



Short Communication

Health selection into neighborhoods among patients enrolled in a clinical trial

Mariana C. Arcaya^{a,*}, Ruth L. Coleman^b, Fahad Razak^c, Maria L. Alva^d, Rury R. Holman^b^a Department of Urban Studies and Planning, Massachusetts Institute of Technology, Cambridge, MA, USA^b Diabetes Trials Unit, Oxford Centre for Diabetes, Endocrinology and Metabolism, University of Oxford, Oxford, England, United Kingdom^c Li Ka Shing Knowledge Institute of St Michael's Hospital, University of Toronto, Toronto, Ontario, Canada^d RTI International, USA

ARTICLE INFO

Article history:

Received 9 November 2016

Received in revised form 12 July 2017

Accepted 14 July 2017

Available online 24 July 2017

Keywords:

Neighborhoods

Self-selection

Health

Equity

Socioeconomic status

ABSTRACT

Health selection into neighborhoods may contribute to geographic health disparities. We demonstrate the potential for clinical trial data to help clarify the causal role of health on locational attainment. We used data from the 20-year United Kingdom Prospective Diabetes Study (UKPDS) to explore whether random assignment to intensive blood-glucose control therapy, which improved long-term health outcomes after median 10 years follow-up, subsequently affected what neighborhoods patients lived in. We extracted postcode-level deprivation indices for the 2710 surviving participants of UKPDS living in England at study end in 1996/1997. We observed small neighborhood advantages in the intensive versus conventional therapy group, although these differences were not statistically significant. This analysis failed to show conclusive evidence of health selection into neighborhoods, but data suggest the hypothesis may be worthy of exploration in other clinical trials or in a meta-analysis.

© 2017 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Geographic disparities are among the most glaring type of social inequalities in health that epidemiologists observe. For example, life expectancy at birth differs by up to a decade across neighborhoods within New York City, and by up to 20 years in Richmond, Virginia ([The Robert Wood Johnson Foundation, 2015](#)). For context, male life expectancy at age 40 differs by 14 years between the richest 1% and poorest 1% of Americans, after accounting for race ([Chetty et al., 2016](#)). On average nationwide, nearly seven years separates the highest (Hispanic) and lowest (Black) racial/ethnic group life expectancies that CDC reports ([Arias et al., 2017](#)). Geographic disparities are similarly important in the United Kingdom where life expectancy at birth differs by up to 10 years across Local Authority Districts ([Office for National Statistics, 2014a](#)), but only by roughly six years between the healthiest and least healthy occupational classes ([Office for National Statistics, 2015](#)).

Explanations for striking differences in health across place fall into three broad categories. The first is compositional; income-based, racial/ethnic, and other forms of residential segregation tend to concentrate non-geographic health risks into neighborhoods. In other words, some degree of the association between health and place reflects confounding by prior common causes of both health and residential outcomes. The other two categories refer to causal processes: a) neighborhood effects on health, and b) reverse causation, or “health selection” into neighborhoods. Epidemiologists still struggle to characterize these causal

relationships despite the fact that neighborhood differences in health have been studied extensively over the past 20 years ([Arcaya et al., 2016](#); [Oakes et al., 2015](#)). Claims of neighborhood effects on health are supported by ample observational research suggesting that place matters for health ([Diez Roux, 2007](#)), and, crucially, by the Moving to Opportunity experiment, which provides casual evidence of neighborhood effects on at least some health outcomes ([Ludwig et al., 2011](#)). Health selection into neighborhoods, by contrast, is a poorly understood, but substantively important process, that might reinforce links among poor places, poor people, and poor health ([Arcaya et al., 2014](#)). Mechanistically, poor health could sap individuals of the energy required to seek better environments, or it might depress intentions to move among those whose health makes them dependent on place-based resources such as transit systems or local health care facilities. Further, previous work has shown that health status affects future income, educational attainment, employment, and wealth ([Case et al., 2005](#); [Smith, 2004](#)), any or all of which could serve as mediators on the causal pathway from health to neighborhood outcomes. While a nascent body of literature suggests that health is predictive of subsequent neighborhood characteristics ([Arcaya et al., 2015, 2014](#); [Grafova et al., 2014](#); [Green et al., 2015](#); [Jokela, 2014](#)), understanding the causal role of health as a determinant of neighborhood outcomes will require stronger experimental designs. We are not aware of any efforts to exploit random variation in health to test for health selection into neighborhoods.

In this Short Communication, we demonstrate the potential for clinical trial data to help clarify the causal role of health on locational attainment. We used data from the 20-year United Kingdom Prospective Diabetes Study (UKPDS) to explore whether random assignment to

* Corresponding author at: 77 Massachusetts Avenue, 9-426 Cambridge, MA, USA.

E-mail addresses: marcaya@mit.edu (M.C. Arcaya), ruth.coleman@dtu.ox.ac.uk (R.L. Coleman), fahad.razak@mail.utoronto.ca (F. Razak), malva@rti.org (M.L. Alva), rury.holman@dtu.ox.ac.uk (R.R. Holman).

intensive blood-glucose control therapy, which improved long-term health outcomes, subsequently affected what neighborhoods patients lived in.

1. Methods

The UKPDS was a randomized, prospective, multicenter trial, that demonstrated for the first time the health benefits of intensive glucose therapy in patients with newly-diagnosed type 2 diabetes mellitus. Between 1977 and 1991, 3867 patients, aged 25–65 years, were randomized to conventional therapy (primarily with diet), or to an intensive glucose control strategy with sulfonylurea or insulin therapy. At baseline, participants in the conventional and intensive treatment groups were well matched with respect to age, sex, ethnicity, and clinical and biochemical profiles (UK Prospective Diabetes Study (UKPDS) Group, 1998). Information on participants' neighborhoods were not available at baseline, nor were data on number of moves during the course of the study. After median 10 years follow-up, which ranged from 5 to 18 years across patients, the intensive therapy group had experienced fewer diabetes related end-points, particularly a 25% risk reduction in microvascular complications, with a borderline non-significant decreased risk of macrovascular disease, and a longer complication-free interval, as measured by time until the development of at least one diabetes-related endpoint (UK Prospective Diabetes Study (UKPDS) Group, 1998). Loss to follow-up was low and non-differential across the conventional and intensive treatment groups, and there was no evidence of differences in all-cause mortality between the two groups at the end of the study (UK Prospective Diabetes Study (UKPDS) Group, 1998). We hypothesized that the health advantage conferred to the intensive therapy group might have translated into a neighborhood quality advantage.

To test this, we used data on English UKPDS patients who had been randomized to conventional or intensive glucose control therapy ($n = 3339$), and extracted postcode information from addresses for the 2710 surviving participants living in England at study end in 1996/1997. Over the course of the study, 526 patients died (15.8%), 47 moved abroad (1.4%), and 56 were lost to follow-up (1.7%). We assigned each postcode to its corresponding Lower Layer Super Output Area, the smallest geography at which the Office of National Statistics computes English Indices of Deprivation (Office of the Deputy Prime Minister, Neighbourhood Renewal Unit, 2004). Postcodes, which typically contain 15 addresses, identify neighborhoods on a very fine geographic scale, while Lower Layer Super Output Areas contain between 400 and 1200 households (Office for National Statistics, 2014b). We used two indices to compare neighborhood deprivation between the conventional and intensive therapy groups. First, we used the Index of Multiple Deprivation, which is based on measures of income, employment, health and disability, education and skills, crime, housing, and environmental deprivation at the neighborhood level. Secondly, we used the income deprivation index alone, which measures the percent of an area's population that is low-income. Higher scores indicate higher levels of deprivation.

Mean levels of deprivation were computed for both treatment groups and compared using *t*-test statistics.

2. Results

We observed small neighborhood advantages in the intensive therapy group compared to the conventional therapy group, although these differences were not statistically significant. Patients assigned to conventional therapy were, numerically, living in more deprived areas (0.006 ± 0.012 , $p = 0.30$) in terms of income at the end of the study as compared with the intensive therapy group (Fig. 1). Those in the conventional therapy group were also, numerically, living in neighborhoods that faced a higher degree (0.775 ± 1.466 , $p = 0.29$) of multiple forms of deprivation (Fig. 2).

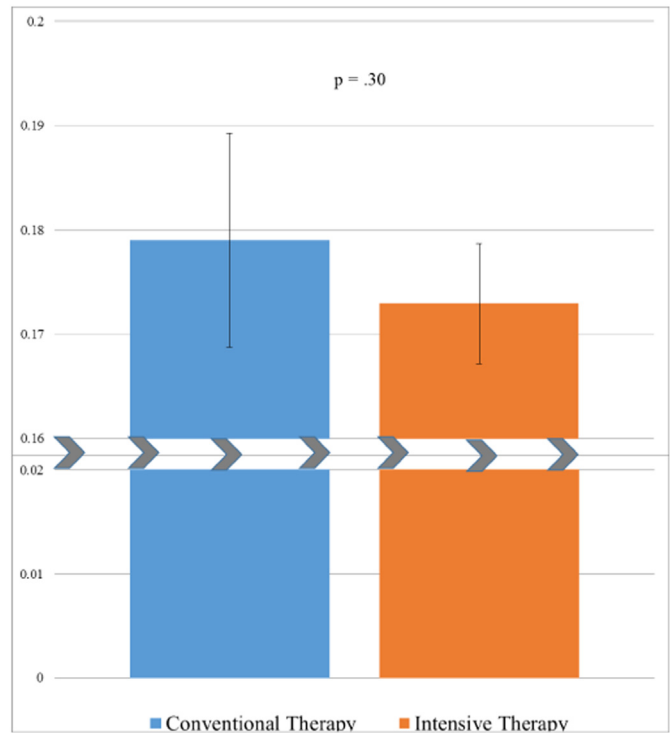


Fig. 1. Neighborhood-level income deprivation in conventional versus intensive therapy patients for the 2710 surviving participants of UKPDS living in England at study end in 1996/1997.

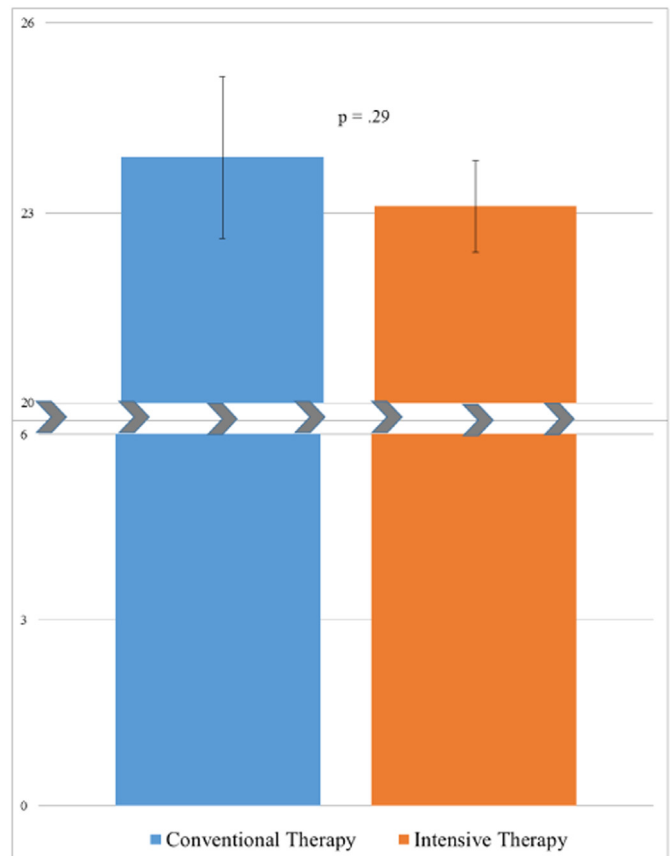


Fig. 2. Multidimensional neighborhood-level deprivation in conventional versus intensive therapy patients for the 2710 surviving participants of UKPDS living in England at study end in 1996/1997.

Download English Version:

<https://daneshyari.com/en/article/5723626>

Download Persian Version:

<https://daneshyari.com/article/5723626>

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