Heterogeneity in Chronic Disease Outcomes among Women and Men in Midlife: Examining the Role of Stability and Change in Childhood Economic Hardship

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Abstract

In this study, we advance existing research on childhood disadvantage, gender, and health by examining how the timing and duration of childhood economic hardship differentiates between those at low and high risk of chronic disease onset in midlife for women and men, across four different health outcomes. The study uses prospective data on childhood and adulthood from the US Panel Study of Income Dynamics. Discrete time hazard models are estimated using logistic regression to determine how experiences of childhood economic hardship affect the risk of disease onset in midlife. Results indicate that, in general, childhood economic context results in an increased risk of multiple diseases for women but not for men. Specifically, women who experienced long-term economic hardship in childhood, or began life in poverty but moved out of poverty in childhood, were more likely to experience the onset of diabetes, arthritis, and cardiovascular diseases in midlife, net of other factors, such as adult resources. The impact of childhood economic hardship on disease onset also varied by age for women but not for men, and this relationship was also dependent on the health outcome examined. This study draws attention to the importance of conceptualizing and measuring childhood disadvantage as dynamic, and reveals that the process of cumulative disadvantage may be different for women and men.

Key words: cumulative disadvantage; gender and health; life course; childhood economic hardship

Improving gender equity in health has been recognized by the World Health Organization as "one of the most direct and potent ways to reduce health inequities overall and ensure effective use of health resources" (Sen & Ostlin 2007: viii.). Gender differences in health are well-documented in the U.S. (see Read & Gorman, 2010 for a review), with women experiencing greater morbidity than men despite living longer. Yet attempts to explain and reduce disparities in health faced by women and men have typically focused on the relationship between health and resources in adulthood, with limited attention to the early origins of disease and health over the life course.

Through its emphasis on human development and aging as lifelong processes (Elder, Johnson, & Crosnoe, 2003), the life course perspective has directed attention to the 'long arm' of childhood disadvantage, or how early life conditions impact health and other outcomes in adulthood. Research increasingly has recognized the importance of childhood origins in shaping health disparities (Murray et al., 2011; Diprete & Eirich, 2006), yet little work has examined how childhood context may differentially affect men and women. Existing research treats gender as a control variable rather than a focal point (e.g. Bowen, 2010), often attempting to "explain away" gender differences rather than examining how social factors may operate differently for women and men and lead to divergent health trajectories and heterogeneity within groups (Evans-Campbell et al., 2010). Further, childhood disadvantage has been treated as static, rather than as a dynamic process involving stability and change over time (e.g. Pudrovska & Anikputa, 2013; Walsemann et al., 2012; Lemelin et al., 2009), and its effects rarely compared across health outcomes.

The current study advances research on childhood disadvantage, gender, and health by conceptualizing and measuring childhood economic context as a dynamic process that may affect

disease onset in midlife differently for women and men. Specifically, we take into consideration stability and change in the experience of childhood poverty and its impact on health in midlife. Using the US Panel Study of Income Dynamics (PSID), these relationships are examined across four chronic disease outcomes that are among the most prominent causes of morbidity and mortality in the United States.

Background

Diabetes, hypertension, arthritis, stroke, heart attack and heart disease are among the most common causes of morbidity and mortality in the US (Heron 2007; Gluckman & Hanson, 2005; CDC, 2014). In general, men tend to experience more life-threatening chronic diseases at younger ages, while women have higher rates of chronic debilitating conditions (Bird & Rieker, 2008). Across all age groups, heart disease is more prevalent among men than women, although it remains the leading cause of death for both genders (National Center for Health Statistics, 2009). Partly due to heart attack occurring at later ages for women, nearly half of all fatal heart attacks each year in the US occur in women. For men up to age 75, the incidence of stroke is higher than in women, but this trend reverses in adults 85 years and older (Petrea et al., 2009). Women also have a higher lifetime risk of stroke (Petrea et al., 2009). Gender differences do not appear with regard to the overall prevalence of hypertension (33.6% of men and 32.3% of women), but prevalence is higher for men under 25 (Doumas et al., 2013). Finally, women experience higher rates of arthritis than men (26% vs. 19%) while a slightly higher percentage of men have diabetes than women (14% vs. 11%) (CDC, 2014).

Social explanations of differences in men and women's health outcomes have centered on differential access to protective resources, including income and education, as well as exposure to factors that negatively affect health, such as behavioral risk factors, in adulthood (Bird &

Rieker, 2008). Life course research, however, has consistently linked each of these chronic disease outcomes to childhood socioeconomic circumstances (Hamil-Luker & O'Rand, 2007; Danese et al., 2007; Luo & Waite, 2005; Blackwell, Hayward, & Crimmins, 2001; Maty et al., 2008; Johnson & Schoeni, 2011). Cumulative dis/advantage is a key framework used to conceptualize this link, referring to a process through which initial disadvantage or advantage is compounded or amplified over time to produce heterogeneity in life course outcomes, such as health (O'Rand, 1996). In other words, the relationship between socioeconomic resources and health begins in early life and is magnified over time. Widening health disparities between advantaged and disadvantaged groups with age suggest that processes of cumulative dis/advantage operate across the life course (Lynch, 2003; Dupre, 2007; Willson et al., 2007; Shuey & Willson, 2008; Brown, O'Rand, & Adkins, 2012).

Early life inequalities in socioeconomic environment are thought to initiate the cumulative process that leads to divergent trajectories of health across the life course (Corna, 2013). Research also indicates that the timing, duration, and sequencing of childhood exposure to economic hardship are critical for many adulthood outcomes, including health (Wagmiller et al., 2006; Shuey & Willson, 2014). Existing models of cumulative dis/advantage, however, differentially emphasize the importance of each temporal complexity (see Shuey & Willson, 2014, for a review). Such approaches also do not take into account heterogeneity in childhood circumstances, ignoring the way in which socioeconomic circumstances can improve or deteriorate throughout childhood, as well as issues of timing related to the onset of disadvantage. Instability in resources in childhood and throughout the life course often occurs, challenging notions of disadvantage that view poverty as a long-term and irreversible state (McDonough & Berglund, 2003; McDonough, Sacker, & Wiggins, 2005). Little attention has been given to

patterns of change in childhood circumstances. Existing research has also relied heavily on retrospective data and static measures of childhood socioeconomic status. Measures of childhood SES used in previous studies have included: parents' education (e.g. Walsemann et al., 2012; Lemelin et al., 2009; Bowen, 2010), parents' occupation (e.g. Pudrovska & Anikputa, 2013; Gustafsson & Hammarstrom, 2012; Hallqvst et al., 2004; Maty et al., 2008; Lidfelt et al., 2006), family income at a single point in childhood (e.g. Fothergill et al., 2009), or some combination of factors, such as receipt of welfare, parental divorce, and father's education (e.g. Morston et al., 2012; Schafer & Ferraro, 2012; Montez & Hayward, 2014).

While these studies have made key contributions to our understanding of life course processes of health, they are not able to addresses the effects of dynamic and differing experiences of economic hardship. For example, long-term exposure to childhood disadvantage appears to have the strongest negative effect on adult achievement outcomes and is harmful to health in adulthood (e.g., Shuey & Willson, 2014; Wagmiller et al., 2006). However, research also suggests that transitions into or out of sustained poverty in childhood have distinct effects on health. For example, deteriorating health in mid-life is more likely among those who transition into sustained economic hardship in childhood, while those whose families move out of poverty during childhood have health trajectories similar to those who never faced economic hardship (Shuey & Willson, 2014). Accordingly, when and how long experiences of disadvantage in childhood occur are important to understanding life course trajectories of health. Yet, studies tend to draw conclusions about long-term processes based on single snapshots in time (Wolfe, Haveman, Ginther, & An, 1996). The life course perspective, however, calls for an examination of patterns of stability and change in childhood economic hardship, and how this is related to such dynamic processes as health.

In addition to identifying how adult health may be anchored in early life trajectories of dis/advantage, whether these trajectories initiate process of disadvantage in health outcomes similarly across groups over time is also a critical step forward as it should not be assumed that these processes apply universally (George, 2005). Indeed, little empirical attention has been given to whether cumulative processes of inequality that begin in childhood may differ for men and women. Such differences are likely given gender differences in biological disease processes as well as in responses to stressors and social conditions, and access to resources (Taylor et al. 2000; Zunzunegui et al., 2008). Research that has incorporated gender into the study of childhood disadvantage and adult health suggests that childhood socioeconomic disadvantage more strongly predicts psychological distress, depressive symptoms, BMI, cardiovascular disease, diabetes and risk of heart attack for women than for men (Gilman et al., 2002; Pudrovska & Anishkin, 2012; Walsemann et al., 2012; Lemelin et al., 2009; Lipowicz et al., 2007; Maty et al., 2008; Hamil-Luker & O'Rand 2007). It is likely, then, that the process of cumulative dis/advantage differs by gender; however, research has not adequately problematized heterogeneity within women and men to understand how differences in the timing and duration of childhood economic hardship generate health inequality among these groups.

Finally, in examining these processes, it is important to consider multiple measures of health rather than single or monolithic measures for two reasons. First, "different health conditions vary in their etiologies" (Brown et al., 2013, p. 360). Therefore, combining multiple health concerns into an all-encompassing measure risks overlooking the differential accumulation of risk factors that lead to different conditions. Second, the direction and magnitude of gender differences in health vary depending on the condition examined (Denton, Prus, & Walters, 2004). It is therefore essential to examine multiple health conditions in order to

understand similarities and differences in the processes leading to each and to capture important variations by gender. Whereas past studies on cumulative disadvantage, gender, and health have considered a single or limited number of health outcomes, the present analysis examines multiple chronic diseases and compares how dynamic experiences of childhood economic hardship are related to each for men and women.

Research Questions

Based on the above considerations, we ask whether trajectories of childhood economic hardship are associated with chronic disease outcomes in midlife for both women and men. In other words, we examine if patterns of stability and change in childhood circumstances initiate processes of cumulative health disadvantage for each group or just one. Previous literature suggests childhood disadvantage may be more detrimental for women's health outcomes, so it is possible that the trajectories of childhood economic hardship examined here will be associated with poor health for women only. We also investigate whether the observed relationships between childhood economic hardship and disease onset vary by the health outcome under investigation.

Methods

Data

This study uses the U.S. Panel Study of Income Dynamics (PSID), an ongoing survey that began in 1968 with a nationally representative sample of approximately 5,000 families (Panel Study of Income Dynamics, 2013). Families were interviewed annually until 1997 when interviewing became biennial. The latest wave of available data used in this analysis was collected in 2011. Children of PSID families who leave their parents' homes also become PSID family units, and sample representativeness is maintained (Fitzgerald, Gottschalk & Moffit,

1998). The extensive and multi-generational design of data collection enables adult children to be linked to their parents. Data on childhood socioeconomic environment provided prospectively by parents at the time the child was in the parental home can therefore be used, which avoids recall bias in childhood conditions. An oversample of families from low-income neighborhoods was included in the original sample design of the PSID, which enables the differentiation of various experiences of childhood economic hardship. Finally, the PSID contains rich information on various health outcomes, health behaviors, and other important covariates such as income, employment, and marital status.

Analytic Sample

This study focuses on individuals who were newborn to eight years old in 1968. This age range is particularly useful for this analysis as, during the observation period, these individuals enter a stage of the life course in which many health problems begin to emerge. Latent classes of childhood economic hardship experience were estimated for the full sample of these respondents (N=4,167) using data collected from PSID families from 1968-1977 (see Shuey & Willson, 2014). The sample used in multivariate analyses includes the subsample of individuals who remained in the study in adulthood and were a PSID "head" or a "wife" at the start of the observation period in 1999 as these are the household members that the PSID collects detailed information on in each survey year (N=1229; 697 women, 532 men).

Missing data is a challenge in any longitudinal study. This paper uses survival analysis, which allows the use of unbalanced panels, meaning individuals who attrited from the PSID after the initial observation year (1999) are still included in the analysis. Additionally, one advantage of the PSID is that, unlike retrospective studies which do not begin studying individuals until much older ages, many selection processes are observable. Multiple studies have extensively

examined the effects of the attrition of this cohort of children from the PSID sample on intergenerational models (e.g., those using family income during the respondent's childhood) with covariates that predict adult health outcomes and demonstrate that the PSID maintains its representativeness over time without strong evidence of attrition bias, with the exception that the effect of higher education on sample attrition is stronger than that of health and that female subsamples demonstrate weaker effects of attrition than males (Fitzgerald, 2011; Halliday, Kimmitt, & Kimmitt, 2012; Meer, Miller, & Rosen, 2003). Previous research also has found that individuals who experienced childhood poverty are less likely to have remained in the PSID to have an observed health outcome in 1999 when health data began to be collected (see Shuey & Willson, 2014). Any selective attrition with respect to health will likely lead to an underestimate of the impact of childhood economic hardship. Taken together, this indicates that, while not significantly biased, results from this study are likely conservative estimates of the association of childhood economic hardship and adult health (Shuey and Willson, 2014).

Measures

Disease Outcomes. Four disease outcomes are assessed in this study: high blood pressure, diabetes, arthritis, and a measure consisting of heart attack, heart disease, and stroke. Stroke, heart attack, and heart disease were grouped together due to relatively low prevalence levels in middle age in addition to all affecting the heart and circulatory system (Johnson & Schoeni 2011). The conditions are measured by responses to the question: "Has a doctor or health professional ever told you that you have had–?" Respondents were asked this question in each survey wave from 1999 to 2011.

Childhood Economic Hardship. Children's histories of economic hardship were analyzed over a 10 year period, from 1968 (when the children were 0-8 years old) to 1977. A child was

considered to be living in poverty in a given year if the family's total annual income fell below 125% of the official U.S. poverty threshold.[1] In a previous study (Shuey & Willson, 2014), these indicators and repeated measures latent class analysis were used to identify subgroups of individuals with similarities in their experience of economic hardship in childhood. Based on fit statistics from the latent class models, and the previous literature (Wagmiller et al., 2006), it was determined that there were four groups into which respondents could be classified: non-poor, moving into poverty, moving out of poverty, and long-term poverty. Those who moved into poverty began with a relatively low risk of experiencing poverty which increased as they reached and transitioned into adolescence, while those who moved out of poverty had a relatively high risk of poverty in early childhood that dropped steadily as they approached late childhood. The long-term poor had a very high probability of exposure to poverty during the entire period of observation (1968-1977), and the non-poor had a very low probability of experiencing poverty during this period.

Other Covariates. Both adult resources and health behaviors are associated with childhood disadvantage and adult health (e.g. Hayward & Gorman, 2004; Pudrovska & Anishkin, 2013). All covariates belonging to these categories were included as time-varying, with the exception of education (coded as less than high school, high school, some post-secondary, and post-secondary). Employment status and marital status were dichotomized (1=employed; 1=married). Total household income was lagged by one year, adjusted for inflation, and logged for each year of observation. Based on considerations from previous literature (Kagotho, 2009; Hamil-Luker & O'Rand, 2007), frequency of heavy physical activity was coded as 1=never engages in physical activity. Drinking and smoking were also dichotomized, with 1=drinks one

[1] Consistent with previous literature using the PSID, 125% of the U.S. poverty threshold was used because the PSID consistently finds higher reported incomes than the Census Bureau (Wagmiller et al., 2006).

or more drinks per day and 1=current smoker (see Kagotho, 2009). Race/ethnicity, which is strongly associated with both childhood poverty and adult health (Lynch, 2008; National Poverty Center, 2013), was also included as a covariate and coded as non-Hispanic black (1) and non-Hispanic white (0). Other racial/ethnic groups were not included due to an inadequate number of observations.

Analytic Strategy

Survival analysis was used to determine how experiences of economic hardship in childhood affect the risk of disease onset in midlife. Multivariate analyses were clustered by person ID, and all descriptive statistics were weighted using the PSID 2011 longitudinal weights. The unit of analysis for all analyses was person-years. The population at risk for each disease outcome was defined as those individuals who had not experienced disease onset for the particular condition under investigation before age 40. Thus, the models predict the likelihood that an individual would develop a condition by the end of the observation period assuming they did not have it by age 40. This restriction was imposed for two reasons: to address left-censoring, and also, because the focus of this study was to examine disease onset in mid-life.

Multivariate discrete-time hazard models were estimated using logistic regression. These models were appropriate given the fairly large intervals at which the presence of each disease was measured (years) as well as the censoring of some data. Women and men were analyzed as separate groups. Such an approach provides greater ease with which to assess the significance of covariate effects within each group (Phillips & Sweeney, 2005). In addition, it allows us to assess how childhood economic hardship produces heterogeneous health outcomes within women and men, similar to Hamil-Luker and O'Rand (2007). This is particularly important

considering our limited understanding of the unique health experiences of men and women who face economic hardship in childhood.

In analyses not shown here, temporal dependence was assessed. For both women and men, the risk of experiencing the onset of a chronic condition was found to change over time; therefore, age was included in the multivariate models as a categorical variable: 40-45 (0) and 46-52 (1). These categories were chosen as they are reflective of a division between early and late middle-age. The proportional hazards assumption was also evaluated for women and men. This assumption implies that predictor variables have uniform effects across time, or that there are no interactions between predictors and time (see Allison, 2010; Borucka, 2013). The proportional hazards assumption was violated for women with regard to the effect of poverty class on health, indicating that an interaction term between age and poverty class was necessary for models of women's health to allow for non-proportional hazards (Allison, 2010; Borucka, 2013). The assumption was not violated for men; therefore, models predicting men's outcomes did not include the aforementioned interaction terms. In other words, the effect of childhood economic hardship on disease onset changes over time for women but not men. This prevents testing for significant differences across the two groups as the model specification for women and men is different; however, the focus of this paper is to examine whether and how childhood economic hardship produces heterogeneous health outcomes among women and among men. Results will demonstrate how the timing and duration of childhood economic hardship impacts the health of women and men.

Results

Descriptive Results

Weighted proportions and means by gender are presented in Table 1. On average, over the observation period, the same percentage of women and men reported having diabetes (5%) and stroke, heart disease, or heart attack (3%). In any given year, about 8% of men reported arthritis compared to 12% of women. Over the observation period, men and women experienced similar rates of high blood pressure, at 17% and 16%, respectively. Rates of childhood economic hardship were roughly similar across women and men. High school graduates make up the largest proportion of education categories for both men and women (39% and 34%, respectively). More men (43%) than women (25%) reported drinking one or more drinks per day and more women (33%) than men (25%) reported never exercising. Smoking rates were similar at 25% for women and 23% for men.

Table 1. Descriptive Statistics by Gender (Weighted), 1999-2011 PSID

Variable	Women	Men
Diabetes		
Yes	0.05	0.05
No	0.95	0.95
High Blood Pressure		
Yes	0.16	0.17
No	0.84	0.83
Arthritis		
Yes	0.12	0.08
No	0.88	0.82
Stroke, Heart Disease, Heart Attack		
Yes	0.03	0.03
No	0.97	0.97
Childhood Poverty Status		
Non-Poor	0.75	0.75
Move into Poverty	0.05	0.04
Long-term Poor	0.10	0.08
Move out of Poverty	0.09	0.13
Race/Ethnicity		
Non-Hispanic Black	0.27	0.20
Non-Hispanic White	0.73	0.80
Age	41.37	41.27
Adult Education		
<High School	0.10	0.07
High School	0.34	0.39
Some Post-secondary	0.29	0.22
Post-secondary	0.27	0.32
Employment Status		
Employed	0.22	0.90
Not Employed	0.78	0.10
Marital Status		
Married	0.66	0.76
Not Married	0.34	0.24
Income (Median)	60851	78087
Smoking Status		
Yes	0.25	0.23
No	0.75	0.77
Drinking Frequency		
1+/Day	0.25	0.43
<1/Day	0.75	0.57
Physical Activity		
Never Engages	0.33	0.25
Engages	0.67	0.75
N(person-years)	8848	6776

Notes: Proportions for disease outcomes refer to the average proportion in each category over the observation period. Number of observations (Women): 16, 200; Number of observations (Men): 11, 880

Multivariate Analyses

Diabetes (Table 2). In Model 1, women in late midlife who experienced long-term poverty in childhood were approximately 8 times more likely to experience the onset of diabetes by the end of the observation period compared to their younger counterparts who did not experience poverty (p=0.006). In addition, older women who moved out of poverty in late childhood were still 16 times more likely to experience the onset of diabetes (p=0.022). With the introduction of adult resources and health behaviors and other covariates, women belonging to both of these poverty classes remained more likely to experience the onset of diabetes by the end of the observation period relative to younger women who did not experience poverty (OR=9.01, p=0.007; OR=12.97, p=0.032). For women, then, the effects of childhood economic hardship on diabetes onset in midlife vary by age, with the impact of long-term poverty and poverty in early childhood manifesting in late middle age. Conversely, childhood economic hardship was not a significant predictor of diabetes onset for men.

Table 2. Discrete-Time Logistic Regression Estimated Effects of Childhood Economic Hardship on the Risk of Onset of Diabetes Within 12 Years, by Gender: 1999-2011 PSID

Independent Variable	Model 1				Model 2[a]				Model 3[b]				Model 4[c]			
	Women		Men		Women		Men		Women		Men		Women		Men	
	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value
Childhood Economic Hardship (Non-Poor)																
Move into Poverty	0.92	0.889	2.15	0.285	1.17	0.819	1.75	0.371	0.94	0.929	1.83	0.350	0.70	0.652	1.54	0.433
Long-term Poverty	0.20	0.026	0.76	0.289	0.17	0.019	0.73	0.422	0.15	0.011	0.72	0.401	0.10	0.007	0.49	0.168
Move out of Poverty	0.15	0.081	2.21	0.279	0.15	0.126	1.78	0.429	0.13	0.091	1.63	0.518	0.10	0.051	1.29	0.718
Age (40-45)																
46-52	2.04	0.096	7.42	0.000	2.44	0.045	8.90	0.000	2.51	0.076	9.01	0.000	2.57	0.062	9.82	0.000
Childhood Economic Hardship X Age																
Move into Poverty X 46-52	1.06	0.921			0.76	0.688			1.02	0.982			0.90	0.887		
Long-term Poverty X 46-52	8.17	0.006			8.43	0.006			9.07	0.008			9.01	0.007		
Move out of Poverty X 46-52	15.67	0.022			12.37	0.034			11.88	0.038			12.97	0.032		
Constant	0.29	0.002	0.12	0.000	19.75	0.190	0.00	0.002	6.27	0.465	0.00	0.002	6.77	0.437	0.00	0.002

Notes:
Number of observations (women) = 810. Number of observations (men) = 594.
[a] Model 2 controls for adult resources: education, income, employment status, and marital status.
[b] Model 3 controls for the variables specified in Model 2 and adds adult health behaviors: smoking, drinking, and physical activity.
[c] Model 4 controls for the variables specified in Models 2 and 3 and adds race/ethnicity.

Table 3. Discrete-Time Logistic Regression Estimated Effects of Childhood Economic Hardship on the Risk of Onset of High Blood Pressure Within 12 Years, by Gender: 1999-2011 PSID

Independent Variable	Model 1				Model 2[a]				Model 3[b]				Model 4[c]			
	Women		Men		Women		Men		Women		Men		Women		Men	
	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value
Childhood Economic Hardship (Non-Poor)																
Move into Poverty	1.13	0.758	1.52	0.280	1.22	0.635	1.65	0.200	1.40	0.412	1.63	0.235	1.50	0.321	1.66	0.228
Long-term Poverty	0.65	0.108	0.97	0.861	0.72	0.259	0.98	0.937	0.78	0.396	1.01	0.953	0.85	0.589	0.95	0.838
Move out of Poverty	0.59	0.192	0.95	0.808	0.68	0.340	1.03	0.873	0.70	0.392	1.03	0.891	0.76	0.504	0.96	0.897
Age (40-45)																
46-52	5.90	0.000	7.69	0.000	6.85	0.000	8.30	0.000	6.65	0.000	8.17	0.000	6.70	0.000	8.17	0.000
Childhood Economic Hardship X Age																
Move into Poverty X 46-52	0.62	0.289			0.53	0.170			0.55	0.191			0.55	0.194		
Long-term Poverty X 46-52	1.51	0.191			1.31	0.394			1.34	0.366			1.33	0.379		
Move out of Poverty X 46-52	1.81	0.202			1.52	0.380			1.65	0.294			1.62	0.310		
Constant	0.17	0.000	0.12	0.000	0.20	0.082	0.17	0.049	0.26	0.147	0.17	0.062	0.30	0.225	0.15	0.055

Notes:
Number of observations (women) = 2592. Number of observations (men) = 2020.
[a] Model 2 controls for adult resources: education, income, employment status, and marital status.
[b] Model 3 controls for the variables specified in Model 2 and adds adult health behaviors: smoking, drinking, and physical activity.
[c] Model 4 controls for the variables specified in Models 2 and 3 and adds race/ethnicity.

High Blood Pressure (Table 3). Childhood economic hardship was not a significant predictor of the onset of high blood pressure for women or men in any of the four models.

Arthritis (Table 4). In Model 1, women in late middle-age who moved out of poverty were about 6 times more likely to experience arthritis compared to their younger peers who did not experience childhood poverty (p=0.006). This relationship persisted when adult resources, health behaviors, and race/ethnicity were taken into account (OR=7.75, p=0.011 in Model 4). For men, however, childhood economic hardship was not a significant predictor of arthritis onset.

Stroke, Heart Disease, Heart Attack (Table 5). In Model 1, women in late midlife who lived in long-term poverty as children were about 6 times more likely to experience stroke, heart disease, or a heart attack compared to their younger peers who did not experience childhood poverty (p=0.001). This relationship remained the same controlling for adult resources, health behaviors, and race/ethnicity (OR=6.02, p=0.002;Model 4). For men, having moved into poverty in childhood was associated with being 3 times more likely to experience stroke, heart disease, or a heart attack by the end of the observation period (p=0.004; Model 1). With introduction of adult resources in Model 2, this increased to 4 times more likely (p=0.001). When health behaviors were added in Model 3, men who moved into poverty as children were nearly 6 times more likely to experience stroke, heart disease, or a heart attack compared to their non-poor peers (p=0.001). This remained true in Model 4.

Table 4. Discrete-Time Logistic Regression Estimated Effects of Childhood Economic Hardship on the Risk of Onset of Arthritis Within 12 Years, by Gender: 1999-2011 PSID

Independent Variable	Model 1				Model 2[a]				Model 3[b]				Model 4[c]			
	Women		Men		Women		Men		Women		Men		Women		Men	
	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value
Childhood Economic Hardship (Non-Poor)																
Move into Poverty	0.35	0.085	0.82	0.535	0.30	0.043	0.64	0.233	0.29	0.034	0.67	0.340	0.31	0.053	0.66	0.297
Long-term Poverty	0.55	0.066	0.77	0.268	0.49	0.033	0.65	0.193	0.48	0.030	0.65	0.219	0.54	0.105	0.47	0.108
Move out of Poverty	0.19	0.005	1.62	0.203	0.18	0.008	1.39	0.435	0.17	0.008	1.47	0.357	0.19	0.011	1.07	0.901
Age (40-45)																
46-52	4.03	0.000	6.07	0.000	4.38	0.000	6.40	0.000	4.60	0.000	6.43	0.000	4.57	0.000	6.62	0.000
Childhood Economic Hardship X Age																
Move into Poverty X 46-52	2.56	0.167			2.57	0.162			2.49	0.174			2.58	0.151		
Long-term Poverty X 46-52	1.63	0.209			1.46	0.329			1.45	0.333			1.48	0.307		
Move out of Poverty X 46-52	6.18	0.006			5.55	0.011			5.53	0.012			5.75	0.011		
Constant	0.27	0.000	0.15	0.000	1.11	0.931	0.30	0.481	1.03	0.981	0.18	0.330	1.39	0.804	0.18	0.330

Notes:
Number of observations (women) = 1944. Number of observations (men) = 950
[a] Model 2 controls for adult resources: education, income, employment status, and marital status.
[b] Model 3 controls for the variables specified in Model 2 and adds adult health behaviors: smoking, drinking, and physical activity.
[c] Model 4 controls for the variables specified in Models 2 and 3 and adds race/ethnicity.

Table 5. Discrete-Time Logistic Regression Estimated Effects of Childhood Economic Hardship on the Risk of Onset of Stroke, Heart Disease, Heart Attack Within 12 Years, by Gender: 1999-2011 PSID

Independent Variable	Model 1				Model 2[a]				Model 3[b]				Model 4[c]			
	Women		Men		Women		Men		Women		Men		Women		Men	
	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value
Childhood Economic Hardship (Non-Poor)																
Move into Poverty	1.35	0.534	2.92	0.004	1.43	0.513	4.03	0.001	1.99	0.215	5.83	0.001	2.03	0.217	5.99	0.000
Long-term Poverty	0.33	0.022	0.73	0.399	0.32	0.053	0.43	0.146	0.39	0.110	0.44	0.158	0.40	0.173	0.14	0.000
Move out of Poverty	0.71	0.421	1.06	0.915	0.76	0.540	1.09	0.864	0.76	0.542	1.05	0.928	0.78	0.646	0.44	0.18
Age (40-45)																
46-52	2.13	0.015	4.52	0.000	2.35	0.008	6.21	0.000	2.42	0.012	5.95	0.000	2.40	0.013	8.91	0.000
Childhood Economic Hardship X Age																
Move into Poverty X 46-52	1.02	0.986			1.02	0.985			0.78	0.793			0.79	0.808		
Long-term Poverty X 46-52	6.07	0.001			5.80	0.002			5.98	0.002			6.02	0.002		
Move out of Poverty X 46-52	2.71	0.093			2.62	0.143			3.24	0.102			3.24	1.00		
Constant	0.34	0.000	0.23	0.000	3.08	0.532	1.43	0.883	5.92	0.279	25.08	0.285	6.13	0.302	15.91	0.353

Notes:
Number of observations (women) = 486. Number of observations (men) = 356.
[a] Model 2 controls for adult resources: education, income, employment status, and marital status.
[b] Model 3 controls for the variables specified in Model 2 and adds adult health behaviors: smoking, drinking, and physical activity.
[c] Model 4 controls for the variables specified in Models 2 and 3 and adds race/ethnicity.

Discussion

While studies of gender and health have typically focused on "explaining away" the gender difference, we take a different approach to this commonly investigated phenomenon through examining how patterns of change and stability in childhood economic hardship initiate processes of disadvantage in health among women and men rather than between them. Although men and women in this study experienced chronic disease at similar rates, the cumulative processes leading to heterogeneity within each group were quite different. Consistent with previous literature, childhood economic hardship differentiated between women at low and high risk of chronic disease but not men (e.g. Walsemann et al., 2012; Lemelin et al., 2009). One exception was stroke, heart disease, and heart attack, where childhood economic hardship increased risk of onset for both men and women. This inconsistency with previous research could be the result of a more nuanced and prospective measure of childhood economic hardship than was used in previous studies (e.g. Hamil-Luker & O'Rand, 2007). Overall, our findings indicate that it is not just long-term poverty that matters for women's health outcomes, but additionally that initial poverty has lasting effects even after leaving it. For example, long-term poverty in childhood significantly predicted women's risk of onset for diabetes and stroke, heart disease, and heart attack. For both diabetes and arthritis women who began life in poverty but moved out of poverty in childhood were more likely than those who were never in poverty to experience onset in late midlife. These findings reveal the importance of measuring childhood poverty as dynamic rather than capturing it at a single point in time or as a retrospective global measure. Existing research on the impact of SES in early life on later life health largely relies on one measure of parents' SES (e.g.

Beebe-Dimmer et al., 2004), and retrospective accounts of childhood SES, which increase the likelihood of recall bias and underestimation of true effects (e.g. Galobardes et al., 2004). In addition, few studies have explicitly examined how processes of cumulative disadvantage which begin in childhood vary by gender. One recent exception is Pudrovska & Anikputa (2013) who find an indirect relationship between early life SES and health through the operation of health behaviors for women only. While the authors use a multidimensional measure of parents' SES, early life conditions are measured at a single point in time. Consequently, it is unclear how the important life course concepts of stability and change factor into gendered processes of cumulative disadvantage. Certainly, SES in childhood (and across the life course) is not always stable, and entrances into and exits from poverty can uniquely influence health outcomes (Shuey & Willson, 2014). These changes also do not necessarily have the same association with adult health outcomes for all subgroups of the population.

Overall, these analyses demonstrate that the timing and duration of childhood economic hardship is associated with more negative health outcomes in later midlife for women than men. Socioeconomic conditions in childhood may be more detrimental to women's health outcomes because they are less likely to experience social mobility over the life course than men (Walsemann et al., 2012). In other words, the impact of childhood disadvantage on health is eventually less important for men because of their greater resource attainment in adulthood. Childhood adversity is also associated with reduced accumulation of life course capital, and this relationship is stronger for women (Hamil-Luker & O'Rand, 2007). Additionally, qualitative research suggests a greater accumulation of adversity over the life course for women than men (deVries & Watt,

1996). Disadvantage experienced in childhood may therefore continue to accumulate for women over the life course based on the structuring of opportunities and life chances by gender (Hunt & Annandale, 1999). Through disadvantages in paid and unpaid labor, discriminatory experiences, stress, and caregiving burdens, the impact of childhood economic hardship on health may be aggravated (Turner et al., 1995; Turner & Avison, 2003; Lundberg & Parr, 2000; Lundberg, 1996; Coltrane, 2000). Future research should continue to assess pathways through which heterogeneous trajectories of childhood economic hardship are associated with health among women.

As expected, the observed relationships between childhood economic hardship and health for both men and women also depended on the health outcome examined. For example, women who began childhood with a high risk of exposure to poverty but moved out of poverty as they reached adolescence were more likely to have arthritis in late midlife; in contrast, long-term poverty was most consequential for women's heart disease outcomes. For men, a move in to poverty in childhood predicted stroke, heart disease, and heart attack in midlife, but childhood economic hardship was not a significant predictor of men's other health outcomes. These findings are not surprising given that different health outcomes often have different etiologies (Brown et al., 2013), and also provide support for the dynamic measurement of childhood economic hardship in future research given the nuanced effects on health that emerge (Shuey & Willson, 2014).

This study has several limitations. First, as in any longitudinal analysis that covers a large span of time, there is the potential for unobserved heterogeneity resulting from panel attrition; although there is comprehensive evidence which suggests that the observed relationships were not seriously biased due to attrition, they were potentially

weakened. Second, childhood disadvantage was conceptualized and measured as economic hardship based on household income. Future research may also consider such experiences as change in family structure. Finally, this study considers the onset of four physical disease outcomes. Future research should also examine other physical and mental health outcomes.

Despite these limitations, this study is the first to examine whether the timing and duration of childhood exposure to economic hardship generates a process of cumulative disadvantage in health for both men and women. It has demonstrated the importance of measuring poverty as dynamic rather than static in that long-term and an initial high risk of childhood poverty appeared to be more consequential than other experiences of childhood economic hardship for women. Indeed, when childhood economic hardship is measured as dynamic, nuances emerge that have not been captured by other studies. While this study is unable to concretely determine why different experiences of economic hardship in childhood matter for different disease outcomes, it clearly demonstrates that change and stability in childhood socioeconomic circumstances matter. Further, the link between childhood economic hardship and long-term negative health consequences may be more relevant to women's health over the life course.

Rather than focusing on how socioeconomic circumstances in adulthood explain differences in health between men and women, we focus on how childhood adversity differentiates risk of onset within each group. In so doing, we not only find childhood economic hardship to produce heterogeneity in women's chronic disease outcomes (Hamil-Luker & O'Rand, 2007), but also, that the impact of childhood poverty varies by age for women.. Little empirical research has examined whether the process of

cumulative disadvantage is the same across different sub-groups of the population over time or when the effects of childhood economic hardship may emerge for particular groups. This study suggests that cumulative disadvantage may be a gendered process, with age-dependent effects and heterogeneous health outcomes generally emerging for women, but not for men.

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