

Article

Predicting later life health status and mortality using state-level socioeconomic characteristics in early life



Rita Hamad^{a,*}, David H. Rehkopf^a, Kai Y. Kuan^b, Mark R. Cullen^a

^a Stanford University, Department of Medicine, 1070 Arastradero Road, Palo Alto, CA 94304, USA

^b Stanford University, Department of Statistics, 390 Serra Mall, Stanford, CA 94305, USA

ARTICLE INFO

Article history:

Received 9 November 2015

Received in revised form

13 April 2016

Accepted 14 April 2016

Keywords:

Life course epidemiology

Sensitive periods

Social determinants of health

Mortality

Claims data

State context

ABSTRACT

Studies extending across multiple life stages promote an understanding of factors influencing health across the life span. Existing work has largely focused on individual-level rather than area-level early life determinants of health. In this study, we linked multiple data sets to examine whether early life state-level characteristics were predictive of health and mortality decades later. The sample included 143,755 U.S. employees, for whom work life claims and administrative data were linked with early life state-of-residence and mortality. We first created a “state health risk score” (SHRS) and “state mortality risk score” (SMRS) by modeling state-level contextual characteristics with health status and mortality in a randomly selected 30% of the sample (the “training set”). We then examined the association of these scores with objective health status and mortality in later life in the remaining 70% of the sample (the “test set”) using multivariate linear and Cox regressions, respectively. The association between the SHRS and adult health status was $\beta=0.14$ (95%CI: 0.084, 0.20), while the hazard ratio for the SMRS was 0.96 (95%CI: 0.93, 1.00). The association between the SHRS and health was not statistically significant in older age groups at a p-level of 0.05, and there was a statistically significantly different association for health status among movers compared to stayers. This study uses a life course perspective and supports the idea of “sensitive periods” in early life that have enduring impacts on health. It adds to the literature examining populations in the U.S. where large linked data sets are infrequently available.

© 2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Studies that extend across multiple life stages promote an understanding of the factors that influence health across the life span (Braveman & Barclay, 2009). A growing literature has examined not only the individual-level socioeconomic factors in early life that influence health outcomes (Glymour, Avendaño, Haas & Berkman, 2008; Merkin, Karlamangla, Diez Roux, Shrager & Seeman, 2014; Pereira, Li & Power, 2014; Turrell, Lynch, Leite, Raghunathan & Kaplan, 2007), but also the influence of place. Studies in the U.S. have found that a person's state or region of birth is associated with later life development of cancer, dementia, diabetes, heart disease, and other illnesses (Datta, Glymour, Kosheleva & Chen, 2012; Glymour et al., 2013; Greenberg & Schneider, 1998; Patton, Benjamin, Kosheleva, Curtis & Glymour, 2011). Fewer have examined the specific characteristics of early life state-of-residence that are predictive of adult health, although one

recent study found small associations of state socioeconomic characteristics with chronic disease during working life (Rehkopf et al., 2015).

Prior work has suggested multiple types of trajectories through which early life factors may influence health and mortality in later life (Ben-Shlomo, Mishra & Kuh, 2014). “Critical period” and “sensitive period” models assume that an exposure in a time window during fetal life or childhood alters an individual's health trajectory early on (Ben-Shlomo & Kuh, 2002). “Accumulation of risk” models suggest that correlated or uncorrelated exposures across the life course interact additively or synergistically to bring about later disease. Meanwhile, “chains of risk” models hypothesize that initial adverse exposures bring about disease in later life because they increase the risk of additional adverse exposures throughout life (Ben-Shlomo et al., 2014).

Adverse exposures have been conceptualized not only in terms of chemical or metabolic risk factors, but also social factors (Halfon, Larson, Lu, Tullis & Russ, 2014). Numerous studies have begun to examine how early and later life socioeconomic status (SES) interact, and systematic reviews have suggested that childhood SES may be as important in determining later life cause-specific mortality and cardiovascular disease as adulthood SES,

* Corresponding author. Tel.: +1 650 497 3208; fax: +1 650 725 6247.

E-mail addresses: rhamad@stanford.edu (R. Hamad), drehkopf@stanford.edu (D.H. Rehkopf), kykuan@stanford.edu (K.Y. Kuan), mrcullen@stanford.edu (M.R. Cullen).

depending on the disease process and contextual factors (Galobardes, Lynch & Smith, 2008; Galobardes, Smith & Lynch, 2006). In general, however, a life course perspective is not frequently applied, and researchers have recently called for increased attention to how socioeconomic exposures are “sustained, exacerbated, or attenuated over time” (Cornia, 2013).

Moreover, most studies focus on individual-level socioeconomic factors, with less attention to the ways in which contextual factors interact across the life course. For example, area-level socioeconomic factors during childhood may influence educational and economic opportunities or may be associated with poorer housing and environmental conditions (Bartley, Blane & Montgomery, 1997). With regard to macro-level factors that differ across states and countries, differences in social and economic policies may affect how well the safety net buffers vulnerable individuals from adverse conditions (Currie & Rossin-Slater, 2015; Eikemo, Bambra, Judge & Ringdal, 2008).

In this study, we build upon this prior literature by examining how state characteristics in early life predict health status and mortality decades later (Fig. 1). We use composite indices representing socioeconomic characteristics of early state-of-residence as the predictors of interest. We take advantage of multiple large linked data sets among a cohort of U.S. workers, employing in-sample and out-of-sample models to strengthen results. We adjust for potential mediating individual- and area-level factors during adulthood, testing the hypothesis that early life state environment remains important even after controlling for socioeconomic factors during adulthood.

Methods

Data set

The sample included individuals who were ever employed at Alcoa, a large multi-site U.S. manufacturing firm. The data set was constructed by linking administrative, personnel, and medical claims files for employees who worked at least one day since January 1, 1986, which is the earliest that data are available. These data have been made available to researchers through an ongoing collaboration between the firm and the investigators, and they have been described in detail in prior work (Cullen et al., 2006). While this sample is not nationally representative, it is nevertheless demographically and geographically diverse, with extensive available data that enhance the potential to create data linkages across the life span.

Early life state-of-residence was imputed for each individual using the first three digits of his or her Social Security number, a technique commonly implemented based on the fact that these digits differ according to the state in which the Social Security card

was issued (Block, Matanoski & Seltser, 1983; Puckett, 2009). Less than 1% were missing information on early life state-of-residence, resulting in a sample size of 143,755 that included individuals from all 50 states and the District of Columbia.

Outcomes

The first outcome examined was an objective measure of health status determined administratively using claims data. This measure was calculated for individuals based on their International Classification of Diseases (ICD) and Current Procedural Terminology (CPT) codes, and health utilization from the prior year. A score of 1 indicates that an individual's health expenditures are likely to fall at the mean in the following year relative to a nationally representative population; each unit increase indicates a one-fold greater value than the mean. This measure was calculated using a proprietary algorithm originally developed as a medical management tool to forecast expenditures and health utilization, based on Diagnostic Cost Group Hierarchical Condition Category (DxCG-HCC) models (Verisk Health, 2015). However, this measure is increasingly being used in epidemiologic and health services research as a marker of objective overall health (Einav, Finkelstein, Kluender & Schrimpf, 2016; Hamad et al., 2015a; Handel, 2011; Modrek & Cullen, 2013; Modrek et al., 2015), and has previously been shown to predict short- and long-term disease outcomes and mortality (Hamad et al., 2015b). In particular, it is valuable for studies such as this one that rely on secondary data sources in which self-reported health is not available. In fact, prior studies have shown that claims-based measures of objective health status are highly correlated with self-rated health, lending credence to their use as a measure of overall health (DeSalvo et al., 2009; Wang et al., 2000). Because of the right-skew of this variable, the natural logarithm was taken, i.e., $\log(\text{health})$.

In this sample, all individuals were covered by similar insurance plans with comprehensive benefits, reducing bias due to differences in insurance coverage. For analyses using this outcome, the sample was restricted to those for whom claims data were available in 2004; this was the year in which the largest number of individuals was employed at Alcoa, maximizing the sample size of those for whom the objective health status could be calculated in a given year. Additionally, we restricted the sample to those who were less than 65 years old in 2004, to exclude those individuals for whom we might not have full claims data due to their utilization of Medicare for insurance coverage. The resulting sample size for these analyses was 55,436.

The second outcome was mortality. This was obtained by linking our sample with the Social Security Administration's Death Master File (Social Security Administration Office of Policy, 1998). This included deaths through September 2011, including individuals no longer employed at Alcoa. Remaining individuals were

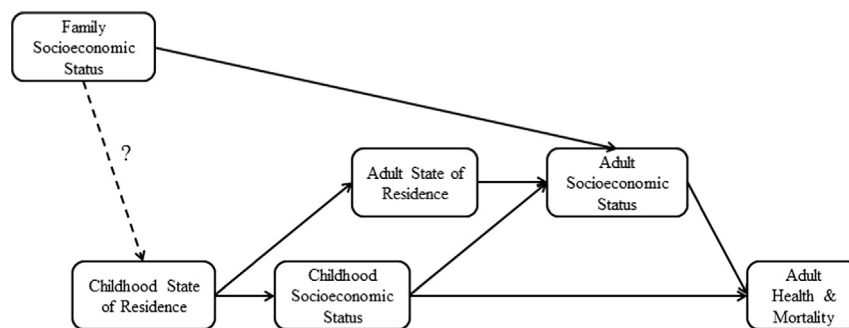


Fig. 1. Conceptual Model: State-of-Residence and Health over the Life Course Note: This figure illustrates hypothesized pathways linking childhood state-of-residence with adult health and mortality. While family socioeconomic status (SES) during childhood has been strongly linked with childhood *neighborhood-* of-residence, it is less likely that it confounds the relationship between childhood *state-* of-residence and adult SES.

Download English Version:

<https://daneshyari.com/en/article/1092331>

Download Persian Version:

<https://daneshyari.com/article/1092331>

[Daneshyari.com](https://daneshyari.com)