthew D., and Tonetti Christopher. 2017 Older Americans would work longer if jobs were flexible. National Bureau of Economic Research, NBER Working Paper 24008 Cambridge MA Available from <http://www.nber.org/papers/w24008> (accessed 29 December).
- Angel Ronald J., Angel Jacqueline L., and Hill Terrance D.. 2014 Longer lives, sicker lives? Increased longevity and extended disability among Mexican-origin elders. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* 70 (4): 639–48.
- Batty G. David, Lawlor Debbie A., Macintyre Sally, Clark Heather, and Leon David A.. 2005 Accuracy of adults' recall of childhood social class: Findings from the Aberdeen children of the 1950s study. *Journal of Epidemiology and Community Health* 59:898–903. [PubMed: 16166367]
- Ben-Shlomo Yaov, and Kuh Diana. 2002 A life course approach to chronic disease epidemiology: Conceptual models, empirical challenges and interdisciplinary perspectives. *International Journal of Epidemiology* 31:285–93. [PubMed: 11980781]
- Burkhauser Richard V., Daly Mary C., Houtenville Andrew J., and Nargis Nigar. 2002 Self-reported work-limitation data: What they can and cannot tell us. *Demography* 39 (3): 541–55. [PubMed: 12205757]
- Clarke Philippa, and Latham Kenzie. 2014 Life course health and socioeconomic profiles of Americans aging with disability. *Disability and Health Journal* 7 (Suppl 1): S15–S23. [PubMed: 24456680]
- Fitzgerald John M. 2011 Attrition in models of intergenerational links using the PSID with extensions to health and to sibling models. *The B. E. Journal of Economic Analysis & Policy* 11 (3): ii.
- Haas Steven A. 2007 The long-term effects of poor childhood health: An assessment and application of retrospective reports. *Demography* 44:113–35. [PubMed: 17461339]
- Haas Steven A., Krueger Patrick M., and Rohlfen Leah. 2012 Racial/ethnic and nativity disparities in later physical performance: The role of health and socioeconomic status over the life course. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* 67 (2): 238–48.
- Hayward Mark D., Hummer Robert A., Chiu Chi-Tsun, González-González César, and Wong Rebecca. 2014 Does the Hispanic paradox in U.S. adult mortality extend to disability? *Population Research and Policy Review* 33:81–96. [PubMed: 25821283]
- Hummer Robert A., and Hayward Mark D.. 2015 Hispanic older adult health & longevity in the United States: Current patterns & concerns for the future. *Daedalus* 144 (2): 20–30. [PubMed: 26082561]
- Laditka James N., and Laditka Sarah B.. 2014 Stroke and active life expectancy in the United States, 1999–2009. *Disability and Health Journal* 7 (4): 472–7. [PubMed: 25096630]
- Laditka James N., and Laditka Sarah B.. 2016a Associations of educational attainment with disability and life expectancy by race and gender in the United States: A longitudinal analysis of the Panel Study of Income Dynamics. *Journal of Aging and Health* 28 (8): 1403–1425. [PubMed: 26690254]
- Laditka James N., and Laditka Sarah B.. 2016b Associations of multiple chronic health conditions with active life expectancy in the United States. *Disability and Rehabilitation* 38 (4): 273–89.
- Laditka James N., and Laditka Sarah B.. 2016c Unemployment, disability and life expectancy in the United States: A life course study. *Disability and Health Journal* 9 (1): 46–53. [PubMed: 26385529]
- Laditka James N., and Laditka Sarah B.. 2017 Adverse childhood circumstances and functional status throughout life. *Journal of Aging and Health*. doi: 10.1177/0898264317715976.
- Laditka James N., and Laditka Sarah B.. 2018 Work disability in the United States, 1968–2015: Prevalence, duration, recovery, and trends. *SSM - Population Health* (4): 126–34. [PubMed: 29349281]
- Laditka Sarah B. 1998 Modeling lifetime nursing home use under assumptions of better health. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* 53B (4): S177–87.
- Laditka Sarah B., and Laditka James N.. 2009 Active life expectancy: A central measure of population health In *International handbook of population aging*, ed. Uhlenberg Peter. 543–65. Netherlands: Springer-Verlag.

- Laditka Sarah B., and Laditka James N.. 2014 More education may limit disability and extend life for people with cognitive impairment. *American Journal of Alzheimer's Disease and Other Dementias* 29 (5): 436–47.
- Laditka Sarah B., and Laditka James N.. 2015 Active life expectancy of Americans with diabetes: Risks of heart disease, obesity, and inactivity. *Diabetes Research and Clinical Practice* 107 (1): 37–45. [PubMed: 25476207]
- Laditka Sarah B., and Laditka James N.. 2017 Moxie matters: Associations of future orientation with active life expectancy. *Aging and Mental Health* 21 (10): 1040–1046. [PubMed: 27353876]
- Laditka Sarah B., and Laditka James N.. 2018 An enduring health risk of childhood adversity: Earlier, more severe, and longer lasting work disability in adult life. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*. doi: 10.1093/geronb/gby018
- Laditka Sarah B., and Wolf Douglas A.. 1998 New methods for analyzing active life expectancy. *Journal of Aging and Health* 10: 214–41.
- Luo Ye, and Waite Linda J.. 2005 The impact of childhood and adult SES on physical, mental, and cognitive well-being in later life. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* 60: 93–101.
- McGonagle Katherine, Schoeni Robert F., Sastry Narayan, and Freedman Vicki A.. 2013 The Panel Study of Income Dynamics: Overview, recent innovations, and potential for life course research. *Longitudinal Life Course Studies* 3 (2): 268–84.
- McLaughlin Michael and Rank Mark R.. 2018 Estimating the economic cost of childhood poverty in the United States. *Social Work Research* 42 (2): 73–83.
- Montez Jennifer Karas, and Hayward Mark D.. 2014 Cumulative childhood adversity, educational attainment, and active life expectancy among U.S. adults. *Demography* 51 (2): 413–35. [PubMed: 24281740]
- National Academies of Sciences, Engineering, and Medicine. 2016 Parenting matters: Supporting parents of children ages 0–8. Washington, DC: The National Academies Press.
- Olofson Mark W. 2017 Childhood adversity, families, neighborhoods, and cognitive outcomes: Testing structural models of the bioecological framework. *International Journal of Education and Practice* 5 (12): 199–216.
- Pavela Gregory, and Latham Kenzie. 2016 Childhood conditions and multimorbidity among older adults. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* 71 (5): 889–901. [PubMed: 25975290]
- Pransky Glenn S., Fassier Jean-Baptise, Besen Elyssa, Blanck Peter, Ekberg Kerstin, Feuerstein Michael, Munir Fehmidah, and The Hopkinton Conference Working Group on Workplace Disability Prevention. 2016 Sustaining work participation across the life course. *Journal of Occupational Rehabilitation* 26: 465–79. [PubMed: 27704342]
- Pudrovskaya Tetyana, and Anikputa Benedicta. 2014 Early-life socioeconomic status and mortality in later life: An integration of four life-course mechanisms. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* 69 (3): 451–60.
- Rank Mark R., and Hirschl Thomas A.. 2014 The risk of developing a work disability across the adult years. *Disability and Health Journal* 7 (2): 189–95. [PubMed: 24680048]
- Schafer Mark H., Ferraro Kenneth F., and Mustillo Sarah A.. 2011 Children of misfortune: Early adversity and cumulative inequality in perceived life trajectories. *American Journal of Sociology* 116 (4): 1053–91.
- Schoeni Robert, Stafford Frank, Katherine A. McGonagle, and Patricia Andreski. 2013 Response rates in national surveys. *The ANNALS of the American Academy of Political and Social Science* 645 (1): 60–87. [PubMed: 23358122]
- Rose Schüssler-Fiorenza, Miryam Sohia, Eslinger Jessica G., Zimmerman Lindsey, Scaccia Jamie, Lai Betty S., Lewis Catrin, and Alisic Eva. 2016 Adverse childhood experiences, support, and the perception of ability to work in adults with disability. *PLoS ONE* 11 (7): e0157726. [PubMed: 27379796]
- Shuey Kim M., and Willson Andrea E.. 2017 Trajectories of work disability and economic insecurity approaching retirement. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*. doi: 10.1093/geronb/gbx096.

- Smith James P. 2009 Reconstructing childhood health histories. *Demography* 46 (2): 387–403. [PubMed: 21305399]
- Smith Natalie R., Ferraro Kenneth F., Kemp Blakelee R., Morton Patricia, Mustillo Sarah A., and Angel Jacqueline L.. 2016 Childhood misfortune and handgrip strength among Black, White, and Hispanic Americans. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*. doi: 10.1093/geronb/gbw147.
- Social Security Administration. 2018 Disability benefits. Publication No. 05-10029. ICN 456000. Washington, DC: Social Security Administration Available from: <https://www.ssa.gov/pubs/EN-05-10029.pdf> (accessed 6 January).
- Toossi Mitra. 2012 Labor force projections to 2020: A more slowly growing workforce. *Monthly Labor Review* 1:43–64.
- Turner R. Jay, Courtney S. Thomas, and Tyson H. Brown. 2016 Childhood adversity and adult health: Evaluating intervening mechanisms. *Social Science & Medicine* 156:114–24. [PubMed: 27030896]
- Umberson Debra, Williams Kristi, Thomas Patricia A., Liu Hui, and Thomeer Mieke Beth. 2014 Race, gender, and chains of disadvantage: Childhood adversity, social relationships, and health. *Journal of Health and Social Behavior* 55 (1): 20–38. [PubMed: 24578394]
- United States Department of Labor, Bureau of Labor Statistics. 2018 Civilian labor force participation rate, by age, sex, race, and ethnicity. Available from https://www.bls.gov/emp/ep_table_303.htm (accessed 6 January).
- World Health Organization. 2017 Towards a common language for functioning, disability and health: ICF. Available from <http://www.who.int/classifications/icf/en/> (accessed 22 November).

Work Disability, Characteristics of the Sample

Table 1.

	Women			Men		
	African American	Hispanic	White	African American	Hispanic	White
Sample size (unweighted)	1,779	531	3,365	1,135	378	3,068
Sample distribution (weighted %)	7.4	6.9	41.3	4.0	4.1	36.3
Age at first status measurement (unweighted mean)	42.0	38.9	46.5	43.0	40.3	45.9
Age at last status measurement (unweighted mean) ^a	54.4	51.7	58.3	53.6	52.3	57.6
Educational attainment, years (unweighted mean)	12.6	11.4	13.4	12.2	10.4	13.5
Measured work disability and death transitions	12,081	3,710	22,298	6,793	2,502	20,118
Person years of measured disability status	21,447	6,518	39,549	12,189	4,360	35,615
Adversity index (weighted mean) (95% confidence interval)	1.57 (1.51-1.64)	1.29 (1.19-1.39)	1.14 (1.08-1.18)	1.52 (1.45-1.59)	1.59 (0.25-2.93)	1.14 (1.10-1.17)
High adversity (weighted %) (95% confidence interval)	8.5 (7.4-9.7)	4.3 (2.6-6.1)	3.5 (2.6-4.3)	7.9 (6.2-9.6)	1.6 (0.3-2.9)	3.0 (2.2-3.7)
Deaths, n	236	27	476	178	26	461

SOURCE: Panel Study of Income Dynamics, 1998–2015.

NOTE: n=10,256. Disability refers to work disability.

^a Age at the beginning of the final transition interval.

Table 2.
Association of Childhood Adversity with Life Expectancy and Work Disability in the United States, Women

	African American		Hispanic		White	
	0	4+	0	4+	0	4+
Childhood Adversities:						
Age at death given survival to age 20, mean	78.5 (74.6-79.9)	67.9* (64.2-69.5)	82.8 (79.7-83.8)	71.8* (68.8-72.9)	81.8 (77.8-82.4)	71.3* (68.2-72.1)
Age at death given survival to age 65, mean	83.4 (79.9-83.6)	77.5* (74.2-77.8)	86.7 (83.2-87.1)	80.2* (76.9-80.8)	85.5 (81.5-85.6)	78.6* (75.5-79.0)
Any moderate disability at ages 20–65, %	70.0 (63.7-76.9)	90.4* (87.7-94.4)	71.4 (66.6-77.6)	91.9* (89.8-95.5)	68.9 (62.2-75.1)	91.7* (89.7-94.9)
Any severe disability at ages 20–65, %	48.5 (41.3-55.6)	75.5* (68.8-81.9)	46.2 (39.2-53.5)	75.6* (70.4-81.8)	34.0 (28.0-37.9)	63.3* (55.2-69.8)
Moderate disability at age 65, %	5.6 (4.1-6.7)	9.2 (5.9-12.0)	6.1 (4.7-7.3)	11.2* (8.1-13.6)	5.6 (3.9-7.0)	10.4* (7.2-12.8)
Severe disability at age 65, %	4.9 (3.2-6.1)	9.3 (5.2-11.7)	4.6 (3.1-5.9)	10.0* (7.1-12.1)	3.7 (2.2-4.9)	8.3* (5.0-11.0)
Moderate disability, % of years lived, ages 20–65	3.5 (2.9-4.2)	8.2* (6.4-9.6)	3.9 (3.1-4.4)	9.3* (7.5-11.0)	3.4 (2.7-4.0)	8.3* (6.7-9.6)
Severe disability, % of years lived, ages 20–65	2.8 (2.1-3.2)	7.1* (5.6-8.5)	3.1 (2.4-3.7)	8.3* (6.8-9.9)	2.4 (1.7-2.9)	6.8* (4.9-7.9)
Moderate disability, % of years lived, ages 65+	10.7 (9.2-10.8)	19.2* (16.1-19.7)	11.0 (8.9-11.7)	20.0* (16.9-20.4)	10.7 (8.8-11.2)	19.5* (16.1-20.3)
Severe disability, % of years lived, ages 65+	11.9 (9.8-12.7)	22.1* (18.9-24.2)	11.2 (9.0-12.1)	21.4* (17.6-23.9)	9.3 (7.1-10.1)	18.7* (14.6-21.1)

SOURCE: Panel Study of Income Dynamics

NOTE: Results of multinomial logistic Markov models and dynamic microsimulation; parentheses show 95 percent confidence intervals.

*
p < 0.01.

Table 3.
Association of Childhood Adversity with Life Expectancy and Work Disability in the United States, Men

	African American		Hispanic		White	
Childhood Adversities:	0	4+	0	4+	0	4+
Age at death given survival to age 20, mean	72.3 (68.1-73.7)	61.4* (58.1-62.8)	77.4 (74.2-78.4)	65.7* (63.0-66.2)	76.8 (73.4-77.7)	65.7* (62.1-66.0)
Age at death given survival to age 65, mean	79.6 (76.1-79.9)	74.7* (71.9-74.8)	83.1 (80.3-83.0)	77.3* (74.2-78.0)	81.9 (78.4-82.2)	75.9* (73.7-76.3)
Any moderate disability at ages 20-65, %	64.5 (58.4-70.4)	83.7* (79.5-88.5)	65.3 (60.4-70.7)	86.1* (82.2-90.6)	62.8 (56.4-69.3)	86.0* (82.3-89.8)
Any severe disability at ages 20-65, %	59.1 (51.7-66.1)	80.2* (73.4-86.4)	55.1 (49.6-61.8)	80.3* (75.4-85.7)	41.7 (35.4-46.9)	69.7* (62.4-75.9)
Moderate disability at age 65, %	4.0 (2.9-4.9)	4.9 (2.7-6.6)	4.4 (3.4-5.2)	6.7 (4.5-8.2)	4.1 (3.0-4.9)	6.3 (4.1-7.6)
Severe disability at age 65, %	6.5 (3.8-8.0)	9.8 (4.5-12.7)	6.2 (4.0-7.4)	11.5* (7.4-14.5)	4.8 (2.9-6.1)	9.3 (5.2-12.7)
Moderate disability, % of years lived, ages 20-65	2.8 (2.3-3.2)	5.7* (4.5-6.4)	2.9 (2.5-3.3)	6.4* (5.3-7.4)	2.6 (2.2-3.0)	5.9* (4.9-6.6)
Severe disability, % of years lived, ages 20-65	2.3 (1.8-2.6)	5.1* (3.9-5.9)	2.5 (2.0-2.9)	5.9* (4.7-6.7)	2.0 (1.4-2.4)	5.0* (3.8-5.6)
Moderate disability, % of years lived, ages 65+	8.9 (7.4-9.2)	15.1* (12.0-15.9)	8.9 (7.1-9.0)	15.2* (12.4-15.0)	8.7 (6.9-8.8)	14.9* (12.1-15.3)
Severe disability, % of years lived, ages 65+	16.0 (13.7-16.7)	29.4* (26.8-31.8)	14.5 (12.2-15.4)	27.7* (24.2-29.9)	11.9 (9.4-13.0)	23.9* (20.1-26.4)

SOURCE: Panel Study of Income Dynamics

NOTE: Results of multinomial logistic Markov models and dynamic microsimulation; parentheses show 95 percent confidence intervals.

*
p < 0.01.

Association of childhood adversity, and adult diabetes, depression, heart disease, obesity, and sedentary behavior, with life expectancy and work disability, ages 65 and older, Men

Table 4.

	No Listed Conditions	Diabetes	Heart Disease	Depression	Obesity	Sedentary
No Child Adversity						
Age at death, mean	80.2 (78.0-80.5)	77.6 (75.1-86.4)	78.0* (75.0-77.8)	76.8* (73.6-76.8)	77.9 (75.8-80.2)	77.3* (75.3-77.1)
Moderate disability, % of years	9.7 (8.1-10.0)	12.6* (10.6-12.8)	16.1* (13.9-16.4)	19.5* (15.9-20.2)	13.3* (11.1-13.8)	12.9* (10.2-13.2)
Severe disability, % of years	11.8 (9.2-12.5)	19.0* (14.9-20.4)	24.0* (19.3-25.4)	34.2* (30.3-36.3)	20.4* (16.6-21.2)	25.4* (20.9-26.3)
High Child Adversity						
Age at death, mean	73.6 [†] (71.8-75.3)	72.5 [†] (70.5-72.2)	73.1 [†] (70.7-72.5)	72.4 [†] (70.4-73.2)	72.9 [†] (71.2-74.5)	72.6 [†] (70.8-74.0)
Moderate disability, % of years	13.3 [†] (11.1-13.5)	15.5 (12.5-15.0)	17.0* (14.2-18.7)	17.8* (13.8-18.2)	15.6 (12.7-19.2)	14.7 (11.4-17.5)
Severe disability, % of years	24.2 [†] (20.3-26.8)	35.4* [†] (30.7-38.7)	41.8* [†] (37.0-46.4)	51.3* [†] (49.3-55.7)	37.9* [†] (34.5-41.5)	42.8* [†] (39.7-46.6)

SOURCE: Panel Study of Income Dynamics.

NOTE: Results of multinomial logistic Markov models and dynamic microsimulation; parentheses show 95 percent confidence intervals; high adversity=reports of four or more childhood adversities; age at death is given survival to age 65; % of years is for ages 65 and older.

* p < 0.01 for comparison with “no listed conditions.”

[†] p < 0.01 for comparison with “no child adversity.”