Doctor Who? The Effect of Physician-Patient Match on The SES-Health Gradient*

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Abstract

We investigate whether primary care physician and patient concordance in terms of socio-economic status (SES) reduces the SES inequality in health. We measure physicians' SES by their childhood SES and find that SES concordance decreases low-SES patients' mortality, while high-SES patients' mortality does *not* depend on their physicians' background. Together, they translate to a substantial reduction in the SES-mortality gradient. SES concordance changes the health behavior of the patient and increases treatment of chronic conditions: low-SES patients with low-SES physicians receive more care at the intensive margin, have a higher detection of chronic conditions, and have higher adherence to treatment.

Keywords: Health inequality, physician practice style, intergenerational transmission, family background, socio-economic status, health behaviors
JEL Codes: I12, I14, J62

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1. Introduction

Health disparities are large and growing in developed economies (Mackenbach et al., 2018, Deaton, 2013). The *health-SES gradient* has become a more important source of inequality relative to race in recent years (Case and Deaton, 2021) and is observed in many dimensions: low socio-economic status (SES) individuals have worse self-reported health, more chronic conditions, and shorter life expectancy (OECD, 2019). The gap in life expectancy in the US between a college and a high school male graduate is 7 years (Meara, Richards and Cutler, 2008). Even in countries with universal healthcare access and the most equal income distributions, we still observe a similar health-SES gradient (OECD/European Union, 2020). Mitigating this inequality is at the top of the policy agenda globally (OECD, 2019). In this paper, we investigate the importance of the match between primary care physicians (henceforth physicians) and patients.

Understanding how the physician-patient match affects health has important policy implications on both matching patients to physicians and efficiency in healthcare spending. Primary care physicians' responsibilities cover all aspects of everyday health; they provide continuous interaction with patients, make diagnoses, prescribe drugs, act as gatekeepers to medical specialists, and work with patients to manage chronic conditions (Starfield, 1994), making the physician-patient relationship especially important in this setting. Previous studies have found that similarities between physicians and patients in terms of salient characteristics, such as gender, race, or family ties, can improve patient health (Ye and Yi, 2022, Chen, Persson and Polyakova, 2022, Greenwood et al., 2020, Hill, Jones and Woodworth, 2020, Alsan, Garrick and Graziani, 2019, Greenwood, Carnahan and Huang, 2018). Despite the importance of the match quality and the growing SES inequality in health, SES-concordance between physicians and patients is unexplored.

In this paper, we ask: does matching primary care physicians and patients in terms of SES reduce the SES gradient in health? We measure physicians' SES using their parental SES, since all physicians are highly educated.Unlike gender and race, physicians' parental SES is unobserved by the patient. We focus on mortality as a main outcome of health and study potential mechanisms by investigating different causes of death and patient health

behaviors.

We use Danish population-wide administrative data of patients between ages 30-70 to study SES concordance effects. The Danish setting is ideal for the research question as it allows us to track families across generations and to merge this information with physicians' practices, patients' healthcare utilization, and health outcomes. Universal healthcare coverage in Denmark allows us to zoom in on the effect of the physician-patient match and rule out effects attributed to differences in healthcare costs and insurance selection.

The main challenge in providing causal evidence is that physician-patient matches may be endogenously created. To circumvent this, we exploit variation induced by clinic closures, a cause for physician-patient separation that is plausibly exogenous to patients' health trajectories (Simonsen et al., 2021, Fadlon and Van Parys, 2020). We compare health and health behaviors between high- and low-SES patients (first difference) before and after clinic closure (second difference) who get new physicians from either a high- or low-SES family (third difference). While we do not find evidence for selection on the new physicians' SES, potentially because this characteristic is unobserved by the patient, we address additional concern by comparing high- and low-SES patients within groups that have the same physician before and after the clinic closes in a triple differences design.

We find that SES concordance between physicians and patients closes the SES-gap in mortality, measured by the difference in mortality between high- and low-SES patients, by around 20%. The reduction in the SES gradient is caused by lower mortality rates for low-SES patients who are matched with low-SES physicians in the post period. High-SES patients' mortality does not depend on their physician's SES. This means that the reduction in the SES gradient in mortality is *not* caused by harming the high-SES patients, but by improving the health of low-SES patients whose health seems particularly sensitive to their assigned physician. Importantly, we do *not* find that other attributes of the physician, including academic performance, graduating institution, gender, experience, or experience with low-SES patients, contribute to the effect we find.

To break down the effect, we focus on deaths caused by chronic conditions, as primary care physicians hold the central role for the diagnosis and management of these condi-

tions (The Danish Ministry of Health, 2008, Rothman and Wagner, 2003). We find that the effect on overall mortality is driven by a large reduction in cardiovascular mortality, especially for men, and to a smaller extent, cancer mortality.

Evidence on patient health behavior and cause of mortality suggests that physician-patient SES concordance may improve low-SES patients' health through the following channels. (1) Low-SES patients matched with low-SES physicians receive more care at the intensive margin (more visits to physicians, more services per visit, and higher reimbursement to medical specialists), but not at the extensive margin (likelihood of making *any* office visits). (2) SES concordance increases detection of chronic conditions and adherence to medical guidelines. For example, we find that SES concordance increases uptake of statins, a medicine that prevents major heart attacks.[1] (3) Physicians' exposure to chronic conditions in their own families make them better at treating low-SES patients. (4) The effect is not driven by low-SES physicians being better at treating less healthy patients. In addition, we find suggestive evidence of that (5) The effect is increasing in the degree of similarity between patients' and physicians' social identities.

The proposed channels above are supported by the literature on shared language and discrimination. Shared identifies leads to less miscommunication (Lang, 1986). Differences in communication styles in health care is well documented.[2] In a setting where communication is key in diagnosis, these patterns could lead to under-diagnosis (Vellakkal et al., 2013) or under-treatment (Di Cesare et al., 2013). High-SES patients may have similar social identities to their physicians, whom are all highly educated, which facilitates easier interaction (Thornton et al., 2011, Street, 1991, Lang, 1986).Therefore, physicians from Low-SES families may be better prepared to understand low-SES patients' questions and their way of expressing symptoms, as well as better able to communicate medical advice, which are crucial to the patient's adherence to treatment and health (Ha and Longnecker, 2010). In addition, as a result of miscommunication and different prior believes, differences in physician treatment may arise from statistical discrimination (Balsa and

[1]Statins have documented sub-optimal utilization patterns and are commonly used in the literature to study health behaviors, see, e.g., Fadlon and Nielsen (2019). Physician-patient matches are important for the adherence rate for e.g. Statins (Koulayev, Simeonova and Skipper, 2017).

[2]Low-SES patients ask fewer questions, are more often misunderstood, and receive less medical information from their physician (Willems et al., 2005, Street, 1991).

McGuire, 2001).

Mismatch between physician and patient is unlikely to be mitigated by the market, despite the long-term and continuous nature of the physician-patient relationship. First, evidence suggest that patients are not fully informed about match quality nor its effect on health outcomes (Alsan, Garrick and Graziani, 2019). Second, geo-location constraints and the shortage of primary care physicians limit patients' ability to switch to a better-matched physician (Godager, 2012). Third, even if patients are able switch, discontinuity in care may be associated uncertainty and costs (Bischof and Kaiser, 2021).

Our paper makes a novel contribution by demonstrating that physician-patient SES concordance can mitigate the gap in SES inequality in mortality substantially. We do that by bridging the literature on health inequality to the literature on physician practice style. Our study demonstrates that childhood SES, a non-salient characteristic, is a relevant and important factor for how physicians interact with patients. Our findings are especially important in informing policy as health behaviors are difficult to alter (Cutler, 2004) via traditional interventions, in which low-SES individuals are shown to respond more slowly (Cawley and Ruhm, 2011, de Walque, 2010). We discuss our contribution to three strands of literature below.

First, our paper builds on a literature studying physicians practice styles (see, e.g., Chandra, Cutler and Song 2011 for a review). Differences in physicians' behaviors translate into differences in quality of care (Simeonova, Skipper and Thingholm, 2022, Ginja et al., 2022, Fadlon and Van Parys, 2020). What affects the physician's practice style? Studies show that physician's skill or quality (Dahlstrand, 2021, Currie and MacLeod, 2020, Doyle Jr, Ewer and Wagner, 2010), their medical training (Schnell and Currie, 2018), and their personal belief about the benefit of a treatment (Cutler et al., 2019) matter for their practice styles, while observable characteristics of the physician, such as gender, age, and specialization, only explains little variation in quality (Ginja et al., 2022). Simonsen et al. (2021) studies the effect of discontinuity in care that arises from a clinic closure on patient health in Denmark and finds that disruption in care increases reimbursement per visit and the detection of chronic conditions. We also use discontinuity induced by clinic closures as Simonsen et al. (2021), but use a different source of

identifying variation - SES of the physicians post closure. We contribute to the above literature by showing that the physicians' family background impacts how they interact with patients.

Second, this paper is closely related to a literature on matching quality as an input in production functions. We highlight papers on the effect of similarity in social identities. In educational settings, Card et al. (2022), Dee (2005) finds teachers who are demographically similar to their students improve student outcomes. Kunze and Miller (2017) find that having a female boss increases the chance of advancing in rank for female workers. In the medical setting, Alsan, Garrick and Graziani (2019) study racial physician-patient concordance in a randomized controlled experiment in the primary care sector. They estimate that racial concordance between physician and patient can reduce the black-white gap in cardiovascular mortality substantially, and the improvement is largely driven by better communication. In non-experimental settings, Greenwood et al. (2020), Hill, Jones and Woodworth (2020), Greenwood, Carnahan and Huang (2018), Blunch and Datta Gupta (2020) and Ye and Yi (2022) find that physician-patient concordance in terms of race, religion, and gender reduces mortality and increase health knowledge. Family is a form of close distance in social identity; having familial access to medical expertise is found to improve health and change health behaviors (Chen, Persson and Polyakova, 2022, Finkelstein et al., Forthcoming), although the evidence is mixed (Artmann, Oosterbeek and van der Klaauw, 2022). We contribute to a recent literature that study the role of patient-physician match by focusing on a physician characteristic that is under-explored, not directly observable, but universally policy relevant as it directly addresses the SES gradient in health.

Third, this paper contributes to the literature on intergenerational effects of parents' education and the childhood home environment. Parents' education affects children's cognitive skills, occupation choice, behavior, and even children's experience with the health-care system (Polyakova et al., 2020, Cesarini et al., 2016, Lundborg, Nilsson and Rooth, 2014, Carneiro, Meghir and Parey, 2013). We show that the childhood home environment impacts how individuals interact with people who may share similarities with their family members, potentially via intra-family transference of norms and knowledge.

The remainder of the paper is organized as follows. Section 2 describes the institutional setting and our data set. Section 3 describes our empirical strategy. We discuss our main results and robustness checks in Section 4 and conclude in Section 5.

2. Institutional Settings and Data

Denmark has tax-funded universal public health insurance that provides free and equal access for all citizens. Primary care clinics are privately owned, and are reimbursed on a mixed capitation and fee-for-service system. Primary care physicians are gatekeepers of the healthcare system; they perform initial diagnoses, treat illnesses, prescribe medication, manage chronic conditions, and refer patients to medical specialists. The tasks they face vary widely and often require intensive communication and a continuous relationship with the patient (Heritage and Maynard, 2006, Chapter 1). SES concordance may be particularly important in the primary care setting since a common cultural background and familiarity in low-SES lifestyle constraints may make low-SES physicians more cognizant of health risks and conditions of low-SES patients; it may also help facilitate medical communication (Thornton et al., 2011).

Our identifying variation is induced by clinic closures; a vast majority of clinic closures (74%) are due to retirement.[3] New assignment of physicians and patients takes place in three ways upon closures: (1) if the physician chooses to sell the clinic to another physician, the patient list is sold along with the clinic. (2) If the clinic is not sold, patients choose a new primary care physician online at the Danish National eHealth Portal, from a list of clinics that accept new patients. In this scenario, patients are informed about the number of physicians in the clinics, as well as the physicians' names, gender, and age when making a choice. From this information it is difficult for patients to infer the type of childhood SES of the physicians. (3) If patients do not make an active choice, they are assigned a clinic by the municipality. In the analysis period, many municipalities had a critical shortage of primary care physicians and many clinics did not accept new patients,

[3]Retirement is defined as the average age in the clinic being over 60 years at the time of clinic closure following Simonsen et al. (2021).

restricting the choice of the patient.[4] Physicians' graduating institution is not available on the eHealth Portal when patients choose a physician. In the period of interest, there were three medical schools in Denmark following similar curricula and providing a similar quality of training.[5]

2.1 Data

To study the effect of physician-patient SES concordance on health and health behavior, the ideal data requires linking each physician to demographic information about their parents, and merging this with information about their patients' health, health behaviors, and demographics. The Danish population-wide administrative data are one of the few data sources that allows for such an analysis on the population level. We describe how the analysis sample and variables of interest are constructed below.

2.1.1 Constructing the analysis sample

To construct the patient analysis sample, we start with all adults between ages 30-70 in the entire Danish population between 1995 and 2017. We use the Danish National Health Service Register and follow Kjaersgaard et al. (2016) to link every adult to their corresponding primary care clinic on an annual basis.[6] We are only able to match patients to physicians at the clinic level. We find clinics that close between 1999 and 2016 and define the closure year as the last year with registered services for the clinic. We include patients the first time they experience a clinic closure, and define their new clinic as the clinic that patients are connected to in the first year after closure of their old clinic. We observe 776 clinic closures affecting more than 480,000 adult patients in the analysis period, see Table 1. Our main analysis sample is balanced in the pre-period such that we observe patients at least four years before clinic closure. The patients may pass away in

[4]Clinics can stop the intake of new patients if they have more than 1600 patients per physician, and have to stop their intake of new patients when the number reaches 2500. Clinics must take all patients who choose them when the list is open.

[5]University of Copenhagen, Aarhus, and Odense. Aalborg University introduced a program in Medicine in 2010. The University of Copenhagen is the most popular institution to study Medicine, as measured both in terms of number of applicants and GPA cut-off.

[6]We can match patients and physicians with more than 98% accuracy using this algorithm (Kjaersgaard et al., 2016).

the post period, and their mortality is a core outcome of interest.

After linking patients to clinics, we use the Service Provider Registry to add the ID of the physicians in the clinic. Using physician IDs, we obtain physicians' demographics and their parents' levels of education from the registers.[7] There are 1.8 physicians per clinic in Denmark on average and 61% of clinics are non-solo. We then aggregate physician SES to the clinic level. In the main analysis, a clinic is defined as low-SES if one or more low-SES physicians work in the clinic. We use two alternative definitions in the Appendix 1 as robustness checks.

2.1.2 Measurement of socio-economic status

We use the highest level of completed education to determine SES. We define a patient to being low-SES if he/she has primary school as the highest level of completed education, which corresponds to 9 years of schooling. To identify physicians' SES, we use their parents' highest level of education. A physician is defined as low-SES if at least one parent has primary school as their highest level of completed education. Parental education is missing for most people born before 1960 in the Danish data (see Appendix Figure A1 Panel D). This means that for most physicians born before 1960, we are unable to identify their SES. They make up 79% of the primary care physicians working in closing clinics and 34% of physicians working in non-closing clinics in our sample. In our main analysis, we assume that physicians for whom we do not observe their SES are high-SES.[8] We discuss how this affects our identification strategy in section 3 and show in Appendix 1 that our results are not sensitive to this assumption.

2.1.3 Measures of health and health behaviors

After defining the population of interest, we construct the relevant outcome variables. Patient mortality is a primary outcome of interest. We identify patient mortality and

[7]Physicians in the clinics are defined as people with a master in Medicine. Some may not have their speciality yet and may work in the clinic as part of their training. Our results are robust to restricting the sample to only physicians with a medical speciality in general practice, although our sample of physicians is reduced the the half and the share of physicians with missing SES increases.

[8]Most physicians born before 1960 attended medical school between 1959 and 1976, when most students in medical schools were from high-SES families (Ministry of Education, 1998).

cause of death using the Cause of Death Registry. We use the Health Insurance Registry to identify the number of visits the patient had at the clinic, the number of services the physician conducts for each patient visit, and the total expenditure the physician is reimbursed for by the region for the services provided to the patient.[9] Number of visits and services provided per visit per year are calculated conditional on having at least one visit that year. We also use the Health Insurance Registry to identify whether the patient receives any specialized care, as well as specialist reimbursement amount.

2.1.4 Measures related to chronic conditions

To explore the underlying causes of the mortality effects, we focus on the four most unequally distributed chronic conditions. They account for the majority of the global and national burden of diseases, are leading causes of deaths, and primary physicians are central to the management of these conditions (The Danish Ministry of Health, 2008, Rothman and Wagner, 2003): cardiovascular conditions (CVC), cancer, diabetes and chronic obstructive pulmonary disease (COPD) (The Danish Health Authority, 2015).[10] Many of the common chronic conditions are under-diagnosed. E.i., Falagas, Vardakas and Vergidis (2007) find that CVC have an under-diagnosis rate of 30-60%, COPD 70-80%, and diabetes 20-50%. Although primary care plays a central role in managing chronic conditions, diagnosis is only recorded in hospital admission data in the Danish data.[11] In the absence of accurate records of diagnosis, we use outcomes related to the different chronic conditions, such as first-line treatments or medical services.[12] Using treatment to infer diagnosis is imperfect. While we are unable to give precise estimates on whether physicians are under-diagnosing or over-treating, improvements in health outcomes after clinic closure suggest under-diagnosis or under-treatment in the pre-period.

The conditions have the following in common: (1) they have a close link with health behaviors such as smoking, lack of exercising, exposure to pollutants, and diet, (2) early

[9]Examples of a service in the Danish data are blood tests, in-person consultation, or phone consultation. Visits can be in-person office visit or phone consultation.

[10]Cause of death is coded according to ICD-10. See Appenix Table A5 for the ICD-10 codes used.

[11]The patients who are diagnosed in hospitals might have been diagnosed in non-hospital settings prior to hospital admissions; they are also at more severe stages of these conditions.

[12]We use Anatomical Therapeutic Chemical (ATC) classifications to code medical treatments; see Appendix Table A5 for an overview of the codes used.

detection leads to better outcomes and higher survival rates, (3) the diagnosis process requires communication between primary care provider and patient, and (4) reducing disease progression in the early stages often does not involve invasive treatments, but lifestyle changes (such as smoking cessation, limiting alcohol intake, balanced diet, and exercise) or medication.

Our data does not capture patients' changes in health behaviors outside of the clinic, such as smoke cessation and changed diet, which are the most common interventions in the early stages of the conditions. Effects from early stage interventions, especially on mortality or hospitalization, may take longer to observe.

Cardiovascular Conditions (CVC) Cardiovascular conditions are the most common causes of death in developed countries (Raghupathi and Raghupathi, 2018). Guidelines for primary care physicians include assessing patients' risk of cardiovascular conditions using multivariate risk prediction algorithms (Danish College of General Practitioners, 2022*a*), putting primary care at the center of identifying high-risk patients and preventing acute hospitalizations arising from CVC. To infer a CVC diagnosis in our data, we use prescriptions for statins and ACE inhibitors. These medications are considered first-line treatments for hyperlipdemia and hypertension (Danish College of General Practitioners, 2022*a*). Statins reduce CVC mortality and major coronary events by 70 percent (Scandinavian Simvastatin Survival Study Group, 1994). Patients should not stop taking statins once they start; adherence is therefore key to survival.

Chronic obstructive pulmonary disease (COPD) COPD is a group of chronic lung conditions that cause obstructed airflow from the lungs commonly caused by long term exposure to irritating particulate matters such as cigarette smoke, dust, or fumes. It is often misdiagnosed in the early stages, and the process of diagnosis involves a conversation between the physician and patient about exposure to irritants, family history, and symptoms (Danish College of General Practitioners, 2022*b*). Although COPD is progressive, it could be well managed through smoking cessation alone in the early stages, and medication when the condition progresses. We infer COPD diagnosis using (1) prescriptions

of common COPD medications[13], and (2) avoidable hospitalizations due to COPD.[14]

Diabetes Around 8% of the Danish adult population has been diagnosed with diabetes. Individuals of low SES are around twice as likely to be diagnosed with diabetes compared to high-SES individuals (The Danish Ministry of Health, 2014). Diabetes is closely associated with lifestyle – a healthy diet and regular exercise can delay or prevent the condition. Guidelines published by the American Diabetes Association refer to a care model with "proactive practice teams and informed activated patient" as the first-line (American Diabetes Association Professional Practice Committee, 2022). The care model involves an annual checkups of diabetes complications. Hence, we look at the following diabetes related treatments (1) annual diabetes checkup with primary care physicians and (2) prescriptions of metformin.[15] Diabetes is a common cause for heart disease and stroke (Danish College of General Practitioners, 2022*c*).

Cancer Cancer is the chronic disease that causes the most deaths in Denmark (Lyngaa et al., 2015). While breast cancer is the most common cancer, lung cancer causes the most deaths (The Danish Health Authority, 2009). Lung cancer is often diagnosed after the disease has spread, as symptoms do not appear at early stages; The 1-year survival rate was 33-38 percent in the period from 2000-2009. Therefore, early detection of lung cancer is key in increasing the likelihood of survival. This is in contrast to breast cancer, which had an 84 percent one-year survival rate among Danish women in the same period (NORDCAN, 2022*a*, 2022*b*). Unlike the three diseases described above, the diagnosis and treatment primarily take place in specialists' offices or in hospital settings. A primary physician's role is at the initial stages by making referrals to specialists. To study physicians' behavior in relation to cancer, we look at patients' first-time use of services related to detection of lung and breast cancer: (1) thorax scans (x-rays and CT-scans) to detect

[13]Long-acting muscarinic antagonists (LAMA) and Long-acting β2-agonists (LABA). See Appendix Table A5 for the ATC codes used.

[14]Avoidable hospitalizations can be prevented with appropriate care in the primary care sector. Avoidable hospitalizations are commonly used to assess physician performance and physician-patient relationships, see, e.g., Oster and Bindman (2003).

[15]Metformin has been the first-line pharmacotherapy for treating people with type 2 diabetes since the 1950s. Annual diabetes checkups are only recorded in the years 2006-2014 and regressions using this outcome therefore contains fewer observations than the other outcomes.

lung-cancer and (2) radiology for breast cancer.[16]

2.2 Descriptive Statistics

Table 1 shows summary statistics on the patient, physician, and clinic levels for the full Danish population between ages 30-70, our analysis sample, and our analysis sample by patient SES. Patients who experience a clinic closure in the period of interest are older and more likely to be ethnic Danes.[17] Low-SES patients are older, more likely to be female, of Danish ethnicity and less likely to be married.[18] High- and low-SES patients are equally likely to have a low-SES physician.

We have a total of 3,137 clinics and 9,096 physicians in our sample. Compared to the total population, physicians are are less likely to come from a low-SES household, as shown in Appendix Figure A1 Panel A. Closing and non-closing clinics are different: closing clinics are older and more likely to be solo clinics. Around 25% of physicians and 28% of clinics are defined as low-SES in our sample. As shown in columns 4 and 5 of Table 1, low-SES physicians are more likely to be female, they are slightly older, and less likely to have a degree from the University of Copenhagen.[19]

2.2.1 Socio-economic inequality in health

While Denmark has equal access to healthcare and education, we still observe a large inequality in health. Figure 1 shows one-year mortality rates by patient education and physician SES in the full population adjusted for age, gender, and year fixed effects. The figure shows that patients with primary school as their highest level of education have the highest probability of dying, and mortality decreases in a nonlinear fashion in

[16] A national screening program was rolled out in 2007-2008. We do not take account of this in our analysis. In our analysis, we use any contact with a radiologist as a proxy for a mammography

[17] This is most like because clinic closures are more concentrated in rural areas where there are fewer immigrants and the population is older.

[18] Immigrants' levels of education are coded differently from non-immigrants, resulting in some missing values. We show in Appendix 1 that our results are robust to excluding non-ethnic Danish patients from our analysis sample.

[19] Low-SES physicians are likely older because average levels of education have increased over the past decades. In Appendix Figure A1, we see a clear decline in the proportion that have a parent with primary school education for both the overall population and physicians. As a robustness check, we use physicians parents' educational rank in the whole adult population to measure their SES. Figure A1 shows that physicians' parents' educational rank is fairly stable across the period.

Table 1: Summary Statistics - Patients, Physicians (PCP), and Clinics

	(1) All	(2) Non-closing clinics	(3) Closing clinics	(4) High-SES	(5) Low-SES
Panel A: Patients					
Male	0.504		0.510	0.532	0.454
Year of birth	1959.4		1957.4	1958.3	1954.9
Danish ethnicity	0.877		0.908	0.883	0.971
Low-SES	0.288		0.285	0.000	1.000
Married	0.593		0.609	0.637	0.539
PCP low SES	0.324		0.182	0.182	0.183
Panel B: Physicians					
Male	0.531	0.495	0.681	0.370	0.325
Year of birth	1963.5	1966.3	1951.9	1975.9	1972.9
Danish ethnicity	0.897	0.887	0.940	0.982	0.987
Low-SES	0.246	0.237	0.328	0.000	1.000
Non-missing SES	0.566	0.632	0.288	1.000	1.000
University of Copenhagen	0.523	0.505	0.599	0.527	0.424
University of Southern Denmark	0.162	0.181	0.085	0.219	0.280
Aarhus University	0.280	0.279	0.283	0.251	0.287
Other University	0.035	0.035	0.034	0.003	0.009
Panel C: Clinics					
Solo	0.611	0.501	0.948	0.487	0.419
Number of doctors in clinic	1.828	2.083	1.053	2.005	2.475
Low-SES	0.220	0.278	0.041	0.000	1.000
Non-missing SES	0.501	0.637	0.085	1.000	1.000
Number of patients	4,651,432		488,505	349,380	139,125
Number of physicians	9,096	7,352	1,744	3,212	794
Number of clinics	3,137	2,361	776	682	518

Notes: The table presents patient, physician, and clinic characteristics. PCP stands for physicians and include all people with a master in medcine working in a primary care clinic. Physicians are low-SES if one of their parents has primary school as his/her highest level of education. Clinics are low-SES if at least one physician in the clinic is defined as low-SES. Patients are Low-SES if they have primary school as the highest level of completed education. The patient characteristics in column 3 are for the analysis sample. The characteristics of clinics in columns 4 and 5 are for the non-closing clinics. Appendix Table A6 reports more summary statistics on the patient level.

education. On average, 0.75% of patients with primary school education only die in a given year, while the same is true for 0.51%, 0.39% and 0.33% of those with a high school degree, undergraduate, or a postgraduate degree (which together averages 0.48%). In sum, patients with primary school as their highest level of completed education are (0.75-0.48/0.48*100=) 56% more likely to die in a given year after adjusting for age, gender, and year fixed effects, than all those with higher levels of education. The figure also shows that low-SES patients with low-SES physicians have lower mortality rates compared to low-

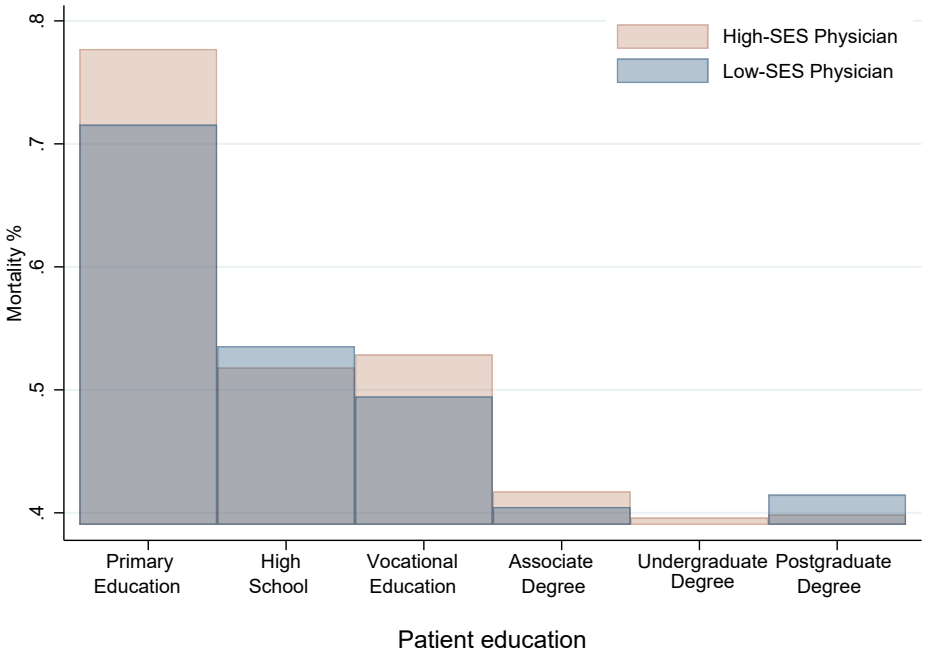


Figure 1: One-Year Mortality by Patient Education and Physician SES

Note: The figure plots one-year mortality rates by patient education and physician SES in the full Danish adult population between ages 30-70, adjusted for age, gender, and year fixed effects.

SES patients with high-SES physicians. The mortality gap between high- and low-SES patients is reduced 12% when low-SES patients are matched with a low-SES physician in the total population.

Figure 2 summarizes the health-SES gradients across outcomes in the full population, after adjusting for age, gender and year fixed effects.[20] A positive value means that low-SES patients (those with primary education as their highest level of completed education) have higher utilization or experience the condition at a higher rate. The figure shows that low-SES patients are less healthy and have higher healthcare utilization at baseline. Low-SES patients are more likely to die from the causes considered, e.g. they are 150% more likely to die from COPD, and 57% more likely to die from CVC compared to high-SES patients. We also see positive gradients in most of the outcomes related to health behaviors: low-SES patients are more likely to visit their physician in a given year and to have more visits per year and more services per visit. This difference may reflect that

[20]The outcomes in the analysis sample, unadjusted for age, gender, and year fixed effects, can be found in Table A6.

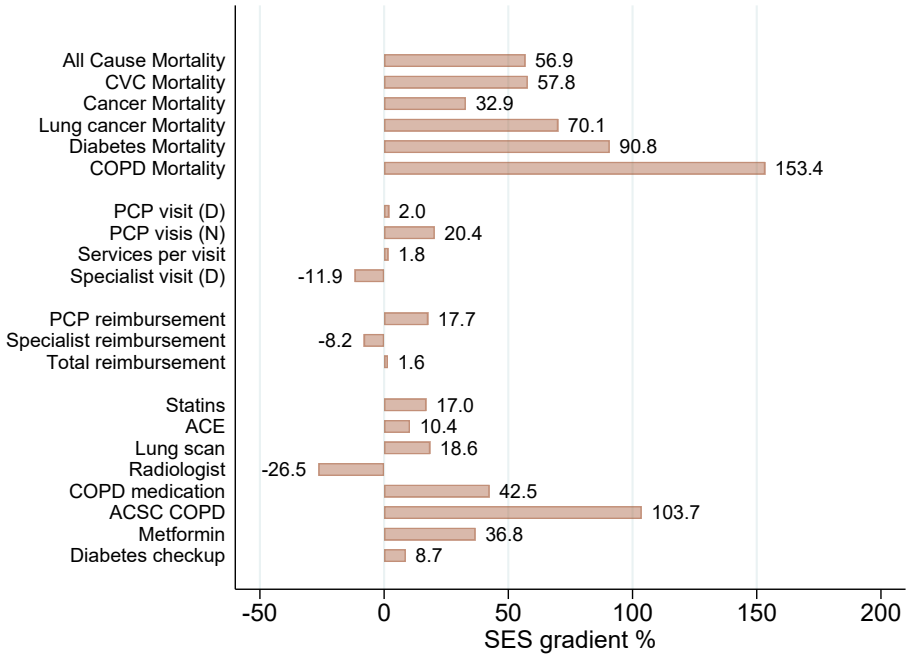


Figure 2: Health-SES Gradient by Outcomes of Interest

Note: The figure presents the SES gradient by outcomes of interest in the full Danish adult population adjusted for age, gender, and year fixed effects. See Section 2.1 for definitions of variables. The gradient is defined as the "excess" part of an outcome for low-SES patients relative to high-SES patients, weighted by the high-SES outcome. For example, the SES gradient in mortality is calculated as (low SES mortality − high SES mortality)/(high SES mortality) × 100. PCP stands for primary care physician, D stands for dummy, N stands for counts, ACSC stands for ambulatory care sensitive condition (hospitalization).

low-SES individuals are more likely to have chronic conditions and co-morbidities and thereby need consultations with their primary care physician more often. Despite worse health, low-SES patients are less likely to be in contact with a medical specialist. Low-SES patients are also more likely to be treated for chronic conditions and to be tested for lung cancer, but less likely to be tested for breast cancer. They are 17% more likely to be treated with statins, 37% more likely to be treated with metformin, and 9% more likely to have a yearly diabetes checkup visit.

3. Identification Strategy

An ideal experiment to study our research question would be to separate a representative group of patients from their existing physicians and randomly assign them to physicians with a different SES. To mimic such an experiment, we use clinic closures,

as they are plausibly exogenous to patients' health trajectories and exploit the variation from the re-assignment of patients to physicians after these closures.

We employ two empirical strategies. First, we estimate two dynamic difference-in-difference event studies for high- and low-SES patients separately. We use this strategy to evaluate if there is evidence of pre-trends, and to look at the evolution of the effect across time. Second, to quantify the effect of concordance on the SES *gradient* in health, we employ a triple differences specification. The triple differences strategy allows for several ways to address concerns related to non-random assignment of physician-patient pairs and physician characteristics. The first difference compares outcomes of interest for low-SES patients before and after they join a low-SES clinic. Since this difference includes a discontinuity-of-care effect from the separation of patients from their initial physicians, we use low-SES patients who join high-SES clinics in the post period as a control group; this creates our second difference. Since there are potential systematic differences between high- and low-SES physicians, we introduce a second control group consisting of high-SES patients who either are matched with a high- or low-SES physician post clinic closure. This gives us the third difference.

We highlight that our design mimics a randomized experiment as closely as possible. First, because we are interested in the adult population, an ideal experiment would need to separate patients from their existing physician, creating a similar discontinuity of care. Second, due to

Although the separation from the old clinics is plausibly exogenous, there remains concern that selection exists in the formation of new physician-patient pairs. Godager (2012) finds that patients choose physicians who resemble themselves on observable characteristics. In line with this, we find that patients and physicians of the same gender, ethnicity, and approximately of the same age are more likely to be matched. In contrast, we do not find any evidence that low-SES patients are more likely to choose a low-SES physician, as shown in Table 2. The reason could be that physicians' SES is not observed by the patients, therefore, the patient is unable to select a new physician based on this characteristic.[21]

[21]We do not find that patient gender, age, ethnicity, or whether they have been treated for a chronic

Table 2: Test for Selection in Patient-Physician Reassignment After Clinic Closure

	(1)	(2)	(3)	(4)
Physician characteristics	Low-SES	Male	Non-Danish ethnicity	Age> 60
Patient characteristics				
Low SES	0.00468			
	(0.00585)			
Male		0.03484***		
		(0.00585)		
Non-Danish ethnicity			0.03049***	
			(0.01079)	
Age > 60				0.00251*
				(0.00151)
Observations	474,614	474,614	474614	474,614
Patient characteristics	Y	Y	Y	Y
New physician characteristics	Y	Y	Y	Y
Old physician fixed effects	Y	Y	Y	Y

Notes: The table tests for selection in patients' re-assignment to new physicians post clinic closures. The table shows coefficients from regressing indicator functions of physician characteristics on patients having the same characteristics one year after clinic closure. The coefficients are the likelihood of physicians sharing the same characteristics with the patient. The regressions include both new physician controls (on the clinic level) and patient controls, except for the focal characteristic. New physician controls include average age, share of male physicians, share of ethnic Danish physicians, dummy for being a solo clinic, number of physicians in the clinic, graduating institutions, and SES. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, low-SES dummy, and educational level fixed effects for levels higher than primary school. Standard errors are clustered at the old-physician level. *** p <0.01, ** p <0.05, * p <0.1.

We further address the concern of endogenous selection by employing a trajectory fixed effect in our triple difference identification strategy. Trajectory fixed effects refer to taking fixed effects on the pre-post closure physician interaction. The triple interaction coefficient therefore compares high- and low-SES patients who had the same pre-closure physician and post-closure physician. This strategy not only accounts for the fact that there might be selection of the post-closure physician, but also that low-SES physicians may be different from high-SES physicians on several dimensions, as seen in Table 1.[22]

condition before clinic closure explain the SES of their new physician, see Appendix Table A7. In addition, we see no sign of either the treatment or control groups selecting into physicians that graduated from a particular institution, potentially because this information is not readily available upon choosing a physician. Ideally, we would also investigate the gender, age, and ethnicity concordance effects. However, selection along these dimensions makes a causal analysis infeasible using our design.

[22]A concern regarding the internal validity is the non-random assignment of physician SES to other physician characteristics. This is a concern if a particular group of patients benefit more from a certain physician characteristic. Trajectory fixed effects does not take account of this. We test for this in

Under the assumption of random selection of the post-closure physician, conditioning on pre-closure physician, the trajectory fixed-effects should not affect the estimation. And we do not find that adding these fixed effects affect our estimation results, which suggest that the non-random selection of the post-closure physician is not an issue for our strategy.

3.1 Estimation Equations

We present graphical evidence to test for parallel pre-trends. We examine how outcomes of interest change in years around clinic closures by employing a dynamic double differences strategy for high- and low-SES patients separately. The estimating equation is

$$y_{ijt} = \sum_{r\neq -1}^{r=5} \theta \times I_r + \sum_{r\neq -1}^{r=5} \theta \times I_r \times SES_j^p + x_{it}^p\beta + x_{jt}^d\phi + \kappa(GP_i^{-1}) + \epsilon_{ijt}, \tag{1}$$

where y_{ijt} is a measure of health or health behavior for patient i, who gets physician j at time t. SES_j^p takes the values one if the patient's new physician after a clinic closure is from a low-SES family and zero otherwise. We hold SES_j^p constant even if the patient changes physician in the post period. x_{it}^p includes patient-specific characteristics, such as age, gender, and ethnicity. where I_r is an indicator that takes the values 1 in period r. GP^{-1} is previous physician fixed effects, and x^d is the new physician controls measured at the clinic level, including age, gender, ethnicity, and graduating institution.[23]

To quantify the effect of concordance on the SES *gradient* in health, we estimate the following triple-differences equation:

$$\begin{aligned} y_{ijt} = \tau \times post_{it} \times SES_j^p \times SES_i + \alpha \times post_{it} \times SES_j^p + \rho \times post_{it} \times SES_i \\ + \delta \times SES_j^p \times SES_i + \iota SES_i + \sigma \times Post_{it} + \gamma(PCP_i) + x_{it}^p\beta + \epsilon_{ijt}, \end{aligned} \tag{2}$$

Section 4.4 and do not find that observable physician characteristics affect patient mortality or health behaviors.

[23] In this equation, we are not able to account for trajectory fixed effects as the equation is estimated separately for high- and low-SES patients. Trajectory fixed effects would remove all relevant variation.

SES_i is an indicator that takes the value one if the patient is defined as low SES. The variable $Post_{it}$ takes the value one in post-closure years and zero in the years before the clinic closure. PCP_i is the primary care physician trajectory fixed effects, taking fixed effect on the pre-post physician level. We include four years prior to and three years after the clinic closure.[24] Most of our outcome variables are indicators. In these cases, we use a linear probability model to estimate the parameters. We cluster standard errors by patient ID.

The triple interaction term, $post_{it} \times SES_j^p \times SES_i$, gives us the difference in health or health behavior between high- and low-SES patients who get a physician from a low-SES family following a clinic closure, compared to the same difference for patients who get a physician from a high-SES family. τ is the estimate we use to calculate the gradient. When estimating the effect on mortality outcomes, our triple-differences strategy is reduced to a difference-in-difference strategy, as there is no variation in the pre-period, we only uses the post period for estimating the effect. The coefficient of interest is thereby $SES_j^p \times SES_i$.

Our identification strategy only uses variation in post-closure physician SES and we assume no spillover effects from the pre-closure physician. The key identifying assumption in our empirical design is the parallel trend assumption. The design requires that patients' underlying trends in health and health behavior do not systematically differ by the SES of the physician they get after clinic closures.

4. Effects of physician-patient SES concordance

This section presents two sets of main results on how physician-patient SES concordance affects patient health and health behaviors. First, we look at how SES concordance affects all-cause mortality. To investigate the origin of the concordance effect, we break down mortality by causes, focusing on deaths related to chronic conditions. Second, we study potential pathways that physician-patient interaction could affect mortality by looking at patient health behaviors and behaviors specific to chronic conditions. Lastly, we present suggestive evidence on potential mechanisms, study threats to internal validity

[24] We use three years after clinic closures, as our event study design (explained below) shows that the effect fades out in later periods.

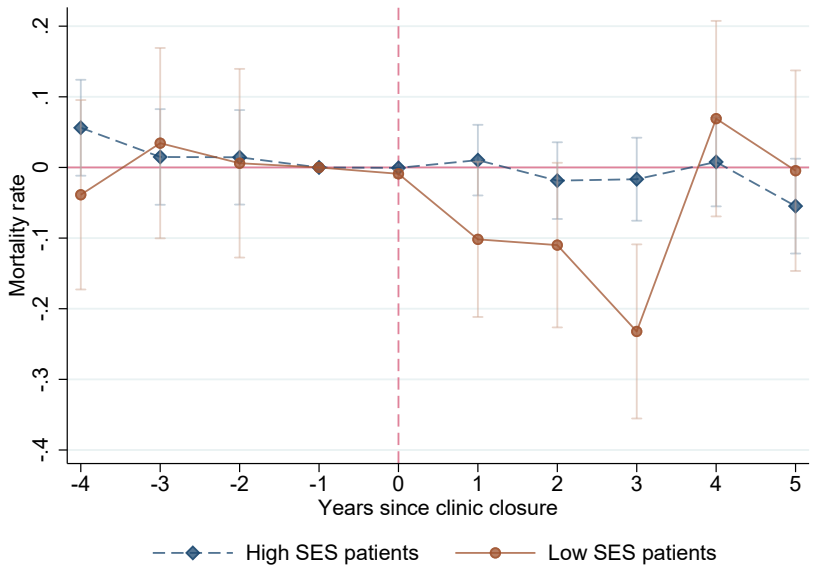


Figure 3: The Effect of Physician-patient SES Concordance on Mortality

Note: The figure presents the effect of physician-patient SES concordance on mortality. The solid (dashed) line plots the estimates and 95 percent confidence intervals of the event dummies in equation 1 using mortality as outcome for low-SES (high-SES) patients. Treatment is defined as the patient being matched with a low-SES physician. For years prior to clinic closures, the solid (dashed) line plots the difference in the likelihood of dying for patients in clinics that close at time 0. For patients that died in the pre-period, treatment is defined as 50% of patients in the same clinic being matched with a low-SES physician in the post period. Both regressions control for old physician fixed effects, year fixed effects, new physician characteristics (mean age, share of male physicians, share of ethnic danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution), and patient characteristics. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. The estimation results can be found in Appendix Tables A8 and A9. Standard errors are clustered by patient ID.

and explore the external validity of our results.

4.1 SES Concordance Effects on Mortality

We begin by presenting the results for all-cause mortality in an event study design following equation 1. Figure 3 shows coefficients from two separate dynamic difference-in-differences regressions. The x-axis denotes years since clinic closure and the y-axis shows the effect of getting a low-SES physician after clinic closure on one-year mortality. The solid line shows the treatment effect of low-SES patients who have a low-SES physician after experiencing clinic closures, relative to low-SES patients who have high-SES physicians after closures. The dashed line shows the same effect for high-SES patients.

Since patients need to be alive at the time of clinic closures for us to identify their new physician's SES, mortality estimates in the pre-periods would be zero by design. In order to test for the parallel trends assumption in mortality, we use deaths that take place between years -4 and 0 in the closing clinics. We define treatment and control for deceased patients at the clinic level using the physician re-assignment of their *peer* patients who are alive when clinic closures take place. We assume that the patients who passed away before clinic closures would have been matched with a low-SES physician if more than 50% of the patients in the same clinic who are alive at the time of the clinic closures, are matched with a low-SES physician. Figure 3 shows that treatment and control groups are on the same mortality trajectory prior to clinic closure.[25]

We see that mortality immediately decreases by 0.1 percentage points for low-SES patients in the first year they are matched with a low-SES primary care physician, relative to low-SES patients that get a high-SES physician. Meanwhile, mortality rates for high-SES patients do not depend on their new physician's SES. This shows that low-SES patients' health is sensitive to the type of physician they have. In the triple-differences design, we estimate the *relative* change in mortality measured by the difference between the solid and dashed lines.

Figure 3 shows that the effect fades in during the first three years after clinic closures and fades out afterwards. We investigate this dynamic by looking at the mortality *levels* for each patient group, and find that the fade-in comes from low-SES patients with low-SES physicians (the treatment group) experiencing lower mortality in the initial years, and the fade-out comes from these patients returning to the mortality levels of their counterparts who are with high-SES physicians, see Figure A2. This suggests that SES concordance delays death and extends the life of low-SES patients.

Table 3 shows the estimation results using mortality as the outcome with varying controls and fixed effects. Our estimate of interest, the coefficient for the interaction term, is robust to controlling for patients' characteristics, old physician fixed effects, and trajectory fixed effects. Our preferred specification is shown in column 4 and uses the triple

[25]Tests for the parallel trend assumption on non-mortality outcomes are done using pre-trends in the standard fashion.

Table 3: The Effect of Physician (PCP)-patient SES Concordance on Mortality

	(1) Death	(2) Death	(3) Death	(4) Death
PCP low SES	-0.00008	-0.00007	-0.00020	
	(0.00016)	(0.00016)	(0.00023)	
Patient low SES	0.00534***	0.00602***	0.00587***	0.00509**
	(0.00022)	(0.00076)	(0.00100)	(0.00208)
PCP low SES x Patient low SES	-0.00129***	-0.00125***	-0.00129***	-0.00099**
	(0.00038)	(0.00038)	(0.00038)	(0.00041)
Outcome mean	.00234	.00234	.00234	.00234
Gradient for high SES physicians	.00541	.00541	.00541	.00541
Effect %	-23.8	-23.1	-23.8	-18.3
Observations	3,749,654	3,749,654	3,749,654	3,749,654
Patient Characteristics	N	Y	Y	Y
Old PCP FE	N	N	Y	N
Patient ID FE	N	N	N	N
Old x new PCP FE	N	N	N	Y

Notes: The table presents the effect of physician-patient SES concordance on mortality. All columns report the estimates from the triple differences equation 2 with different controls. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. Gradient for high-SES physician is the difference in the outcome variable between high and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Column 5 is our preferred specification. Standard errors are clustered by patient ID. *** p <0.01, ** p <0.05, * p <0.1.

differences design described in equation 2 but conditioning on the post period, as there is no variation in the pre-period. The triple-differences estimate indicates that the treatment group (low-SES patients matched with low-SES physicians in the post period) experience a 0.09 percentage point decrease in the probability of dying, relative to comparison groups after clinic closure. For ease of interpretation, we translate the effect into changes in the SES gradient. We compare the triple differences estimate to the difference in mortality between high- and low-SES patients who have a high-SES physician after clinic closure. Table 3 column 4 shows that the SES gradient of high-SES physicians is 0.54 percentage points. This indicates that, in the post-period, the SES gradient in mortality for patients of low-SES physicians decreases by 18.3% in our preferred specification.[26]

[26]This is calculated as (0.099/0.541)*100.

We examine the effect of SES concordance on mortality by sub-populations to study which groups are the most susceptible to the SES concordance effect. As shown in Appendix Table A10, the observed effect on mortality is most pronounced for men. The first two columns show that the SES-mortality gradient drops by 28.7% for men while the effect is 16.8% for women. The effect size is similar for the older and younger birth cohorts, while the effect is entirely driven by the ethnic Danish sample.

4.1.1 The role of chronic conditions

What drives the significant decline in mortality when low-SES patients are matched with low-SES physicians? We breakdown mortality by cause and focus on deaths caused by the four most common and unequally distributed chronic conditions: cardiovascular conditions (CVC), cancer, diabetes, and chronic obstructive pulmonary disease (COPD).

Table 4 column 1 shows that, in the 3 years following clinic closure, the treatment group experiences a lower probability of dying from CVC by 0.043 percentage points compared to comparison groups. Comparing the triple difference result to the baseline gradient, we find that SES concordance lowers this SES gradient in CVC mortality by 42.6%. This effect is almost twice the size of the point estimate for all cause mortality, suggesting that the reduction in deaths due to CVC account for a substantial part of the reduction in all cause mortality. Given the acute nature of CVC deaths, the results align with the fact that we observe mortality to drop immediately after clinic closures. From column 2, we also see a decline in cancer mortality in the first three years following clinic closure, which reduces the SES-gradient by 24%. Columns 3 and 4 show that we find no significant effect of SES concordance on mortality related to diabetes and COPD.

Table A14 reports the triple-differences estimates on the effect on different causes of death by gender and birth cohorts. The effect on CVC and cancer mortality is mainly driven by the older sample.[27] We also see that the SES gradient in CVC mortality is the largest for men, reducing the SES gradient on overall CVC mortality for men by 51.5%, while we do not find a significant effect on CVC mortality for women. However, SES

[27]We do find an overall mortality effect for the younger patient sample, but small effects on cause-specific mortality, which could suggest that the effect is going through another channel for the youngest group of patients.

Table 4: The Effect of Physician (PCP)-patient SES Concordance on Mortality Caused by Chronic Conditions

Cause of death	(1) CVC	(2) Cancer	(3) Diabetes	(4) COPD
PCP low SES × Patient low SES × Post	-0.00043***	-0.00044*	0.00006	-0.00004
	(0.00016)	(0.00025)	(0.00007)	(0.00009)
Outcome mean	.00042	.00098	.00007	.00011
Gradient for high-SES physicians	.00101	.00182	.00017	.00048
Effect %	-42,6	-24.2	35.3	-8.4
Observations	3,749,654	3,749,654	3,749,654	3,749,654
Patient Characteristics	Y	Y	Y	Y
Old x new PCP FE	Y	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance on mortality caused by chronic conditions. All columns report the estimates from the triple differences equation 2. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. Gradient for high-SES physician is the difference in the outcome variable between high and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered by patient ID. *** p <0.01, ** p <0.05, * p <0.1.

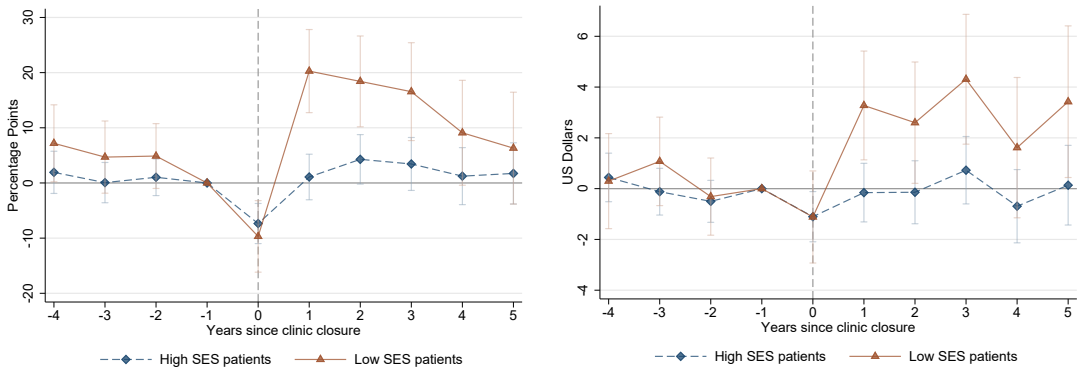
concordance reduces the SES gradient in cancer mortality by 28.6% for women.[28]

4.2 SES Concordance Effects on Health behaviors

To explore how SES concordance affects patient health, we look at patient health behaviors. We first present results on healthcare utilization on the extensive and intensive margins. On the extensive margin, we study whether the patient makes *any* visits to their primary care physician. Table 5 column 1 shows that patients in the treatment and control groups are equally likely to make at least one visit each year in the first three years of clinic closure.

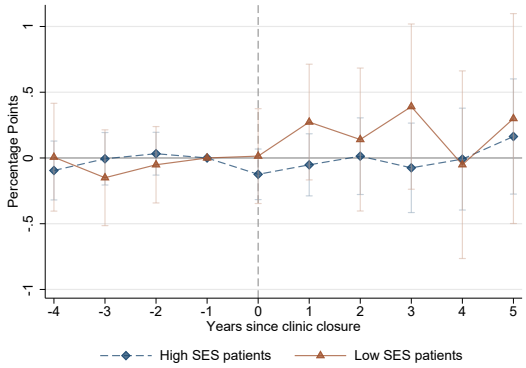
On the intensive margin, we study the number of visits per year, number of services per visit, and the corresponding fee-for-service reimbursements to physicians. Figure 4 Panels A and B show the event study graphs for number of visits and total primary care

[28]Deaths by cancer types are infrequent in the data and do not show significant effects; the largest point estimates are for lung cancer, see Appendix Table A13.

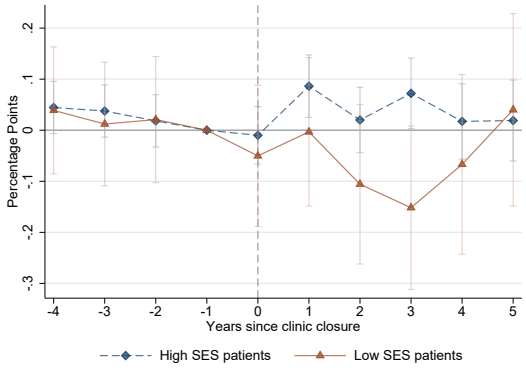


A: Number of office visits

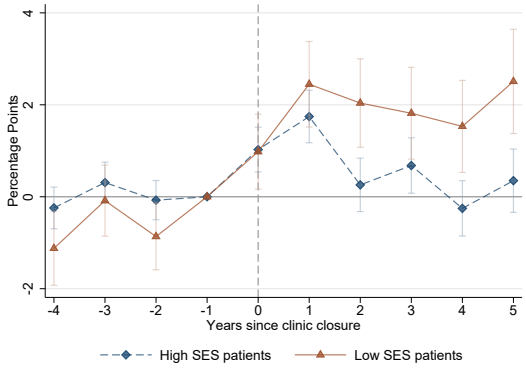
B: Physician services reimbursement



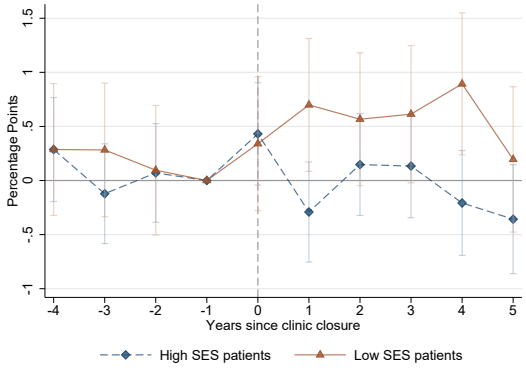
C: Statin prescriptions for men



D: COPD avoidable hospitalization



E: Diabetes checkup



F: Lung scan for older women

Figure 4: The Effect of Physician-patient SES Concordance on Health Behaviors

Notes: The figure presents the effect of physician-patient SES concordance on patient health behaviors. See section 2.1 for the definitions of these outcomes. The solid (dashed) line plots the estimates and 95 percent confidence intervals of the coefficients on the event dummies in equation 1 for low-SES (high-SES) patients. Treatment is defined as the patient being matched with a low-SES physician. Both regressions control for old physician fixed effects, year fixed effects, new physician characteristics (mean age, share of male physicians, share of ethnic danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution), and patient characteristics. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. Older females are born before 1958. The estimation results can be found in Appendix Tables A8 and A9. Standard errors are clustered by patient ID.

Table 5: The Effect of Physician (PCP)-patient SES Concordance on Healthcare Utilization

VARIABLES	(1) PCP visit (Dummy)	(2) PCP visit (N)	(3) Services per visit (N)	(4) Specialist visit (Dummy)
PCP low SES x Patient low SES x Post	-0.00127	0.12377***	0.01343**	0.00337
	(0.00174)	(0.03298)	(0.00557)	(0.00233)
Outcome mean	.83866	6.24079	1.44509	.33085
Gradient for high-SES physicians	.02435	1.4598	.05943	-.01524
Effect %	-5.2	8.5	22.6	-22.1
Observations	3,749,654	3,140,867	3,749,654	3,749,654
Patient Characteristics	Y	Y	Y	Y
Old x new PCP FE	Y	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance on healthcare utilization. All columns report the estimates from the triple differences equation 2. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. Gradient for high-SES physician is the difference in the outcome variable between high- and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered by patient ID. *** p <0.01, ** p <0.05, * p <0.1.

physician fee-for-service reimbursements. We see an increase in the number of visits, and total reimbursements for low-SES patients when there is SES concordance, while we see little to no effect among high-SES patients. Importantly, the estimates in the four years prior to closure suggest that patients in treatment and control groups are on similar health trajectories.

The triple differences results are shown in Table 5 columns 2-3. SES concordance increases the SES gradient in number of visits and mean services per visit by 8.5% and 22.6%, respectively. The increase in number of visits per year and number of services per visit translate to increased fee-for-service reimbursements to the physicians by a total of USD 2.7 per year, as shown in Appendix Table A11. In addition, we also find an increase in spending on medical specialists, and an increase in referrals to specialized care for men, which reduces the SES gradient in medical specialist visits by 34.3%, see Panel B of Appendix Table A12 column 3 and Table A15 column 4.

Increased contact with the physician may originate from the need for more care due to increased detection of conditions or better adherence of treatment guidelines (see sec-

tion 4.2.1); it may also be the contributing factor to the increased detection of conditions. Patients may also improve their health literacy or feel more comfortable with the physician and schedule more visits given the same health condition.[29]

4.2.1 Health behaviors related to chronic conditions

We next consider health behaviors related to chronic conditions.

Cardiovascular Conditions (CVC) First, we consider health behaviors related to cardiovascular conditions to see why CVC mortality declined in response to SES concordance. In Figure 4 Panel B, we see that low-SES men's statin use increases immediately after being matched with low-SES physicians post clinic closure, while no such effect is present for high-SES men. Pre-closure estimates display parallel trends. Triple differences results in Table 6 Panel A and Appendix Table A14 column 1 show that SES concordance increases statin use by 0.286 percentage points in the overall population, and by 0.362 for men. We do not find any effect on ACE use. Combined with the decrease in CVC mortality, the results suggest that low-SES patients are under-diagnosed or under-treated for CVC at baseline and that the higher use of statins prevents or delays deaths in the years after clinic closure. In line with the effect on CVC morality, we see in Figure 4 that men's use of statins also fades out in year 4.

Chronic obstructive pulmonary disease (COPD) The variables of interest related to COPD include both medication and avoidable hospitalization due to COPD. We do not find that COPD medication use responds to SES concordance. However, we observe a stark reduction in avoidable COPD hospitalizations, as shown in Figure 4 Panel D. Our preferred triple differences estimate in Table 6 Panel A column 3 shows that SES concordance reduces the SES-gradient in COPD avoidable hospitalizations by 14.2% relative to the baseline gradient of 3.3 percentage points. The reduction in hospitalizations related to COPD is driven by men and the older cohorts, with a 25.3 and 18.9% reduction in the SES gradient (see Table A17 column 8)

[29] An alternative explanation is that the quality of each visit is lower, leading to more visits. However, considering the decline in mortality and number of services per visit, this seems unlikely.

Table 6: The Effect of Physician (PCP)-patient SES Concordance on Health Behaviors, Treatment Adherence, and Disease Detection

	Statins (1)	Diabetes Checkup (2)	COPD Hospitalization (3)	Lung scans (4)	All cause mortality (5)	CVC mortality (6)
Panel A: Health Behavior						
PCP low SES × Patient low SES × Post	0.00286*	0.01126***	-0.00123**	-0.00156		
	(0.00169)	(0.00251)	(0.00049)	(0.00158)		
Gradient for high-SES physicians	.04643	.0243	0.03277	0.0344		
Effect %	6.2	46.3	-14.2	-4.5		
Panel B: Detection Effect						
PCP low SES × Patient low SES × Post	0.00018	0.00761***	-0.00088***	0.00096	-0.00081**	-0.00038**
	(0.00149)	(0.00235)	(0.00030)	(0.00108)	(0.00041)	(0.00015)
Effect %	1.0	39.3	-36.8	4.5	-20.8	-45.2
Observations	3,275,840	1,616,996	3,308,570	3,749,654	2,559,716	3,275,840
Panel C: Adherence Effect						
PCP low SES × Patient low SES × Post	0.01357*	0.02266***	-0.00396		-0.00218***	-0.00071
	(0.00713)	(0.00713)	(0.00307)		(0.00083)	(0.00071)
Effect %	80.7	75.7	-10.9		-29.9	-51.4
Observations	473,814	506,860	441,084		1,189,938	473,814
Patient Characteristics	Y	Y	Y	Y	Y	Y
Old x new PCP FE	Y	Y	Y	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance on health behaviors. All columns report estimates from the triple differences equation 2. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. Panel B includes patients who are newly diagnosed, as defined by never having received the corresponding treatment in the pre-period. Panel C includes patients who are previously diagnosed, as defined by having received the corresponding treatment in the pre-period. Previously diagnosed and newly diagnosed in Panels B and C are defined the following way: Columns 1 and 6 split on whether the patient had used statins before clinic closures. Column 2 is split on whether the patient had a diabetes checkup or used metformin before clinic closures. Column 3 is split on whether the patient had been treated for COPD before clinic closures. Column 4 uses first time use of lung scans as the outcome. Column 5 splits the mortality effect on whether the patients had been treated with statins, ACE, metformin, had a diabetes checkup, COPD medication, or had a COPD hospitalization before clinic closures. Gradient for high-SES physician is the difference in the outcome variable between high- and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered by patient ID. *** p <0.01, ** p <0.05, * p <0.1.

Diabetes Following treatment guidelines for diabetes, we study how metformin prescriptions and annual diabetes checkups respond to SES concordance. Figure 4 Panel E shows that the both high- and low-SES patients with low-SES physicians experience an increase in diabetes checkup visits after clinic closure. While the effect for low-SES patients is large and persistent, the effect for high-SES patients fades out over time. Triple differencs results in Table 6 column 2 show that SES concordance *increases* the SES gradient by 46.3% relative to the baseline gradient of 2.4 percentage points. Since diabetes is

a cause for CVC, better management of this condition could explain some of the reduction in CVC mortality. While we see both genders increase the number of diabetes checkup visits, the older sample sees a greater increase compared to the younger one.

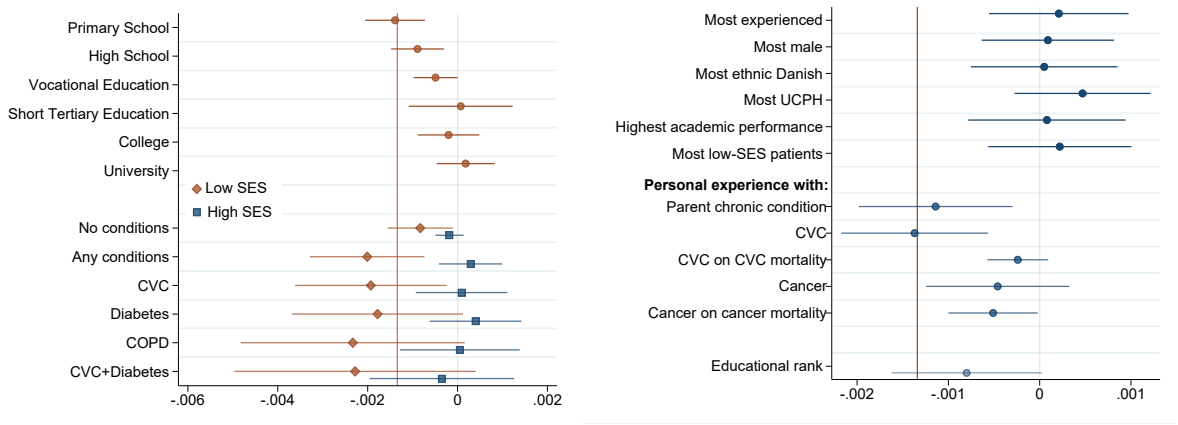
Consistent with dynamic effects on mortality, we see that most effects on health behavior also fade out afterwards over time. This pattern persists in a balanced sample and in a sample in which patients stay with the initial physician five years after the reassignment, see Appendix Table A4. Our results are robust to alternative aggregations of physician SES, excluding patients of non-Danish ethnicity, excluding physicians with missing SES, and using the primary care shortage to address selection concerns, see Appendix 1. Since treatment of cancer takes place in non-primary-care settings, we discuss the behavior related to cancer in Section 4.3.

4.3 Mechanisms

We have shown that SES concordance decreases the SES gradient in mortality and changes patient health behaviors. While many mechanisms may be at play, we test for the five following potential mechanisms of SES concordance: (1) increased adherence to medical guidelines, (2) increased detection of chronic conditions, (3) physicians' personal experience with chronic conditions, (4) degree of social identity similarity between patients and physicians, and (5) decreasing returns to baseline health.

Adherence and detection effects The medical literature uses adherence rates and avoidable hospitalizations to proxy for patient-physician communication quality (see, e.g., Ha and Longnecker 2010, Zolnierek and DiMatteo 2009, or Oster and Bindman 2003).[30] Adherence effects therefore speak to whether SES concordance improves communication between physicians and patients; thus allowing physicians to make relevant information more salient and increasing health literacy. To study the adherence and detection effects, we group patients by whether they received treatment before experiencing a clinic closure

[30]Examples of bad communication practices include physicians not disclosing relevant information, avoiding discussion of patient lifestyle constraints, and discouraging patients from voicing concerns regarding a treatment.



A: Patient characteristics

B: Physician characteristics

Figure 5: Effect of Patient and Physician Characteristic on The SES-Mortality Gradient

Note: The first six rows of Panel A show the effect of being matched with a low-SES physician for patients from each education level, estimated using a triple-differences estimation equivalent to equation 2 and replacing SES_i with indicators of the corresponding levels of education. The bottom six rows in Panel A show the effect of having a low-SES physician for patients with respective baseline conditions in the pre-period. The red diamonds (blue squares) are estimated using a difference-in-difference regression equivalent to equation 1 separately for patients with the corresponding baseline condition and separately for patients with high and low SES. Regression results can be found in Appendix tables A18 and A20. The first six rows of Panel B show the effect of having a physician with the corresponding characteristics on the SES mortality gradient, estimated using equation 1, replacing SES_j^p with an indicator function of the respective physician characteristic. UCPH is the University of Copenhagen. The bottom six rows of Panel B show the effect of having a physician whose parent has the indicated chronic condition on patient overall mortality and mortality caused by the corresponding condition, estimated using equation 1, but replacing SES_j^p with an indicator function that equals one if the physician parent experiences the condition. Regression results can be found in Appendix tables A19 and A21.

("newly diagnosed patients" and "previously diagnosed patients"), and study their use of a treatment and mortality when they are matched with a low-SES physician.

Table 6 Panels B and C show the effects of SES concordance on adherence and detection. Column 1 shows that SES concordance increases adherence to statins, as the effect is strongest for the group of patients that were already treated with statins before clinic closure. In contrast to CVC treatment, we only see a detection effect for COPD hospitalizations, and both an adherence and detection effect for diabetes treatment.

A detection effect can also be observed through tests for cancer for the *first* time. We focus on breast and lung cancer since primary care physicians play a crucial role in the decision to test for them and they are the most common types of cancer. Early detection is especially important for lung cancer due to its low survival rate. While we do not

observe statistically significant effects on these outcomes on average (see Panel B column 4 of Table 6), we find that the older low-SES cohort is more likely to receive *first-time* lung scans if they have a low-SES physician after clinic closure, as shown in Figure 4 Panel F and Appendix Table A17 column 3. The result on lung scans provides suggestive evidence that the decline in cancer mortality may go through earlier detection of lung cancer.

Column 4 shows that all-cause mortality decreases for both newly and previously diagnosed patients with any one of the four chronic conditions, while SES concordance reduces CVC mortality mainly through a detection effect. The fact that we do not find an increase in statin prescription, but a reduction on CVC mortality among not previously diagnosed patients, suggests that our data only captures part of the mechanism that prevents CVC deaths. Patients' changes in health behaviors outside of the clinic, such as smoking cessation, exercising, and dieting, may also contribute to the reduction in the SES gradient on CVC mortality.[31]

Physicians' personal experience with chronic conditions Low-SES patients may benefit more from having a low-SES physician because they may be more cognizant of the underlying health-risks associated with low-SES lifestyles. For instance, physicians from low-SES families might gain familiarity with conditions that are more common among low-SES patients outside of the professional settings through chronically ill family members, which in turn helps them detect and treat these conditions. In this section, we study whether low-SES patients matched with a new physician who has personal experience with a chronic condition after clinic closure can reduce the SES gradient in mortality. We define a physician as having personal experience if the physician had a parent who died from or has received treatment for one of the four conditions: CVC, cancer, diabetes, COPD.[32]

[31] We find no effect on ACE, metformin, or COPD medication use either in terms of adherence or detection

[32] A physician is defined as being exposed to these conditions if a parent has died from or received treatment for a certain condition at some point in the analysis period. The reason being that the parent is likely affected by a certain condition before the time of death. For example, parents that pass away due to cancer had likely been sick before the time of death.

Figure 5 Panel B and Appendix Table A19 show that physicians' personal experience with chronic conditions is a relevant channel. We see that physicians who have a parent with cancer decreases the SES-gradient in cancer mortality. Physicians who have a parent who has been treated or died from any of the chronic conditions reduces the SES gradient in all-cause mortality in the three years after clinic closure (significant at the 10 percent level). The effect is very close to the effect found on SES concordance, which is represented by the red line in Figure 5. The same applies to physicians who have a parent who has CVC or died of cancer.

Degree of social identity similarity A main hypothesis of the concordance effect is that similarity in social identity increases the quality of communication between patient and physician, which thereby improves the low-SES patients' health. In our main analysis, concordance is defined using an indicator function, however, similarity in social identity may be continuous. We test this in the triple-differences framework and compare the mortality rates of patients with different levels of education who are matched with low-SES physicians to those matched with high-SES physicians before and after clinic closures.

Figure 5 Panel A and Appendix Table A20 panel A support this hypothesis. While patients with primary school education, e.i., patients who are the most similar in their social identity to the low-SES physicians, experience the largest gain from a low-SES physician, the effect decreases as the distance in social identity increases between the patient and physician, measured by the patients' level of education.

Decreasing returns to baseline health One potential channel could be that low-SES physicians are better at treating the most frail patients, and the effect of having a low-SES physician is decreasing in patient health status at baseline. According to this hypothesis, the most frail patients have the highest return from having a low-SES physician, regardless of their own SES. This could also contribute to the channel above where we find patients with the least education benefit the most from having a low-SES physician. To test whether this is the case, we define patients' health status by whether

they receive treatment for one or more chronic conditions before clinic closures.[33] Figure 5 Panel A shows that while low-SES patients with chronic conditions (in red) benefit more from getting a low-SES physician after clinic closure compared to a high-SES physician, high-SES patients with chronic conditions (in blue) do not. This suggests that decreasing return in baseline health is not a driving mechanism.[34]

4.4 Internal Validity - the role of other physician characteristics

A threat to internal validity is the non-random assignment of physician SES to other physician characteristics. Low-SES physicians are, on average, older, more likely to be female, and less likely to have a degree from the University of Copenhagen, as shown in Table 1. Could any of these factors be driving our estimates? For instance, do low-SES patients benefit more from having a more experienced physician relative to a high-SES patient? To study this potential threat to identification, we replace the SES treatment dummy with an indicator for another physician characteristic and run the same regression as equation 2.

Figure 5 Panel B and Appendix Table A21 show that matching the most experienced physicians with low-SES patients does not reduce the SES-gradient in mortality with a coefficient close to zero. Neither does matching patients with clinics that have more male, more University of Copenhagen-trained, or more ethnic Danish physicians.[35]

Could we reduce the SES gradient in mortality by matching low-SES patients with physicians of the best quality? In other words, can we substitute low-SES physicians' social background with high physician quality? Since physician quality is hard to measure, we proxy for physicians' quality by their academic performance (GPA) upon entering

[33]Note that treatment patterns are subject to potential endogeneity concerns: the likelihood of receiving a treatment, conditional on the same level of health, may be different between high- and low-SES patients.

[34]From Appendix Table A18, we see that high-SES patients have lower mortality rates in the post-period compared to low-SES patients who have the same treatment patterns as them. This suggests that even when we control for baseline health, high-SES patients manage health conditions better than low-SES patients.

[35]We can also see this by splitting the analysis sample by gender, experience levels, and ethnicity in Appendix Table A22. The only characteristic showing heterogeneous effects is ethnicity. The reason could be that, despite both groups being defined as low-SES, non-ethnic Danish physicians' childhood environments are different from those of ethnic Danish low-SES patients, which further suggests an effect from physician-patient cultural familiarity.

medical school. We define physicians as "high quality" if their grades are among the top 33% in the whole physician population.[36] Figure 5 Panel B and Appendix Table A21 column 6 show that physicians of "higher quality" do not affect the SES gradient in mortality differently compared to physicians with lower "quality". This suggests that higher quality physicians can not substitute low-SES physicians.

Can physicians learn to reduce the SES gradient by having more experience with low-SES patients? We test for this by looking at the share of low-SES patients a physician has one year before the focal patient experiences a clinic closure. We do not find that having a higher share of low-SES patients the year before clinic closure, make physicians decreasing the SES gradient in mortality in the post period, all else equal.

The above suggests that observed physician characteristics, including gender, experience, ethnicity, graduating institution, physician academic performance, and physician experience with low-SES patients, do not explain our findings.

4.5 External validity - generalization of the concordance effects

The share of the Danish population that have primary school as their highest level of education has decreased over time, as shown in Appendix Figure A1 Panel C. By using primary school education as the definition for SES, we label someone who is primary-school-educated and born in 1940 the same as another born in 1970, while the educational "rank" is much lower for the latter.[37] In this section, we investigate whether our results are robust to alternative definitions of low-SES and whether our results can be generalized to other educational groups.

First, we test for robustness of our results using educational rank within birth cohorts to define SES. We define physicians to be low-SES if they have a parent whose educational level is among the bottom 33 percent in their birth cohort. Figure 5 Panel B and Appendix Table A23 show that the estimates are robust to using parental rank, while somewhat smaller than the main results. By substituting the *level* of parental education by the *rank*

[36] High school GPA is observable for the youngest physicians in the sample, i.e., those who graduating high school after 1985. We observe physician GPA for around 25 percent of the physician sample. We aggregate physician school grades to the clinic level.

[37] Appendix Figure A1 Panel B shows that the physicians' parents' educational ranks have been relatively stable across the study period.

of parental education, we show that exposure to physicians from low-SES households continues to be important even as the share of physicians with primary-school-educated parents decreases.

Next, we test whether our results on SES concordance can be generalized to patient populations with higher levels of education. For instance: would the health of patients who have vocational education as their highest level of education improve if they were matched with a physician who has a parent with vocational education as their highest level of education? To assess whether our results apply more broadly, we perform the same analysis following equation 2, but change our definition of low-SES to higher levels of education. As shown in Appendix Table A20 Panel B, we do not find educational concordance to significantly improve the health for groups of patients with higher levels of education. This aligns with our findings from the event study figures, such as Figure 3, in which we do not see that high-SES patients' mortality depends on their physicians' SES. The baseline mortality-SES gradient by patient education levels in Figure 1 also shows that primary-school-educated patients show the largest gap in mortality.

5. Conclusion

This paper studies the effect of physician-patient SES concordance on the socioeconomic gradient in health. We exploit variation in SES concordance between physicians and patients that are induced by clinic closures and use physicians parents' highest level of education to measure their SES. We find that SES concordance lowers low-SES patients' mortality, while the mortality of high-SES patients is unaffected by the SES of their physician, leading to an overall reduction in the SES-gradient in mortality. Mortality effects are driven by a reduction in deaths caused by cardiovascular conditions and cancer. To study how concordance reduces patient mortality, we look at patients' health behaviors. We find that when low-SES patients are matched with low-SES physicians, they increase healthcare utilization on the intensive margin by having more office visits and receiving more services per visit. In addition, SES concordance increases treatment of chronic conditions for low-SES patients; the effect comes from a higher disease detection

rate, and a higher rate of adherence to medical guidelines.

Previous studies have found that interventions had a limited impact on individuals' health behaviors, which is especially true for low-SES groups (Cawley and Ruhm, 2011, de Walque, 2010, Cutler, 2004). In line with Alsan, Garrick and Graziani (2019), our results show that the match between physician and patient is important, especially for the most vulnerable groups in society. We show that physicians' family background impacts the way they interact with low-SES patients, and that low-SES physicians can mitigate a substantial part of the SES gradient in health by changing their health behaviors. By showing the profound impact of physicians' childhood SES, we highlight that early life environments may play an important role in the focal person's interactions in later life. The results may not be limited to a healthcare setting, but could potentially be broadened to social work, education, and legal settings etc.

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For Online Publication

"Doctor Who? The effect of physician-patient match on the SES-health gradient"

Ida Lykke kristiansen and Sophie Yanying Sheng

Appendix 1. Robustness Checks

In this section we discuss robustness checks in relation to the data limitations we face and the assumptions we make addressing those limitations.

Addressing potential selection using primary care shortage Our preferred specification in section 3 addresses selection concerns about physician re-assignment by restricting the treatment and comparison groups to have the same physicians before and after clinic closures. We do this by taking "trajectory" fixed effects, namely, fixed effects on the pre and post closure physician interaction. An alternative to this "with-in" group comparison is to make use of the primary care shortage in Denmark. Over the last 10 years, the number of physicians in Denmark has decreased by 7 percent, while the number of citizens, old people, and individuals with chronic diseases has increased (PLO, 2019). This resulted in a critical shortage of physicians where most clinics do not accept new patients. In 2017, 67 percent of all clinics had closed their intake of new patients. The number of clinics that have closed their intake of new patients varies substantially between municipalities: Some areas have no clinics that accept new patients (PLO, 2017). When clinic closures take place in a municipality and year with extreme primary care shortage, the choice of a new physician is extremely limited. Clinics would only accept a new patient when an opening arises because an existing patient moves to another municipality or passes away.

We run our main analysis using a subsample of patients who experience a clinic closure in municipalities and years with an extreme primary physician shortage. We define primary care shortage as occurring in municipalities and years where the average patient per clinic exceeds 1600.[1] Closures in 458 clinics containing more than one million patients in our analysis sample satisfy this criteria. We use this sub-sample of patients to conduct the analysis on our main outcomes from section 4. Appendix Table A1 Panel A shows that our results are robust to using this sub-sample of patients that have a limited choice of a new physician.

[1] Physicians can close their intake of patients when the number of patients exceeds 1600.

Alternative aggregations of Physician SES Claims data from Denmark allows us to connect each patient to the primary care clinic, rather than a specific physician within the clinic. The average clinic has 1.8 physicians. In this section, we present versions of our analysis by aggregating physician SES to clinic SES in two alternative ways.

In the main analysis, we defined a clinic as being low-SES if at least one of the physicians in the corresponding clinic was defined as low-SES (using a "max" function). In this case, there is a positive probability that the patient sees a physician with a low educational family background. As robustness checks, we repeat our analysis for our main outcomes defining physician SES using the "min" and "mean" functions. The min function takes the value 1 if we define all physicians in the clinic as being low-SES. In this case, we are certain that the patient sees a low-SES physician. We also use the "mean" function; this gives us the share of physicians from a low-SES family and measures the probability that the patient sees a physician with a low educational background. As shown in Appendix Table A2, our results are robust to these alternative definitions.

Missing physician SES As described in Section 2.1, we are unable to identify the SES of a physician in most cases if he or she is born before 1960, and this applies to 36% of physicians in non-closing clinics. We assume that physicians with missing SES are high-SES in our main analysis. As a robustness check, we complement the main analysis by discarding this assumption, and instead we restrict our sample to physicians whose SES we can observe. Appendix Table A3 Panel A shows our main results using this subsample and specification described in equation 2. In Table A3 Panels B and C, we repeat this analysis, using the min and mean functions to aggregate physician SES to the clinic level, as described in the above. The table shows that our results are robust to excluding observations with missing SES information.

Excluding Non-ethnic Danish patients A data limitation is that immigrants' education information is not always recorded. In the main analysis, we assume that immigrants with missing education are high-SES. For robustness, we exclude any non-Danish patient and repeat the main analysis in Appendix Table A1 Panel B and show that most of our

main outcomes are robust.

Patient Survival and Switching Physicians The sample in the main analysis uses a panel that is balanced only in the pre-period, since patients may pass away in the post period. Table A4 Panel A shows that our main estimates are robust in a balanced sample in which patients survive until five years after clinic closures. This shows that the effects we find are not driven by patients that pass away during the post period. Panel B shows the estimates using a sample that further conditions on patients staying with the initial physicians post closures. The effects we find, thereby, do not seem to be driven by patients who switch physicians.[2]

[2]We also find that both high and low-SES patients who are matched with low-SES physicians are less likely to switch physicians in the 5 years after clinic closures.

Table A1: Robustness Check: The Effect of SES Concordance Using a Restricted Choice Sample and Excluding Non-ethnic Danish Patients

	Death	Death from CVC	Number of Visits	Total Reimbursement	Statins	Hospitalization COPD	Diabetes Checkup
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Restricted choice sample							
PCP low SES x Patient low SES x Post	-0.00144*	-0.00041	0.16621**	16.46544***	0.00070	-0.00078	0.00126
	(0.00085)	(0.00035)	(0.07191)	(5.73123)	(0.00367)	(0.00118)	(0.00347)
Outcome mean	.00195	.00032	6.2	391.9	.12511	.00606	.05107
Gradient for high SES physicians	.00607	.00112	1.46923	27.13185	.0646	.01044	.01143
Effect %	-23.7	-36.6	11.3	60.7	1.1	-7.5	11.0
Observations	1,028,570	1,028,570	871,287	1,028,570	1,028,570	1,028,570	766,414
Panel B: Excluding non-ethnic Danish patients							
PCP low SES x Patient low-SES x Post	-0.00133***	-0.00037**	0.10966***	7.52797***	0.00209	-0.00122**	0.01039***
	(0.00040)	(0.00016)	(0.03375)	(2.40024)	(0.00173)	(0.00050)	(0.00257)
Outcome mean	.00244	.00043	6.208341	327.24859	.1044	.00574	.09622
Gradient for high-SES physicians	.00527	.00095	1.58367	27.50425	.04843	.00884	.02503
Effect %	-25.2	-38.9	6.9	27.4	4.3	-13.8	41.5
Observations	3,405,243	3,405,243	2,845,634	3,405,243	3,405,243	3,405,243	1,913,919
Patient Characteristics	Y	Y	Y	Y	Y	Y	Y
Old x new PCP FE	Y	Y	Y	Y	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance on main outcomes, see column headings. All columns report the estimates from the triple differences equation 2. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and education level fixed effects for levels higher than primary school. Gradient for high-SES physician is the difference in the outcome variable between high and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered by patient ID. *** p <0.01, ** p <0.05, * p <0.1.

Table A2: Robustness check: Alternative Physician SES Aggregation to The Clinic Level

	Death	Death from CVC	Number of Visits	Total Reimbursement	Statins	Hospitalization COPD	Diabetes Checkup
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Min							
PCP low SES x Patient low SES x Post	-0.00115**	-0.00031	0.17232***	3.79079	0.00855***	-0.00186***	0.00979***
	(0.00052)	(0.00023)	(0.04476)	(3.20352)	(0.00232)	(0.00066)	(0.00377)
Effect %	-21.3	-30.7	11.8	18.9	18.4	-21.5	40.3
Observations	3,749,654	3,749,654	3,140,867	3,749,654	3,749,654	3,749,654	2,123,957
Panel B: Mean							
PCP low SES x Patient low SES x Post	-0.00138***	-0.00041*	0.16751***	7.55329**	0.00729***	-0.00191***	0.01441***
	(0.00050)	(0.00022)	(0.04314)	(3.08251)	(0.00223)	(0.00064)	(0.00352)
Effect %	-25.5	-40.6	11.5	37.6	15.7	-22.1	59.3
Observations	3,749,654	3,749,654	3,140,867	3,749,654	3,749,654	3,749,654	2,123,957
Patient Characteristics	Y	Y	Y	Y	Y	Y	Y
Old x new PCP FE	Y	Y	Y	Y	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance on the main outcomes, see column headings. All columns report the estimates from the triple differences equation 2. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and education level fixed effects for levels higher than primary school. Panel A ("min") defines a clinic to be low-SES if all physicians are low-SES. Panel B ("mean") uses the proportion of physicians that are low-SES in the clinic. Gradient for high-SES physician is the difference in the outcome variable between high and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered by patient ID. *** p <0.01, ** p <0.05, * p <0.1.

Table A3: Robustness check: Using a Subsample of Physicians with Non-missing SES

	Death	Death from CVC	Number of Visits	Total Reimbursement	Statins	Hospitalization COPD	Diabetes Checkup
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Max							
PCP low SES x Patient low SES x Post	-0.00098*	-0.00044**	0.11248***	5.84811*	0.00389*	-0.00171***	0.01615***
	(0.00052)	(0.00022)	(0.04354)	(3.17264)	(0.00228)	(0.00066)	(0.00347)
Effect %	-18.7	-41.1	7.7	23.9	7.5	-20.2	56.2
Panel B: Min							
PCP low SES x Patient low SES x Post	-0.00112**	-0.00040	0.14080***	1.15863	0.00853***	-0.00200***	0.00865**
	(0.00057)	(0.00025)	(0.04832)	(3.48727)	(0.00252)	(0.00073)	(0.00402)
Effect %	-21.4	-37.4	9.6	4.7	16.5	-23.6	30.1
Panel C: Mean							
New PCP low SES x Patient low SES x Post	-0.00115**	-0.00046*	0.12679***	3.65262	0.00683***	-0.00196***	0.01523***
	(0.00058)	(0.00025)	(0.04869)	(3.52553)	(0.00255)	(0.00074)	(0.00400)
Effect %	-22.0	-43.0	8.7	14.9	13.2	-23.1	53.0
Outcome mean	.00222	.00041	6.16178	340.17327	.10275	.00551	.0918
Gradient for high-SES physicians	.00523	.00107	1.461	24.5176	.05167	.00848	.02874
Observations	1,910,919	1,910,919	1,608,112	1,910,919	1,910,919	1,910,919	1,057,929
Patient Characteristics	Y	Y	Y	Y	Y	Y	Y
Old x new PCP FE	Y	Y	Y	Y	Y	Y	Y

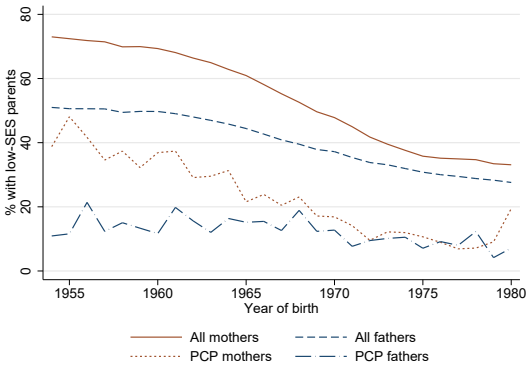
Notes: The table presents the effect of physician-patient SES concordance on selected outcomes, see column headings. All columns report the estimates from the triple differences equation 2. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and education level fixed effects for levels higher than primary school. The panels use different ways of aggregating physician SES to clinic SES. Panel A ("max") defines a clinic as being low-SES if at least one physician is low-SES. Panel B ("min") defines a clinic as being low-SES if all physicians are low-SES. Panel C ("mean") uses the proportion of physicians that are low-SES in the clinic. Gradient for high-SES physician is the difference in the outcome variable between high and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered by patient ID. *** p <0.01, ** p <0.05, * p <0.1.

Table A4: Robustness Check: Conditional on Survival and No Subsequent Physician Switching

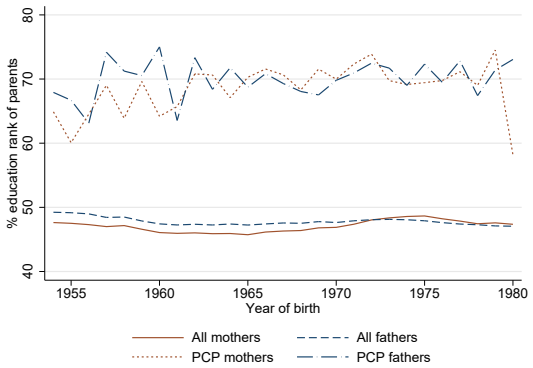
	Number of visits	Total reimbursement	Statins	Hospitalization COPD	Diabetes checkup
	(1)	(2)	(3)	(4)	(5)
Panel A: Conditional on survival (balanced panel)					
PCP low SES x Patient low SES x Post	0.09737**	5.54358**	0.00261	-0.00107**	0.00853***
	(0.03848)	(2.60776)	(0.00192)	(0.00049)	(0.00304)
Outcome mean	6.04908	304.27259	.08433	.00394	.1129
Gradient for high-SES physicians	1.39416	17.86596	.03766	.00592	.02211
Observations	2,087,570	2,526,608	2,526,608	2,526,608	1,370,145
Panel B: Conditional on no subsequent physician switch					
PCP low SES x Patient low SES x Post	0.09724**	4.21803	0.00323	-0.00160***	0.01042***
	(0.04313)	(2.91921)	(0.00219)	(0.00054)	(0.00351)
Outcome mean	5.93045	295.62524	.08401	.00371	.11537
Gradient for high-SES physicians	1.37038	19.54168	.03987	.00589	.02449
Observations	1,599,628	1,960,550	1,960,550	1,960,550	1,045,796
Patient Characteristics	Y	Y	Y	Y	Y
Old x new PCP FE	Y	Y	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance. All columns report the estimates of coefficients from the triple-differences equation 2. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. Gradient for high-SES physician is the difference in the outcome variable between high and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered by patient ID. *** p <0.01, ** p <0.05, * p <0.1.

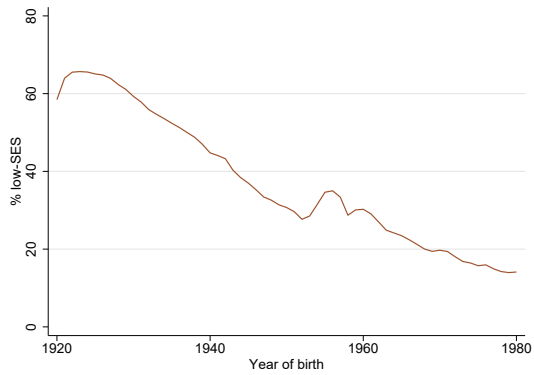
Appendix 2. Additional Figures & Tables



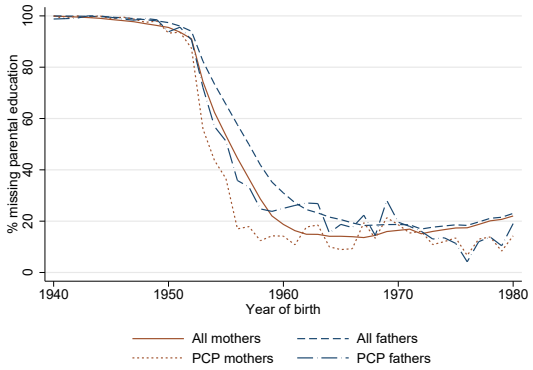
A: Share with a parent with primary school education



B: Parents' educational rank



C: Share of population with primary school education



D: Share with missing parent information

Figure A1: Summary Statistics on The Total Population and Physicians (PCP) by Birth Cohort

Note: The figure plots population education levels by sub-population groups of interest.

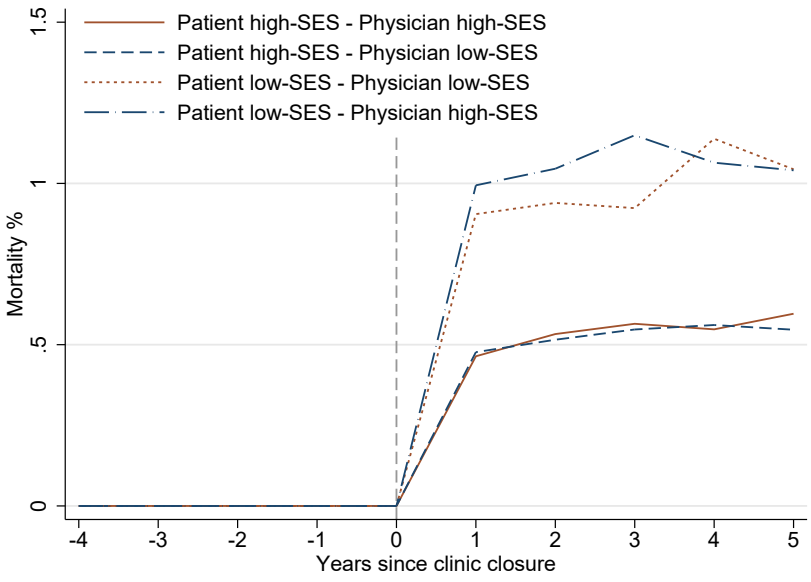


Figure A2: Physician (PCP)-patient SES Concordance and Mortality - Raw Correlations

Note: The figure presents the relationship between physician-patient SES concordance on mortality compared to the time of clinic closure in the raw data by patient-physician SES.

Table A5: ICD-10 and ATC Codes Used to Identify Cause of Death and Treatment for Chronic Conditions

	ICD-10 codes	ATC codes
Cardiovscular conditions	I	C10AA
		C09
Cancer	C	
Diabetes	E10-E14	A10
COPD	J44	R03AC18
		R43AC19
		R43AL02
		R43AL03
		R43AL04
		R43AL05
		R43AL07
		R43AL09
		R03BB04
		R03BB05
		R03BB06
		R03BB07
		R03DX07

Table A6: Summary Statistics - Patients

	(1) Population	(2) Analysis sample	(3) High-SES	(4) Low-SES
Primary education	0.326	0.309	0.000	1.000
High school	0.056	0.064	0.093	0.000
Vocational education	0.360	0.385	0.557	0.000
Associate degree	0.049	0.048	0.069	0.000
Undergraduate degree	0.126	0.126	0.183	0.000
Postgraduate degree	0.083	0.068	0.098	0.000
PCP visit	0.811	0.832	0.825	0.849
Number of visits	5.064	5.148	4.766	6.108
Number of services per visit	1.415	1.435	1.423	1.465
Medical specialist	0.130	0.135	0.132	0.143
Total reimbursement	294.0	318.6	314.3	329.3
Death	0.083	0.053	0.043	0.080
CVC	0.017	0.009	0.007	0.014
Cancer	0.034	0.023	0.019	0.032
Lung cancer	0.009	0.006	0.005	0.010
COPD	0.004	0.003	0.002	0.005
Diabetes	0.002	0.002	0.001	0.003
Statins	0.063	0.089	0.081	0.109
ACE	0.087	0.109	0.101	0.129
Lung scans	0.039	0.035	0.033	0.042
Radiologist	0.012	0.012	0.013	0.010
COPD medication	0.057	0.057	0.049	0.075
COPD hospitalization	0.006	0.005	0.004	0.009
Metformin	0.034	0.039	0.034	0.050
Diabetes control	0.027	0.039	0.037	0.044
Number of observations	4,651,432	488,505	349,380	139,125

Notes: The table presents patient characteristics in different patient samples. See section 2.1 for the definition of the different variables, and Appendix Table A5 for the ICD and ATC codes used. PCP stands for primary care physicians.

Table A7: Test for Getting a low-SES Physician Post Closure by Patient Characteristics and Pre-Closure Treatments

	Analysis sample (1)	Known physician SES sample (2)
Male	-0.00130	-0.00018
	(0.00103)	(0.00104)
Age	-0.00003	0.00002
	(0.00007)	(0.00007)
Non-Danish ethnicity	-0.00096	0.00044
	(0.00254)	(0.00274)
Married	0.00394***	0.00183
	(0.00130)	(0.00125)
Low-SES	-0.00059	-0.00171
	(0.00267)	(0.00292)
Statins	0.00130	0.00075
	(0.00156)	(0.00168)
ACE	0.00018	0.00008
	(0.00132)	(0.00160)
Metformin	-0.00368*	-0.00067
	(0.00212)	(0.00243)
Diabetes checkup	0.00055	-0.00065
	(0.00218)	(0.00196)
COPD medication	-0.00188	0.00027
	(0.00152)	(0.00150)
COPD avoidable hospitalization	-0.00347	-0.00235
	(0.00337)	(0.00378)
Observations	474,585	247,807

Notes: The table presents estimates on the probability of getting a low-SES physician post clinic closure by patient characteristics and pre-closure condition in the main analysis sample and the sub-sample in which all physicians' parents' education is not missing. Standard errors are clustered by old physician ID. *** p <0.01, ** p <0.05, * p <0.1.

Table A8: The Effect of Getting a Low-SES Physician (PCP) Post Closure for High-SES patients by Years since Clinic Closure

	Death	Number of Visits	Total Reimbursement	Statins	Diabetes Checkup	Hospitalization COPD	Statins Men	First lung scan Older Females
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
t=-4 × Low-SES physician	0.00056*	0.01926	0.44108	-0.00027	-0.00243	0.00045*	-0.00095	0.00287
	(0.00035)	(0.01951)	(0.48774)	(0.00078)	(0.00232)	(0.00026)	(0.00114)	(0.00245)
t=-3 × Low-SES physician	0.00149	0.00065	-0.12007	0.00020	0.00310	0.00038	-0.00006	-0.00122
	(0.00035)	(0.01861)	(0.46946)	(0.00070)	(0.00226)	(0.00026)	(0.00102)	(0.00235)
t=-2 × Low-SES physician	0.000144	0.00086	-0.50005	0.00032	0.00074	0.00018	0.00032	0.00070
	(0.00034)	(0.01694)	(0.42179)	(0.00057)	(0.00218)	(0.00026)	(0.00083)	(0.00233)
t=-1 × Low-SES physician								
t=0 × Low-SES physician	-0.00010	-0.07352***	-1.10400**	-0.00061	0.01026***	-0.00010	-0.00124	0.00431*
	(0.00026)	(0.01856)	(0.50424)	(0.00068)	(0.00248)	(0.00029)	(0.00098)	(0.00241)
t=1 × Low-SES physician	-0.00019	0.01083	-0.15626	0.00015	0.02135***	0.01745***	-0.00052	-0.00291
	(0.00027)	(0.02108)	(0.58888)	(0.00084)	(0.00291)	(0.00031)	(0.00120)	(0.00236)
t=2 × Low-SES physician	-0.00019	0.04284*	-0.14225	-0.00026	0.00570	0.00258	0.00014	0.00148
	(0.00028)	(0.02286)	(0.63282)	(0.00104)	(0.00297)	(0.00033)	(0.00149)	(0.00240)
t=3 × Low-SES physician	-0.00017	0.03443	0.72594	-0.00029	0.00981**	0.00679**	-0.00075	0.00134
	(0.00030)	(0.02448)	(0.67721)	(0.00121)	(0.00308)	(0.00035)	(0.00174)	(0.00243)
t=4 × Low-SES physician	0.00007	0.01239	-0.69171	0.00071	0.00699*	-0.00253	-0.00009	-0.00208
	(0.00032)	(0.02637)	(0.73622)	(0.00138)	(0.00307)	(0.00038)	(0.00198)	(0.00247)
t=5 × Low-SES physician	-0.00055	0.01731	0.13573	0.00162	0.00350	0.00019	0.00163	-0.00357
	(0.00034)	(0.02830)	(0.80044)	(0.00157)	(0.00351)	(0.00040)	(0.00223)	(0.00257)
Observations	3,011,064	2,501,860	3,000,770	3,000,770	861,717	3,000,770	1,603,598	553,492
Patient Characteristics	Y	Y	Y	Y	Y	Y	Y	Y
Old PCP FE	Y	Y	Y	Y	Y	Y	Y	Y
Patient ID FE	N	N	N	N	N	N	N	N
Old x new PCP FE	N	N	N	N	N	N	N	N

Notes: The table presents the effect of physician-patient SES concordance on selected outcomes, see column headings. All columns report the estimates of the coefficient on the event dummies relative to $t = -1$ using equation 1. All regressions control for year fixed effects, old physician fixed effects, new physician characteristics (mean age, share of male physicians, share of ethnic danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution), and patient characteristics. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. Standard errors are clustered by patient ID. *** p <0.01, ** p <0.05, * p <0.1.

Table A9: The Effect of Getting a Low-SES Physician (PCP) Post Closure for Low-SES patients by Years since Clinic Closure

	Death	Number of Visits	Total Reimbursement	Statins	Diabetes Checkup	Hospitalization COPD	Statins Men	first lung scan Older Females
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
t=-4 × Low-SES physician	-0.00039	0.07189**	0.29623	0.00034	-0.01123***	0.00039	0.00006	0.00287
	(0.00068)	(0.03558)	(0.95513)	(0.00140)	(0.00410)	(0.00063)	(0.00209)	(0.00311)
t=-3 × Low-SES physician	0.00034	0.04690	1.07382	-0.00008	-0.00084	0.00012	-0.00150	0.00283
	(0.00069)	(0.03339)	(0.88886)	(0.00123)	(0.00395)	(0.00062)	(0.00186)	(0.00315)
t=-2 × Low-SES physician	0.00006	0.04881	-0.31350	-0.00022	-0.00865**	0.00021	-0.00052	0.00095
	(0.00068)	(0.02997)	(0.77557)	(0.00099)	(0.00370)	(0.00063)	(0.00148)	(0.00305)
t=-1 × Low-SES physician								
t=0 × Low-SES physician	-0.00009***	-0.09687***	-1.11528	0.00158	0.00981**	-0.00050	0.00014	0.00340
	(0.00003)	(0.03307)	(0.92509)	(0.00125)	(0.00415)	(0.00070)	(0.00184)	(0.00315)
t=1 × Low-SES physician	-0.00102*	0.20275***	3.27613***	0.00340**	0.02447***	-0.00003	0.00273	0.00699**
	(0.00059)	(0.03843)	(1.09306)	(0.00152)	(0.00475)	(0.00074)	(0.00225)	(0.00313)
t=2 × Low-SES physician	-0.00109*	0.18410***	2.59792**	0.00156	0.02038***	-0.00106	0.00140	0.00567*
	(0.00059)	(0.04199)	(1.21931)	(0.00188)	(0.00491)	(0.00080)	(0.00277)	(0.00313)
t=3 × Low-SES physician	-0.00232***	0.16550***	4.30808***	0.00354	0.01816***	-0.00152*	0.00391	0.00613*
	(0.00062)	(0.04526)	(1.30420)	(0.00218)	(0.00509)	(0.00082)	(0.00321)	(0.00324)
t=4 × Low-SES physician	0.00069	0.09095*	1.61472	0.00142	0.01530***	-0.00067	-0.00051	0.00893***
	(0.00070)	(0.04851)	(1.40974)	(0.00247)	(0.00511)	(0.00090)	(0.00364)	(0.00335)
t=5 × Low-SES physician	-0.00005	0.06313	3.42441**	0.00444	0.02508***	0.00040	0.00300	0.00195
	(0.00072)	(0.05172)	(1.52350)	(0.00276)	(0.00578)	(0.00096)	(0.00407)	(0.00343)
Observations	1,215,052	1,035,190	1,206,542	1,206,542	334,221	1,206,542	547,869	348,164
Patient Characteristics	Y	Y	Y	Y	Y	Y	Y	Y
Old PCP FE	Y	Y	Y	Y	Y	Y	Y	Y
Patient ID FE	N	N	N	N	N	N	N	N
Old x new PCP FE	N	N	N	N	N	N	N	N

Notes: The table presents the effect of physician-patient SES concordance on selected outcomes, see column headings. All columns report the estimates of the coefficient on the event dummies relative to $t = -1$ using equation 1. All regressions control for year fixed effects, old physician fixed effects, new physician characteristics (mean age, share of male physicians, share of ethnic danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution), and patient characteristics. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. Standard errors are clustered by patient ID. *** p <0.01, ** p <0.05, * p <0.1.

Table A10: The Effect of Physician (PCP)-patient SES Concordance on Mortality by Population Demographics

	Male	Female	Yob<1958	Yob>=1958	Ethnic Danish	Non-Danish ethnicity	Married	Unmarried
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PCP low SES x Patient low SES x Post	-0.00184***	-0.00083*	-0.00079**	-0.00171***	-0.00133***	-0.00003	-0.00036	-0.00216***
	(0.00062)	(0.00048)	(0.00039)	(0.00061)	(0.00040)	(0.00200)	(0.00045)	(0.00068)
PCP low SES x Patient low SES	0.00005	0.00019**	0.00002	0.00011	0.00014**	-0.00014	0.00007	0.00010
	(0.00010)	(0.00008)	(0.00007)	(0.00010)	(0.00006)	(0.00032)	(0.00006)	(0.00012)
Patient low SES x Post	0.00622***	0.00460***	0.00281***	0.00577***	0.00497***	0.00334***	0.00294***	0.00656***
	(0.00036)	(0.00028)	(0.00023)	(0.00036)	(0.00023)	(0.00098)	(0.00026)	(0.00039)
PCP low SES x Post	0.00001	-0.00019	0.00002	-0.00028	-0.00015	0.00018	-0.00006	0.00001
	(0.00025)	(0.00020)	(0.00014)	(0.00031)	(0.00018)	(0.00042)	(0.00018)	(0.00033)
Patient low SES	-0.00044	-0.00126***	0.00012	0.00170	-0.00228***	0.00029	-0.00013	0.00407
	(0.00093)	(0.00022)	(0.00033)	(0.00147)	(0.00036)	(0.00069)	(0.00038)	(0.00354)
Post	0.00602***	0.00354***	0.00155***	0.00821***	0.00510***	0.00329***	0.00393***	0.00665***
	(0.00016)	(0.00014)	(0.00009)	(0.00020)	(0.00012)	(0.00025)	(0.00012)	(0.00021)
Outcome mean	.00281	.00185	.00086	.00377	.00244	.00131	.00171	.00333
Gradient for high-SES physicians	.00641	.00495	.0028	.00586	.00527	.00355	.00329	.00701
Effect %	-28.7	-16.8	-28.2	-29.2	-25.2	-0.8	-10.9	-30.8
Observations	1,914,426	1,835,228	1,847,399	1,902,255	3,405,243	344,407	2,300,647	1,446,608
Patient Characteristics	Y	Y	Y	Y	Y	Y	Y	Y
Old x new PCP FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance on mortality for different sub-populations, see column headings. All columns report the estimates from the triple differences equation 2. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. Gradient for high-SES physician is the difference in the outcome variable between high and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered by patient ID. *** p <0.01, ** p <0.05, * p <0.1.

Table A11: The Effect of Physician (PCP)-patient SES Concordance on Primary Care Reimbursement

	PCP	Specialist	Total
	(1)	(2)	(3)
PCP low SES x Patient low SES x Post	2.75673***	4.08300**	6.83973***
	(0.97688)	(2.01551)	(2.35264)
Outcome mean	122.3	210.3	332.6
Gradient for high-SES physicians	32.3	-12.2	20.1
Effect %	8.5	-33.5	34.0
Observations	3,749,654	3,749,654	3,749,654
Patient Characteristics	Y	Y	Y
Old x new PCP FE	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance on physician fee-for-service reimbursements in US dollars. All columns report the estimates from the triple differences equation 2. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. Gradient for high-SES physician is the difference in the outcome variable between high- and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered by patient ID. *** p <0.01, ** p <0.05, * p <0.1.

Table A12: The Effect of Physician (PCP)-patient SES Concordance on Reimbursement by Gender and Birth Cohort

	PCP (1)	Specialist (2)	Total (3)
Panel A: Female			
PCP low SES x Patient low SES x Post	4.55223***	3.67556	8.22779**
	(1.36678)	(2.94248)	(3.39929)
Effect %	13.3	-14.8	87.5
Panel B: Male			
PCP low SES x Patient low SES x Post	0.82749	3.99810	4.82559
	(1.40418)	(2.74350)	(3.24872)
Effect %	3.4	-31.3	41.7
Panel C: Younger sample, year of birth>=1958			
PCP low SES x Patient low SES x Post	4.55223***	3.67556	8.22779**
	(1.36678)	(2.94248)	(3.39929)
Effect %	15.9	-234.5	30.4
Panel D: Older sample, year of birth<1958			
PCP low SES x Patient low SES x Post	3.46626**	3.47760	6.94387**
	(1.38461)	(2.76099)	(3.24055)
Effect %	12.9	-11.2	-165.4
Patient Characteristics	Y	Y	Y
Old x new PCP FE	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance on physician fee-for-service reimbursement in US dollars. All columns report the estimates from the triple differences equation 2. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. Gradient for high-SES physician is the difference in the outcome variable between high and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered by patient ID. Observations: Female: 1,835,228, male: 1,914,426, young sample: 1,847,399, old sample: 1,902,255. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A13: The Effect of Physician (PCP)-patient SES Concordance on Cancer Mortality

	All	Lung	Mouth	Digestive system	Bones	Skin	Breast	Genital organs	Kidney
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Female									
PCP low SES x Patient low SES x Post	-0.00059*	-0.00019	-0.00006*	-0.00011	-0.00001	0.00002	-0.00002	-0.00000	-0.00004
	(0.00033)	(0.00019)	(0.00004)	(0.00015)	(0.00001)	(0.00004)	(0.00013)	(0.00010)	(0.00006)
Outcome mean	.00092	.00026	.00001	.00019	0	.00002	.00016	.0001	.00003
Gradient for high-SES physicians	.00206	.00088	.00006	.00043	.00001	-.00001	.00016	.00006	.00011
Observations	1,835,228	1,835,228	1,835,228	1,835,228	1,835,228	1,835,228	1,835,228	1,835,228	1,835,228
Panel B: Older sample, year of birth<1958									
PCP low SES x Patient low SES x Post	-0.00070*	-0.00022	-0.00012	-0.00016	-0.00001	0.00004	0.00000	-0.00019	0.00013
	(0.00040)	(0.00023)	(0.00000)	(0.00021)	(0.00000)	(0.00000)	(0.00011)	(0.00012)	(0.00000)
Outcome mean	.00164	.00047	.00005	.00045	0	.00003	.00012	.00015	.00008
Gradient for high-SES physicians	.00197	.00099	.00007	.00029	.00001	-.00005	.00015	.00013	.00009
Observations	1,902,255	1,902,255	1,902,255	1,902,255	1,902,255	1,902,255	1,902,255	1,902,255	1,902,255
Patient Characteristics	Y	Y	Y	Y	Y	Y	Y	Y	Y
Old x new PCP FE	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance on mortality by cancer types. All columns report the estimates from the triple differences equation 2. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. Gradient for high-SES physician is the difference in the outcome variable between high and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) $\times 100$. Standard errors are clustered by patient ID. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A14: The Effect of Physician (PCP)-patient SES Concordance on Chronic Conditions Mortality by Gender and Birth Cohort

	All Cause (1)	CVC (2)	Cancer (3)	Diabetes (4)	COPD (5)
Panel A: Female					
PCP low SES x Patient low SES x Post	-0.00083*	-0.00019	-0.00059*	0.00006	-0.00003
	(0.00048)	(0.00018)	(0.00033)	(0.00008)	(0.00013)
Effect %	-16.8	-21.6	-28.6	46.2	-5.4
Panel B: Male					
PCP low SES x Patient low SES x Post	-0.00184***	-0.00067**	-0.00027	0.00006	-0.00005
	(0.00062)	(0.00028)	(0.00037)	(0.00012)	(0.00013)
Effect %	-28.7	-51.5	-16.5	24.0	-12.8
Panel C: Younger sample, year of birth>=1958					
PCP low SES x Patient low SES x Post	-0.00079**	-0.00011	-0.00014	0.00003	-0.00010*
	(0.00039)	(0.00014)	(0.00022)	(0.00006)	(0.00006)
Effect %	-28.2	-31.4	-20.0	50.0	-71.4
Panel D: Older sample, year of birth<1958					
New PCP low SES x Patient low SES x Post	-0.00171***	-0.00061**	-0.00084**	0.00009	0.00002
	(0.00061)	(0.00024)	(0.00037)	(0.00011)	(0.00014)
Effect %	-29.2	-50.4	-42.6	45.0	3.1
Patient Characteristics	Y	Y	Y	Y	Y
Old x new PCP FE	Y	Y	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance on mortality by causes of death. All columns report the estimates from the triple differences equation 2. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. Gradient for high-SES physician is the difference in the outcome variable between high and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered by patient ID. Female observations: 1,835,228, Male observations: 1,914,426 Young sample: 1,847,399, older sample: 1,902,255. *** p <0.01, ** p <0.05, * p <0.1.

Table A15: The Effect of Physician (PCP)-patient SES Concordance on Healthcare Utilization by Gender and Birth Cohort

	PCP visit (Dummy) (1)	PCP visit (N) (2)	Services per visit (N) (3)	Specialist visit (Dummy) (4)
Panel A: Female				
PCP low SES x Patient low SES x Post	0.00055	0.13823***	0.02129***	0.00020
	(0.00204)	(0.04484)	(0.00751)	(0.00336)
Effect %	4.5	9.2	45.1	-0.7
Panel B: Male				
PCP low SES x Patient low SES x Post	-0.00300	0.11030**	0.00513	0.00694**
	(0.00289)	(0.04878)	(0.00830)	(0.00323)
Effect %	-14.2	9.9	13.7	-34.3
Panel C: Young sample, year of birth>=1958				
PCP low SES x Patient low SES x Post	-0.00021	0.05617	0.00065	0.00595*
	(0.00278)	(0.04820)	(0.00820)	(0.00346)
Effect %	-1.0	4.4	1.9	-30.8
Panel D: Old sample, year of birth<1958				
PCP low SES x Patient low SES x Post	-0.00204	0.13201***	0.02665***	-0.00016
	(0.00225)	(0.04536)	(0.00765)	(0.00318)
Effect %	-10.5	10.3	61.1	0,5
Patient Characteristics	Y	Y	Y	Y
Old x new PCP FE	Y	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance on healthcare utilization. All columns report the estimates of coefficients on the event dummies in equation 2. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. Gradient for high SES patients is the difference of the outcome variable between high and low SES patients who have high SES physicians, calculated as (low SES outcome−high SES outcome). Standard errors are clustered by patient ID. Observations female 1,835,228, male: 1,914,426, young sample: 1,847,399, old sample: 1,902,255. *** p <0.01, ** p <0.05, * p <0.1.

Table A16: The Effect of Physician (PCP)-patient SES Concordance on Health Behaviors Related to Chronic Conditions

	CVC		Cancer		Diabetes		COPD	
	Statins	ACE	Lung scan	Radiologist	Metformin	Checkup	Medication	Hospitalization
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PCP low SES × Patient low SES × Post	0.00286*	0.00104	0.00096	0.00040	0.00028	0.01126***	-0.00123**	-0.00076
	(0.00169)	(0.00172)	(0.00108)	(0.00058)	(0.00097)	(0.00251)	(0.00049)	(0.00113)
Outcome mean	.10415	.12554	.03279	.01987	.04311	.09522	.00563	.05568
Gradient for high-SES physicians	.04643	.04235	.00887	-.0032	.02309	.0243	.00866	.03277
Effect %	6.2	2.5	4.5	8.8	1.2	46.3	-2.3	-14.2
Observations	3,749,654	3,749,654	3,262,358	3,749,654	3,749,654	2,123,957	3,749,654	3,749,654
Patient Characteristics	Y	Y	Y	Y	Y	Y	Y	Y
Old x new PCP FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance on health behavior related to the four most common and unequal chronic conditions. All columns report the estimates from the triple differences equation 2. See section 2.1.4 for the definition of the outcome measures. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. Gradient for high-SES physician is the difference in the outcome variable between high and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered by patient ID. *** p <0.01, ** p <0.05, * p <0.1.

Table A17: The Effect of Physician (PCP)-patient SES Concordance on Health Behaviors Related to Chronic Conditions by Gender and Birth Cohort

CONDITIONS	CVC		Cancer		Diabetes		COPD	
	Statins	ACE	Lung scan	Radiologist	Metformin	Checkup	Medication	Hospitalization
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Female								
PCP low SES x Patient low SES x Post	0.00228	0.00138	0.00221	0.00035	0.00042	0.01460***	-0.00066	-0.00020
	(0.00231)	(0.00232)	(0.00150)	(0.00084)	(0.00122)	(0.00354)	(0.00069)	(0.00165)
Effect %	3.3	2.3	23.4	-7.4	1.7	41.2	-6.9	-0.5
Panel B: Male								
PCP low SES x Patient low SES x Post	0.00362	0.00075	-0.00050	0.00001	0.00030	0.00740**	-0.00192***	-0.00162
	(0.00248)	(0.00255)	(0.00156)	(0.00081)	(0.00154)	(0.00356)	(0.00070)	(0.00152)
Effect %	13.2	2.6	5.9	-0.6	1.2	63.4	-8.0	-25.3
Panel C: Younger sample, year of birth>=1958								
PCP low SES x Patient low SES x Post	0.00127	-0.00025	-0.00083	0.00120	-0.00004	0.00565*	-0.00041	-0.00009
	(0.00194)	(0.00209)	(0.00149)	(0.00092)	(0.00121)	(0.00293)	(0.00053)	(0.00159)
Effect %	4.5	-0.9	-9.4	-42.0	-0.2	39.2	-0.4	-9.6
Panel D: Older sample, year of birth<1958								
PCP low SES x Patient low SES x Post	0.00359	0.00227	0.00262*	-0.00051	0.00053	0.01105***	-0.00196**	-0.00111
	(0.00259)	(0.00260)	(0.00156)	(0.00076)	(0.00145)	(0.00395)	(0.00077)	(0.00158)
Effect %	11.8	10.9	43.4	-16.1	2.6	79.6	-3.1	-18.9
Patient Characteristics	Y	Y	Y	Y	Y	Y	Y	Y
Old x new PCP FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance on health behaviors related to the four most common and unequal chronic conditions. All columns report the estimates from the triple differences equation 2. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. Gradient for high-SES physician is the difference in the outcome variable between high and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered by patient ID. Observations: Female: 1,835,228, Male: 1,914,426, Young sample:1,847,399, older sample: 1,902,255. *** p <0.01, ** p <0.05, * p <0.1.

Table A18: Mechanism: The Effect of Having a Low-SES Physician (PCP) on Mortality by Patients With Different Baseline Conditions

	No conditions	Any conditions	CVC	Diabetes	COPD	CVC+Diabetes	CVC+COPD	COPD+Diabetes	All three
	(1)	(2)	(3)	(4)	(5)	(5)	(6)	(7)	(8)
Panel A: Low-SES patients									
PCP low SES x Post	-0.00083**	-0.00201***	-0.00193**	-0.00178*	-0.00233*	-0.00228*	-0.00146	0.00039	0.00005
	(0.00037)	(0.00065)	(0.00086)	(0.00097)	(0.00127)	(0.00137)	(0.00275)	(0.00316)	(0.00450)
Outcome mean	0.00257	0.00509	0.00519	0.00522	0.00690	0.00593	0.00912	0.00913	0.0103
Observations	624,746	442,350	265,814	207,706	157,395	122,298	50,199	39,652	23,584
Panel B: High-SES patients									
PCP low SES x Post	-0.00018	0.00029	0.00009	0.00040	0.00005	-0.00035	-0.00027	0.00222	-0.00006
	(0.00016)	(0.00036)	(0.00052)	(0.00052)	(0.00068)	(0.00082)	(0.00179)	(0.00189)	(0.00284)
Outcome mean	.00123	.00297	.00353	.00294	.00334	.00385	.00533	.00476	.00588
Gradient for high-SES physicians	.00391	.00675	.00543	.00709	.01088	.00656	.01153	.013	.01305
Observations	1,755,915	926,643	524,509	450,616	283,689	231,861	71,626	61,826	33,142
Patient Characteristics	Y	Y	Y	Y	Y	Y	Y	Y	Y
Old PCP FE	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: The table presents the effect of having a low-SES physician for different groups of patients. All columns report estimates from a Difference-in-Differences regression equivalent to equation 2. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. *** p <0.01, ** p <0.05, * p <0.1.

Table A19: Mechanism: The Effect of Physicians' (PCP) Parents' Illness on Mortality

Parental Condition	All cause mortality			CVC mortality	Cancer mortality
	All conditions	CVC	Cancer	CVC	Cancer
	(1)	(2)	(3)	(4)	(5)
PCP low SES x Patient low SES x Post	-0.00114***	-0.00137***	-0.00046	-0.00024	-0.00051**
	(0.00043)	(0.00041)	(0.00040)	(0.00017)	(0.00025)
Outcome mean	.00234	.00234	.00234	.00042	.00098
Gradient for high-SES physicians	.00541	.00541	.00541	.00101	.00182
Observations	3,654,767	3,749,654	3,749,654	3,749,654	3,749,654
Patient Characteristics	Y	Y	Y	Y	Y
Old x new PCP FE	Y	Y	Y	Y	Y

Notes: The table presents the effect of physicians' parents' illness on patient mortality. All columns report the estimates from the triple differences equation 2, replacing SES_j^p with an indicator for the physician's parent receiving treatment for, or dying from the corresponding condition. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. Gradient for high-SES physician is the difference in the outcome variable between high and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered by patient ID.*** p <0.01, ** p <0.05, * p <0.1.

Table A20: Mechanism: The Effect of Physician (PCP) Parental Educational Level on Patient Mortality by Patient Education

	Primary school (1)	High school (2)	Vocational education (3)	Associate degree (4)	Undergraduate degree (5)	Postgraduate degree (5)
Panel A: By patient education						
PCP low SES x Post	-0.00139***	-0.00089***	-0.00049**	0.00007	-0.00020	0.00018
	(0.00034)	(0.00030)	(0.00025)	(0.00059)	(0.00035)	(0.00033)
Outcome mean	.00361	.00322	.00228	.0015	.00142	.00133
Observations	1,067,096	1,289,530	1,335,891	164,854	436,984	522,151
Patient Characteristics	Y	Y	Y	Y	Y	Y
Old PCP FE	Y	Y	Y	Y	Y	Y
Panel B: Concordance effect						
PCP Parent Education x Patient Education x Post	-0.00134***	-0.00038	-0.00023	0.00029	0.00020	0.00085**
	(0.00039)	(0.00081)	(0.00030)	(0.00096)	(0.00036)	(0.00034)
Outcome mean	.00234	.00234	.00234	.00234	.00234	.00234
Gradient for high-SES physicians	.00541	.00497	.00519	.00501	.00509	.00519
Observations	3,749,654	3,749,654	3,749,654	3,749,654	3,749,654	3,749,654
Patient Characteristics	Y	Y	Y	Y	Y	Y
Old x new PCP FE	Y	Y	Y	Y	Y	Y

Notes: Panel A presents the effect of having a low-SES physician for patients with different levels of education, defining low-SES as having a parent with primary school education. All columns report estimates from a Difference-in-Differences regression equivalent to equation 2 for each education group. Panel B presents the effect of a generalized concordance effect, for example, the effect of having a physician with a parent with a vocational education for patients with vocational education. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. *** p <0.01, ** p <0.05, * p <0.1.

Table A21: Internal Validity: The Role of Other Physician (PCP) Characteristics in Reducing the SES-gradient in Mortality

	Most experience	Most Male	Most Ethnic Danish	Most UCPH	Most low-SES patients	Highest academic performance
	(1)	(2)	(3)	(4)	(5)	(6)
PCP characteristic x Patient low SES x Post	0.00021	0.00009	0.00005	0.00047	0.00022	0.00008
	(0.00039)	(0.00037)	(0.00041)	(0.00038)	(0.00040)	(0.00044)
Outcome mean	.00234	.00234	.00234	.00234	00234	00234
Gradient for other physicians	.00491	.00495	.00496	.00476	0.00497	.00541
Effect %	4.3	1.8	1.0	9.9	4.4	-1.5
Observations	3,749,654	3,749,654	3,749,654	3,749,654	3,749,654	3,749,654
Patient Characteristics	Y	Y	Y	Y	Y	Y
Old x new PCP FE	Y	Y	Y	Y	Y	Y

Notes: The table tests for the role of other physician characteristics on the health-SES gradient. All columns report the estimates from the triple differences equation 2, replacing physician SES by the respective physician characteristic. The column "most low-SES patients" refers to physicians having more low-SES patients in the year prior to clinic closures. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. UCPH is the University of Copenhagen. Gradient for high-SES physician is the difference in the outcome variable between high and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered by patient ID. *** p <0.01, ** p <0.05, * p <0.1.

Table A22: Internal Validity: The Effect of Physician (PCP)-patient SES Concordance on Mortality by Physician Characteristic

	Most experienced (1)	Least experienced (2)	Most male (3)	Least male (4)	Non-ethnic Danish (5)	Ethnic Danish (6)	UCPH (7)	Non UCPH (8)
PCP low SES x Patient low SES x Post	-0.00154***	-0.00110**	-0.00169***	-0.00094*	-0.00093	-0.00147***	-0.00198***	-0.00090*
	(0.00055)	(0.00054)	(0.00056)	(0.00053)	(0.00083)	(0.00044)	(0.00065)	(0.00048)
Outcome mean	.00234	.00234	.00234	.00234	.00234	.00234	.00234	.00234
Gradient for high-SES physicians	.00474	.00522	.00495	.00497	.00504	.00489	.00473	.00546
Observations	1,876,444	1,873,210	1,699,672	2,049,982	868,550	2,881,104	1,499,790	2,249,864
Patient Characteristics	Y	Y	Y	Y	Y	Y	Y	Y
Old x new PCP FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance on selected outcomes, see column headings. All columns report the estimates from the triple differences equation 2. All columns report the estimates from the triple differences equation 2, but replace physician being low-SES with another characteristic. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. UCPH is the University of Copenhagen. Gradient for high-SES physician is the difference in the outcome variable between high and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. *** p <0.01, ** p <0.05, * p <0.1.

Table A23: External Validity: The Effect of SES Concordance Using Physician (PCP) Parents' Educational Rank to Define SES

	Death	Death from CVC	Number of Visits	Total Reimbursement	Statins	Hospitalization COPD	Diabetes Checkup
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PCP low SES x Patient low SES x Post	-0.00080*	-0.00038**	0.05378	5.59302**	0.00257	-0.00090*	0.00532**
	(0.00042)	(0.00017)	(0.03594)	(2.55400)	(0.00187)	(0.00054)	(0.00269)
Outcome mean	.00234	.00042	6.24079	332.64699	.10415	.00563	.09522
Gradient for high-SES physicians	.00517	.00101	1.4598	20.10358	.04643	.00866	.0243
Effect %	-15.5	-37.6	3.7	27.8	5.5	-10.4	21.9
Observations	3,749,654	3,749,654	3,140,867	3,749,654	3,749,654	3,749,654	2,123,957
Patient Characteristics	Y	Y	Y	Y	Y	Y	Y
Old x new PCP FE	Y	Y	Y	Y	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance. Physician low-SES equals one if one of the physician's parent has an education level within the bottom 33% of his or her birth cohort. All columns report the estimates of coefficients from the triple-difference equation 2. Patient characteristics include age fixed effects, dummy for being male, non-Danish ethnicity, married, and educational level fixed effects for levels higher than primary school. Gradient for high-SES physician is the difference in the outcome variable between high and low-SES patients who have high-SES physicians in the post period, calculated as (low SES outcome − high SES outcome). The effect as a percentage is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered by patient ID.*** p <0.01, ** p <0.05, * p <0.1.