DOCTOR WHO? THE EFFECT OF PHYSICIAN-PATIENT MATCH ON THE SES-HEALTH GRADIENT*

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Abstract

Health disparities across socioeconomic groups are growing in developed economies. We evaluate the causal effects of concordance, in terms of socio-economic status (SES), between primary care physicians and patients on the health-SES gradient. To measure physicians' socio-economic background, we use the highest level of education of physicians' parents. We find that, while the mortality of high-SES patients does not depend on their physician's family background, SES concordance between physicians and patients decreases low-SES patients' mortality substantially, resulting in a reduction in the SES-mortality gradient. The effect is driven by a large decline in cardiovascular mortality, especially for men. SES concordance improves low-SES patients' health by increasing care at the intensive margin, increasing detection of chronic conditions, and improving adherence to treatment. One potential mechanism is that physicians from low-SES families are more familiar with low-SES patients' medical needs in communication and treatment. In support of this mechanism, we find that low-SES physicians with family members who have had chronic conditions are better at treating low-SES patients, but that effect is not driven by low-SES physicians being better at treating less-healthy patients. *JEL Codes:* I12, I14, J62

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I. INTRODUCTION

Health disparities are large and growing in developed economies (Mackenbach et al., 2018, Deaton, 2013). The *health-SES gradient* has increased across races, while racial health inequality has narrowed, making it an increasingly important source of inequality (Case and Deaton, 2021). Low socio-economic status (SES) individuals have worse self-reported health, more chronic conditions, and shorter life expectancy than high-SES individuals (OECD, 2019). The gap in life expectancy between a college and a high school male graduate in the US is 9 years (Sasson and Hayward, 2019). 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 in terms of SES. Unlike gender and race, the SES of physicians, measured by their childhood SES, is unobserved by the patient.

Primary care physicians' responsibilities cover all aspects of health; they provide long-term care, 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. Understanding how the physician-patient match affects health has important policy implications for patient-physician matching policies and efficiency in healthcare spending. Previous studies have found that similarities between physicians and patients in terms of salient characteristics, such as race (Alsan, Garrick and Graziani, 2019, Greenwood et al., 2020, Ye and Yi, 2022, Frakes and Gruber, 2022), gender (Greenwood, Carnahan and Huang, 2018), or family ties (Chen, Persson and Polyakova, 2022), positively impact patient health, potentially by improving communication and trust. 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 improve patient health? Since all physicians are highly educated, we measure

physicians' SES by their parents' highest level of education, a trait that is unobserved by the patient. We focus on mortality as a main outcome and study potential mechanisms by investigating different causes of death and patient health behaviors.

We use Danish population-wide administrative data for 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 establishing 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) in a triple differences design.[1] We do *not* find evidence for selection on the new physicians' SES, potentially because this characteristic is unobserved by the patient.[2]

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-closure period. High-SES patients' mortality does not depend on their physicians' SES. This means that the reduction in the SES gradient in mortality is caused by improving the health of

[1]Patients need to be alive to match with a new physician to be included in the analysis. When considering mortality, there is, thereby, no variation pre-closure. In these cases, we compare mortality post-closure for high- and low-SES patients matching with a physician from either a high- or a low-SES family, and our triple differences get reduced to a difference-in-difference.

[2]All patients in our analysis experience clinic closure and our empirical design captures the effect of the match with the new physician and *not* the effect of discontinuity in care. 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.

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.

We break down the effect on mortality and focus on deaths caused by chronic conditions, as primary care physicians hold the central role for the diagnosis and management of these conditions (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 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 more services at medical specialists), but not at the extensive margin (likelihood of making *any* visit to their physician's office). (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.[3] (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.

Similarity, or shared identities between the physician and the patient may lead to less miscommunication (Lang, 1986). In a setting where communication is key for diagnosis, mismatch could lead to under-diagnosis (Vellakkal et al., 2013) or under-treatment (Di Cesare et al., 2013). Differences in communication styles in health care are well documented.[4] High-SES patients may have similar social identities to their physicians, as they are all highly educated, which facilitates easier interaction (Lang, 1986, Street, 1991, Thornton et al., 2011). Therefore, physicians from low-SES families may be better prepared to understand low-SES patients' questions and their way of describing symptoms;

[3]Statins are documented to have 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).

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

they may also be more effective in communicating medical advice, which is crucial to the patient's adherence to treatment and health (Ha and Longnecker, 2010). In addition, differences in physician treatment may also arise from statistical discrimination due to differences in prior beliefs and miscommunication (Balsa and 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 relationships. First, evidence suggests that patients are not fully informed about match quality nor its effect on health outcomes (Alsan, Garrick and Graziani, 2019).[5] Second, geo-location constraints and the shortage of primary care physicians limit patients' ability to switch to a better-matched physician. Third, even if patients are able to switch, discontinuity in care may be associated with uncertainty and costs (Bischof and Kaiser, 2021).

Our paper makes a novel contribution by demonstrating that physician-patient SES concordance can mitigate the health-SES inequality substantially. We do so by bridging the literature on health inequality and 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. In addition, we show that primary care physicians have the ability to decrease socio-economic inequality in health. Our findings are especially important in informing policy as health behaviors are difficult to alter via traditional interventions (Cutler, 2004) in which low-SES individuals are shown to respond more slowly (de Walque, 2010, Cawley and Ruhm, 2011). 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). Differences in physicians' behavior translate to differences in quality of care (Simeonova, Skipper and Thingholm, 2022, Fadlon and Van Parys, 2020, Ginja et al., 2022). Studies show that physicians' skill or quality (Doyle Jr, Ewer and Wagner, 2010, Currie and MacLeod, 2020, Dahlstrand, 2021), 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

[5] In line with this, we do not find an effect of SES concordance on the duration of a physician-patient match.

physicians, such as gender, age, and specialization, only explain little of the variation in quality (Ginja et al., 2022).

Second, this paper is closely related to the literature on matching quality as an input in production functions. We focus on matching quality on distance in social identity below.[6] 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. Ye and Yi (2022) and Greenwood et al. (2020) find similar results in hospital settings. Frakes and Gruber (2022) show that racial concordance improve adherence to treatment of chronic conditions. In addition, familial connections between patient and medical expertise, another form of close distance in social identity, is found to improve health and change health behaviors (Finkelstein et al., 2022, Chen, Persson and Polyakova, 2022), although the evidence is mixed (Artmann, Oosterbeek and van der Klaauw, 2022).[7] We contribute to the recent literature that studies the role of patient-physician match by focusing on a physician characteristic that is under-explored and not directly observable, but that is 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 healthcare system (Carneiro, Meghir and Parey, 2013, Lundborg, Nilsson and Rooth, 2014, Cesarini et al., 2016, Polyakova et al., 2020). 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

[6] In educational settings, Card et al. (2022) and Dee (2005) find that teachers who are demographically similar to their students improve student outcomes. In the labor market, Kunze and Miller (2017) find that having a female boss increases the chance of advancing in rank for female workers.

[7] Related to this, Blunch and Datta Gupta (2020) find that mothers in India who have health care workers in their network are more likely to have correct health knowledge, and this effect is stronger for low-SES mothers if there is concordance in terms of caste or religion.

results and robustness checks in Section 4 and conclude in Section 5.

II. 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). Patients are free to switch primary care physician at any point. It costs around $ 31 (205 DDK) to switch, unless the patient moves to another municipality or if the current physician closes their clinic.

Our identifying variation is induced by clinic closures: a vast majority of clinic closures (74%) are due to retirement.[8] 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. Patient are unable to influence their new initial physician. (2) If the clinic is not sold, patients use the online Danish National eHealth Portal to choose a new primary care physician from a list of clinics that are accepting 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 physicians' childhood SES. [9] Physicians' graduating institution is not available on the eHealth Portal. (3) If

[8]Clinic closures are defined as the provider ID stops providing health care, and the physician in the clinic stops working as a primary care physician. 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).

[9]While some names signal family social status, we do not believe this is an issue in our setting. The majority of Danes have last names ending with "-sen." For example, the most common last names in 2010 were Jensen (5.0% of the population), Nielsen (4.9%), and Hansen (4.1%). Even in the richest part of Denmark, more than 45% of the population has a "-sen" last name (Danmarks Statistik, 2010). Thus, the majority of Danes have common last names that do not offer much insight into their social status or family background. Based on a data set of 2358 first names and their socioeconomic outcomes, including the three most common occupations, it was found that names associated with doctors also tended to be associated with other occupations that were not considered high-status. For example, women's names that commonly appeared alongside "doctor" also appeared with job titles such as social and healthcare assistants and preschool teachers. Similarly, men's names associated with "doctor" also

patients do not make an active choice, they are assigned a clinic by the municipality.[10]

In the analysis period, many municipalities had a critical shortage of primary care physicians and many clinics did not accept new patients, which restricted patient choice.[11] There were three medical schools in Denmark following similar curricula and providing a similar quality of training.[12]

II.a 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 collection is 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.

II.a.1 Constructing the analysis sample

To construct the patient analysis sample, we begin with all adults between ages 30-70 in the entire Danish population between 1995 and 2017.[13] We use the Danish National Health Service Register and follow Kjaersgaard et al. (2016) to link every adult to their

frequently appeared in occupations such as carpenters, teachers, or warehouse workers (Kirkegaard and Tranberg, 2015). This suggests that inferring social status from a person's first name is difficult in the Danish setting. While this does not prove that patients cannot infer any information about a physician's social background from their name, it does suggest that doing so is challenging.

[10]We are unable to distinguish between the three ways of reallocation of patients following clinic closure in the data. Simonsen et al. (2021) demonstrates that a significant share of patients end up at the same new clinic post clinic closure. In approximately one-third of the observations, over 80% of patients move to the same new clinics. The large share of patients moving to the same new clinic, could suggest cases where the old clinic is sold to a new physician.

[11]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.

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

[13]We exclude individuals beyond age 70, as a significant proportion of older people reside in nursing homes or in senior living communities, where they can access medical staff affiliated with the facility. Consequently, the allocation of patients to primary care physicians differs significantly for those who live within these arrangements compared to those who do not. In the period of analysis between 10-20 % of the older population lived in these types of arrangements. In addition, many older individuals will be in contact with other health care providers, decreasing the importance of their PCP.

corresponding primary care clinic on an annual basis.[14] We find clinics that close between 1999 and 2016 and define the closure year as the last year with registered services at 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 I. Our main analysis sample is balanced in the pre-period such that we observe patients for at least four years before clinic closure. The patients may pass away in 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. There are 1.8 physicians per clinic in Denmark on average, and 61% of clinics are non-solo. Using physician IDs, we obtain physicians' demographics and their parents' levels of education from the registers. Physicians in the clinics are defined as people with a master degree in Medicine. Some work in clinics as part of their training where they interact with patients. Our results are robust to restricting the sample to physicians who have completed their training, although our sample of physicians is reduced and the share of physicians with missing SES increases. We 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 2 as robustness checks.

II.a.2 Measurement of socio-economic status

We use the highest level of completed education to determine SES. We define patients as low-SES if they have primary school as their highest level of completed education, which corresponds to 9 years of schooling in Denmark. 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). Among the clinics that closed during our analysis period, we are

[14] We can match patients and physicians with more than 98% accuracy using this algorithm (Kjaersgaard et al., 2016). We are only able to match patients to physicians at the clinic level.

able to define the SES on the clinic level for only 8.5% of closing clinics. The low number is drive by that most clinics closed due to physician retirement. Among the non-closing clinics, which were the potential new clinics, we are able to identify the SES on the clinic level for 63.7 % of the clinics. In our analysis, we estimate the effect of SES of the new clinic, hence, this is a sample with fewer missing observation. In our main analysis, we group physicians for whom we do not observe their SES with physicians with high-SES.[15] In Appendix 2 we show that our results are robust to reducing the sample to new clinics for which we have information about the SES.

II.a.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 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 conducted for each patient visit, and the total expenditure the physician is reimbursed for by the regional government for the services provided to the patient.[16] 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 amounts.

II.a.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: cardiovascular conditions (CVC), cancer, diabetes and chronic obstructive pulmonary disease (COPD) (Danish Health Authority, 2015). These diseases account for the majority of the global and national burden of diseases, are leading causes of death, and primary care physicians are central to the

[15]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).

[16]Examples of a service in the Danish data are blood tests, in-person consultations, or phone consultations. Visits can be in-person office visits or phone consultations.

management of these conditions (The Danish Ministry of Health, 2008, Rothman and Wagner, 2003):[17] Many of the common chronic conditions are under-diagnosed: CVC have an under-diagnosis rate of 30-60%, for COPD this figue if 70-80%, and for diabetes it is 20-50% (Falagas, Vardakas and Vergidis, 2007). Although primary care plays a central role in managing chronic conditions, diagnosis is only recorded in hospital admission data in the Danish data.[18] 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.[19] 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. In Appendix 1 we elaborate on the chronic conditions we use and how we measure them in our data.

The conditions have the following in common: (1) They have a close link with health behaviors, such as smoking, lack of exercise, exposure to pollutants, and diet, (2) early detection leads to better outcomes and higher survival rates, (3) the diagnosis process requires communication between primary care provider and patient, and in most cases (4) reducing disease progression in the early stages often does not involve invasive treatments, rather 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.

II.B Descriptive Statistics

Table I 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

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

[18] 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.

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

by SES. Patients who experience a clinic closure in the period of interest are older and more likely to be ethnic Danes compared to the full population.[20] Low-SES patients are older, more likely to be female, and less likely to be married than high-SES patients.[21] High- and low-SES patients are equally likely, a chance of 18 percent, 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 less likely to have a low-SES family background, as shown in Appendix Figure A1 Panel A. Around 25% of physicians and 22% of clinics are defined as low-SES in our sample. Physicians defined as low-SES physicians are more likely to be female and less likely to have a degree from the University of Copenhagen, as shown in columns 4 and 5 of Table I.[22]

II.B.1 Socio-economic inequality in health

While Denmark has equal access to healthcare and education, we still observe a large inequality in health. Figure I 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 education. On average, 0.75% of patients with primary school education as their highest level of completed education 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 patients with higher

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

[21] Patients defined as low SES are also more likely to be ethnic Danish. Immigrants' levels of education are coded differently from non-immigrants, resulting in some missing values. We show in Appendix 2 that our results are robust to excluding non-ethnic Danish patients from our analysis sample.

[22] 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 the educational rank of physicians' parents in the whole adult population to measure their SES. Figure A1 shows that physicians' parents' educational rank is fairly stable across the period.

levels of education. The figure also shows that low-SES patients with low-SES physicians have lower mortality rates compared to low-SES patients with high-SES physicians. The mortality gap between high- and low-SES patients is 12% lower for the group of patients matched with a low-SES physician in the total population.

Figure II summarizes the health-SES gradients across outcomes in the full population, after adjusting for age, gender and year fixed effects. A positive value means that low-SES patients have higher utilization or experience the condition at a higher rate. The figure shows that 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 and have higher healthcare utilization at the baseline. There is also positive gradients in outcomes related to health behaviors, e.g., low-SES patients visit their physician more often. This difference may reflect that 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.

III. 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 reassignment of patients to physicians after these closures.

We employ two empirical strategies. First, we estimate two dynamic difference-in-difference estimations for high- and low-SES patients separately. We use this strategy to evaluate whether 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 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 are matched with either a high- or a low-SES clinic post-clinic closure. This gives us the third difference.

Patients need to be alive to be matched with their new physician to be included in the analysis. When considering mortality, there is, thereby, no variation pre-closure. In these cases, our triple differences get reduced to a difference-in-difference, and we compare mortality post-closure for high- and low-SES patients matching with a physician from either a high- or a low-SES family.

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 of approximately the same age are more likely to be matched post-closure. However, we do not find such evidence on SES, as shown in Table II. The reason could be that physicians' SES is not observed by the patients, so the patients are unable to select a new physician based on this characteristic.[23] Concordance in terms of gender and ethnicity increases the length of the new-physician-patient relationship, c.f. Appendix Table A8. However, we find no evidence of high- or low-SES patients switching physician post-reassignment disproportionally depending on the SES of their new physician. This may suggest that patients are unaware of the quality of the match.

We highlight that our design mimics a randomized experiment as closely as possible. First, as 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 the practical importance of having primary care close to patients' homes,

[23]Controlling for old physician fixed effects does not alter this result. We do not find that patient gender, age, ethnicity, or whether they have been treated for a chronic condition before clinic closure explains 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.

combined with limited availability of open clinics, it is difficult for an experiment to assign patients to physical clinics randomly.

III.A Estimation Equations

We present graphical evidence to test for parallel trends and to explore dynamic effects. 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

$$y_{ijt} = \sum_{\substack{r=-4 \\ r\neq -1}}^{5} \theta_r \times I_r + \sum_{\substack{r=-4 \\ r\neq -1}}^{5} \theta_r^{SES} \times I_r \times SES_j^p + x_{it}^p \beta + x_{jt}^d \phi + \kappa(GP_i^{-1}) + \epsilon_{ijt}, \qquad (1)$$

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 value 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. I_r is an indicator that takes the value one in period r. The parameter θ_r illustrates how patient health or health behavior changes in relative time period r relative to one period prior to clinic closure and thus measure the clinic closure effect. The parameter of interest is θ_r^{SES}. This parameter illustrates the additional effect from clinic closure of getting a new physician from a family with low levels of education post-clinic closure.

As we estimate the equation separately for patients with high and low SES, we do not compare effect on health from clinic closure between high- and low SES patients, but only the additional effect on health from new physician SES. We test for parallel trends by examining health outcomes prior to clinic closure using θ_r^{SES} in the period before clinic closure.

x_{it}^p is patient-specific characteristics, such as age, gender, and ethnicity. For mortality outcomes, our specification includes old physician fixed effects, GP^{-1}. When we include old physician fixed effects, we compare health outcomes for patients of the same social status who had the same old physician but ended up with a new physician with different

social backgrounds. x^d is *new* physician controls measured at the clinic level, including age, gender, ethnicity, and graduating institution. We control for new physician observables as physician SES correlates with other characteristics, such as gender and age. See Table I. For non-mortality outcomes, we replace old physician fixed effects, GP^{-1}, with individual fixed effects, and compare outcomes within individuals before and after clinic closure.

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

$$\begin{aligned} y_{ijt} = \tau \times post_{it} \times SES_j^p \times SES_i + \alpha \times post_{it} \times SES_j^p + \rho \times post_{it} \times SES_i \\ + \delta \times SES_j^p \times SES_i + \iota \times SES_i + \sigma \times Post_{it} + \gamma(GP_i^{-1}) + x_{it}^p \beta + \epsilon_{ijt}, \end{aligned} \tag{2}$$

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. Again, for non-mortality outcomes, we replace previous physician fixed effects with individual fixed effects. We include four years prior to and three years after the clinic closure.[24] We cluster standard errors on the new physician level for mortality and on the patient level for non-mortality outcomes.

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 effect of SES concordance on the health gradient. When estimating the effect on mortality, our triple-differences strategy is in, practice, reduced to a difference-in-difference strategy. As there is no variation in the pre-period, the variable of interest is, thereby, $SES_j^p \times SES_i$.

Our identification strategies use 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'

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

underlying trends in health and health behavior do not systematically differ by the SES of the physician they get after clinic closures.

IV. EFFECTS OF PHYSICIAN-PATIENT SES CONCORDANCE

This section presents two sets of main results. First, we explore 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, and explore the external validity of our results.

IV.A SES Concordance Effects on Mortality

We begin by presenting the results for all-cause mortality in an event study design following equation 1. Figure III shows coefficients from 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 red solid line shows the effect of being matched with a low-SES physician after clinic closure for low-SES patients, relative to low-SES patients who are matched to a high-SES physician. The blue dashed line shows the same effect for high-SES patients. We compare patients who had the same pre-closure physician but match with a physician with a different social background following the clinic closure.

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 are zero by design. In order to test for the parallel trends assumption in mortality, we use deaths that take place before clinic closure in the closing clinics. We define treatment for deceased patients at the clinic level using the physician reassignment of their *peer* patients who are alive when clinic closure takes place. Figure III shows that treatment and control groups are on the same mortality trajectory prior to clinic closure.[25]

[25]We assume that the patients who passed away before clinic closures would have been matched with

Figure III shows 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 are matched with a high-SES physician. Meanwhile, mortality rates for high-SES patients do not depend on their new physician's SES. This shows that the health of low-SES patients is sensitive to their primary care physician.

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 originates from low-SES patients with low-SES physicians (the treatment group) experiencing lower mortality in the initial years, and the fade-out originates from these patients returning to the mortality levels of low-SES patients who are with high-SES physicians, see Figure A2. This suggests that SES concordance delays death and extends the life of low-SES patients.

We estimate the *relative* change in mortality measured by the difference between the solid and dashed lines in Figure III using a reduced version of equation 2. Table III shows the estimation results using mortality as the outcome with varying controls and fixed effects. The coefficient of interest, the interaction term, is similar across specifications and is robust to controlling for patients' characteristics, old physician fixed effects, and other physician characteristics. In addition, the result is also robust to controlling for both old and new physician fixed effects to account for potential selection issues.[26] Our preferred specification is shown in column 4. The estimate indicates that the treatment group (low-SES patients matched with low-SES physicians in the post-period) experiences a 0.124 percentage point decrease in the probability of dying, relative to comparison groups in

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

[26]While we find no evidence of selection, we address potential concerns about endogenous reassignment in physician-patient pairs by employing a *trajectory fixed effect*. Trajectory fixed effects refer to taking fixed effects on the pre-post closure physician interaction. The triple interaction coefficient therefore compares the gradient in mortality between 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 I. Under the assumption of random selection of the post-closure physician, and conditioning on pre-closure physician, the trajectory fixed-effects should not affect the estimation. Consistent with this, we do not find that adding trajectory fixed effects affect our estimation results substantially, suggesting that that non-random selection of the post-closure physician is *not* an issue for our empirical strategy.

the first three years after clinic closure. For ease of interpretation, we translate the effect into changes in the SES gradient. We compare the estimate of the interaction term to the difference in mortality between high- and low-SES patients who have a high-SES physician after clinic closure. The SES gradient of high-SES physicians is 0.54 percentage points. The SES gradient in mortality for patients of low-SES physicians thereby decreases by $((0.124/0.541) * 100 =)$ 22.9% in our preferred specification.

We examine which groups are the most susceptible to the SES concordance effect. As shown in Appendix Table A11 column 1, the observed effect on mortality is most pronounced for men, with a reduction in the SES-mortality gradient by 27%. The effect size is similar for the older and younger birth cohorts.

IV.A.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 IV column 1 shows that, in the 3 years following clinic closure, low-SES patients matched with low-SES physicians experience a lower probability of dying from CVC by 0.043 percentage points compared to comparison groups in our preferred specification. Comparing the estimate to the baseline gradient, we find that SES concordance lowers this SES gradient in CVC mortality by 42%. This effect is almost twice the size of the point estimate for all-cause mortality, suggesting that the reduction in deaths due to CVC accounts for a substantial part of the reduction in all-cause mortality. Given the acute nature of CVC deaths, the result aligns with the fact that we observe that mortality drops 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 22%. Columns 3 and 4 show that we find no significant effect of SES concordance on mortality related to diabetes and COPD.

Table A11 reports the estimates on the effect on different causes of death by gender

and birth cohorts. The effect on CVC and cancer mortality is driven by the older sample.[27] The SES concordance effect on CVC mortality is largest for men, reducing the SES gradient for CVC mortality for men by 53.9% in the first three years after clinic closure. The SES concordance effect on cancer mortality is driven by women, although it is not statistically significant.[28]

IV.B SES Concordance Effects on Health behaviors

We explore how SES concordance affects patient health by examining 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 V 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 IV Panels A and B show an increase in the number of visits and total primary care physician fee-for-service reimbursements for low-SES patients when there is SES concordance with their post-closure physician, 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 trajectories in terms of their health care utilization.

The triple differences results are shown in Table V. SES concordance increases the SES gradient in number of visits and mean services per visit by 9.1% and 23.3%, 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 2.9 per year, as shown in Appendix Table A13.[29] In addition, we also find an increase in spending on

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

[28] Deaths by cancer types are infrequent in the data; the largest point estimates are for lung cancer.

[29] Reimbursement is not conditioned on at least one visit, which number of visits and services per visit are.

medical specialists, and an increase in referrals to specialized care for men, which reduces the SES gradient in medical specialist visits by 35.4%, see Panel B of Appendix Table A14 column 3 and Table A12 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 section IV.b.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.[30][31]

IV.b.1 Health behaviors related to chronic conditions

We next consider health behaviors related to chronic conditions. Since treatment of cancer takes place in non-primary-care settings, we discuss the behavior related to cancer in Section IV.c.

Cardiovascular Conditions (CVC) First, we examine health behaviors related to cardiovascular conditions to find a potential explanation for the decline in CVC mortality in response to SES concordance. In Figure IV Panel C, we see that low-SES patients' statin use increases immediately after being matched with low-SES physicians post-clinic closure, while no such effect is present for high-SES patients. Pre-closure estimates display parallel trends. Triple differences results in Table VI Panel A and Appendix Table A11 column 1 show that SES concordance increases statin use by 0.286 percentage points in the overall population, and by 0.313 for men. We do not find any effect on ACE inhibitors use. Combined with the decrease in CVC mortality, the results suggest that low-SES patients are under-diagnosed or under-treated for CVC at the baseline.

Chronic obstructive pulmonary disease (COPD) The variables of interest related to COPD include both medication and avoidable hospitalization due to COPD. We do

[30] 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.

[31] In Appendix Table A12, we see that number of services per visit (column 3) is large for women. Visits to the PCP could be pregnancy related. In additional analysis, we check if these could be driven by visits or services related to pregnancy. We do not find any effect on PCP visits or services related to pregnancy.

not find that COPD medication use responds to SES concordance. However, we observe a stark reduction in avoidable COPD hospitalizations, as shown in Figure IV Panel D. Our preferred triple differences estimate in Table VI Panel A column 3 shows that SES concordance reduces the SES-gradient in COPD avoidable hospitalizations by 13.8% 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 26.4% and 17.9% reduction in the SES gradient, respectively (see Table A16 column 7).

Diabetes Following treatment guidelines for diabetes, we study how metformin prescriptions and annual diabetes checkups respond to SES concordance. Figure IV Panel E shows that 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 is short-lived. Triple differences results in Table VI 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 diabetes management could explain part 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, see Appendix Table A16.

Consistent with dynamic effects on mortality, we see that most effects on health behavior fade out over time. This pattern persists in a balanced sample and in a sample in which patients stay with the new physician five years after reassignment, see Appendix Table A4. This suggests that the fade out is not driven by a change in the composition of patients, or changes in the physician assignment in the post-period. 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 2.

IV.C 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 following four: (1) increased adherence to medical guidelines, (2) increased detection of chronic conditions, (3) physicians' personal experience with chronic conditions, and (4) decreasing returns to baseline health.

Adherence and detection effects To study the adherence and detection effects, we group patients by whether they received treatment for any of the four chronic conditions before clinic closure ("previously diagnosed" and "not previously diagnosed"), and study the SES concordance effect on mortality and health behavior for these two groups. The medical literature uses adherence rates and avoidable hospitalizations to proxy for patient-physician communication quality (see, e.g., Ha and Longnecker 2010, or Oster and Bindman 2003).[32] Therefore, adherence effects speak to whether SES concordance improves communication between physicians and patients; thus allowing physicians to make relevant information more salient and increasing health literacy.

Table VI Panels B and C show the effects of SES concordance on adherence and detection (i.e., for patients previously diagnosed and not previously diagnosed). 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 lung cancer since primary care physicians play a crucial role in the decision to test. Early detection is especially important for lung cancer due to its low survival rate. While we do not observe a statistically significant effect on average (see Panel B column 4 of Table VI), 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 IV Panel F and Appendix Table A16 column 4. The result on lung scans provides suggestive evidence that the decline in cancer mortality may go through earlier detection of lung cancer.

[32]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.

Columns 5 and 6 show that all-cause mortality decreases mainly for the previously diagnosed patients with any of the four chronic conditions, while SES concordance mainly reduces CVC mortality through a detection effect. The fact that we do not find an increase in statin prescriptions, 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.[33]

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 who, after clinic closure, are matched with a new physician who has personal experience with a chronic condition can reduce the SES gradient in mortality. We define a physician as having personal experience with chronic conditions if the physician had a parent who died from or has received treatment for one of the four conditions: CVC, cancer, diabetes, COPD.[34]

Figure V and Appendix Table A18 show that physicians' personal experience with chronic conditions is a relevant channel. 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. The effect is very close to the effect found on SES concordance, which is represented by the red line in Figure V. The same applies

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

[34] 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. Physicians from low-SES families are more likely to have a parent who died from cancer, a parent having diabetes, or COPD. But slightly less likely to have a parent who have died from or received treatment for a CVC.

to physicians who have a parent who has CVC or died of cancer.

Decreasing returns to baseline health Another potential channel is that low-SES physicians are better at treating the frailest patients, and the effect of having a low-SES physician is decreasing in patient health status at the baseline. According to this hypothesis, the frailest patients have the highest return from having a low-SES physician, regardless of their own SES. To test whether this is the case, we define patients' health status by whether they received treatment for one or more chronic conditions before clinic closures.[35] Appendix Table A17 column 2 suggest that, while low-SES patients with a chronic conditions benefit more from getting a low-SES physician after clinic closure compared to a high-SES physician, high-SES patients with chronic conditions do not. This suggests that decreasing returns in baseline health are not a driving mechanism.[36]

IV.D Internal Validity - the role of other physician characteristics

A threat to internal validity is the correlation between physician SES with 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 I. 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_j^p treatment dummy in equation 2 with an indicator for another physician characteristic, for example, experience.

Figure V and Appendix Table A20 show that matching the most experienced physicians with low-SES patients does not reduce the SES-gradient in mortality. Neither does

[35]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.

[36]When splitting by the different types of chronic conditions (CVC, diabetes, COPD, and multiple conditions), the sample sizes become small, the standard errors large, and the results difficult to interpret. While 8 out of 9 coefficients have a negative sign for low-SES patients, only two out of the 9 coefficients have a negative sign for high-SES patients. Additionally, the coefficients for high-SES patients are also an order of magnitude smaller than the coefficients for low-SES patients. From Appendix Table A17 we also 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.

matching patients with clinics that have more male physicians, more physicians with their degree from the University of Copenhagen, or more ethnic Danish physicians.[37]

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 high school academic performance (GPA) upon entering medical school. While all physicians have high grades, there is still variation in their GPAs. We define physicians as "high quality" if their grades are among the top 33% in the whole physician population.[38] Figure V and Appendix Table A20 column 6 show that physicians of "higher quality" do not affect the SES gradient in mortality differently compared to physicians of lower "quality". This suggests that higher quality physicians cannot substitute low-SES physicians.[39] In addition, we do not find that experience with low-SES patients, as measured by having a higher share of low-SES patients the year before clinic closure, makes physicians decrease 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.

IV.E External validity - generalization of the concordance effects

The share of the Danish population that has 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

[37] We can also see this by splitting the analysis sample by gender, experience levels, and ethnicity in Appendix Table A21. 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.

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

[39] The GPA cut-off to enter the different medical school differs. Excluding the the analysis sample to physicians graduating from University of Copenhagen only does not changes these results.

"rank" is much lower for the latter. 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 the robustness of our results using educational rank within birth cohorts to define SES.[40] We define physicians to be low-SES if they have a parent whose educational level is among the bottom third in their birth cohort. Figure V and Appendix Table A22 show the estimates when using parental educational rank to define physicians' social background. The estimates are robust to substituting the *level* of parental education by the *rank* of parental education, although the estimates are somewhat smaller than the main results.

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 on both the patient and physician side. As shown in Appendix Table A19, 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 III, in which we do not see that high-SES patients' mortality depends on their physicians' SES.

V. CONCLUSION

This paper studies the effect of physician-patient SES concordance on the socioeconomic gradient in health. We exploit variations 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 show that physicians' family background impacts the way they interact with low-SES patients, and that low-SES physicians can mitigate

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

a substantial part of the SES gradient in health by changing patients' health behaviors. Health behavior is difficult to alter via traditional interventions (Cutler, 2004), especially among low-SES individuals (Cawley and Ruhm, 2011, de Walque, 2010). Our results illustrate that the match between physician and patient is important, especially for the most vulnerable groups, in line with Alsan, Garrick and Graziani (2019), and that primary care physicians play an important role in mitigating socio-economic inequality in health.

By showing the profound impact of physicians' childhood SES, we highlight that early life environments play an important role in the focal person's interactions later in life. The results may generalize beyond healthcare settings, and could potentially be broadened to social work, education, and legal settings, etc. Understanding how the match between physicians and patients affects health behaviors has important policy implications for optimizing physician-patient matches and efficiency in government healthcare spending.

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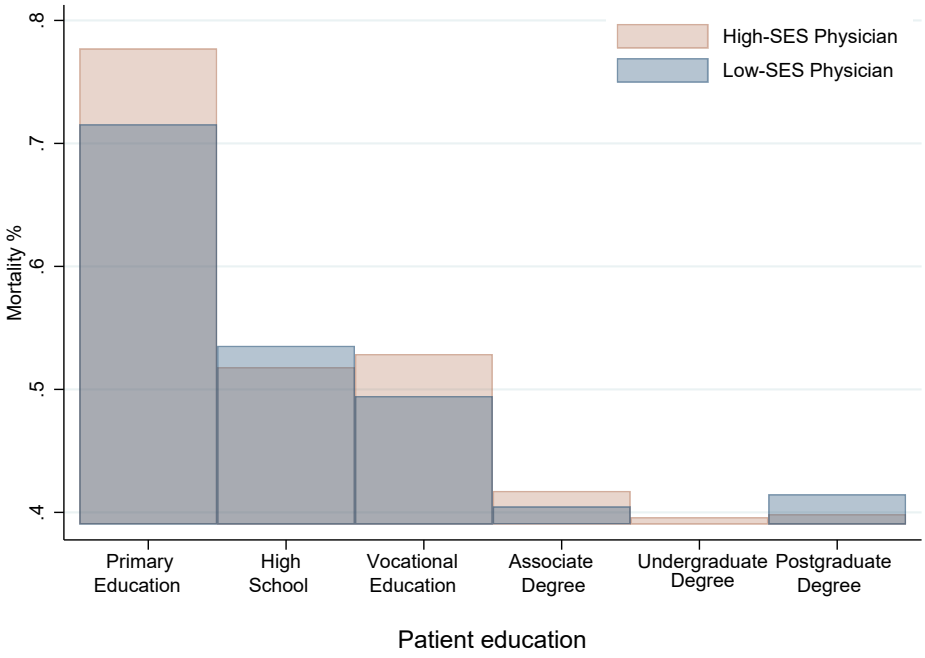


Figure I:
One-Year Mortality by Patient Education and Physician SES

Note: The figure plots one-year mortality rates by patient education and physician SES in the full Danish adult population between ages 30-70 (mean age: 48.7), adjusted for age, gender, and year fixed effects.

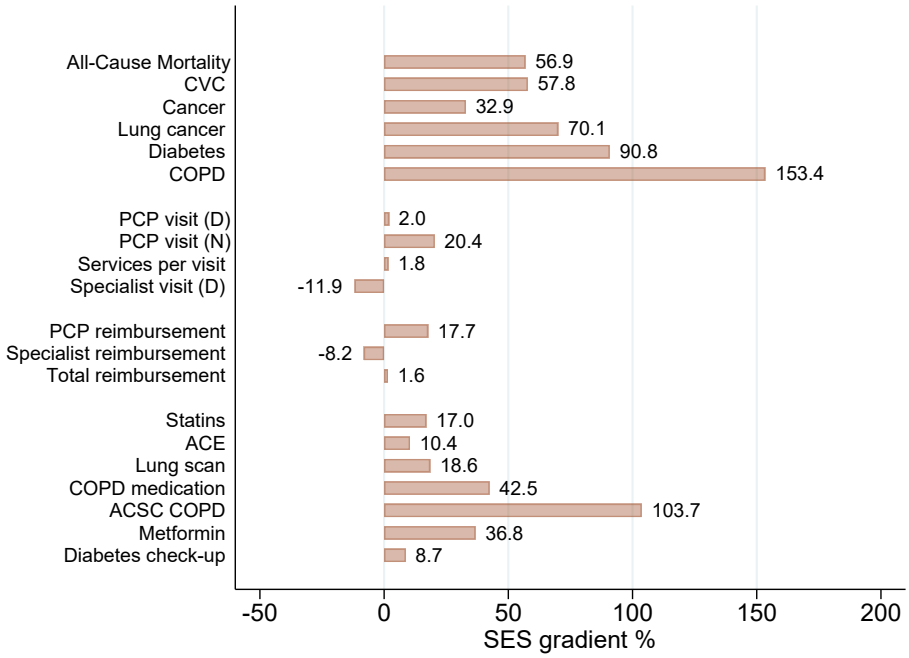


Figure II:

Health-SES Gradient by Outcomes of Interest

Note: The figure presents the SES gradient by outcomes of interest in the full Danish adult population between ages 30-70 (mean age: 48.7) adjusted for age, gender, and year fixed effects. See Section II.a for definitions of variables. The gradient for 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 hospitalizations with an ambulatory care sensitive condition.

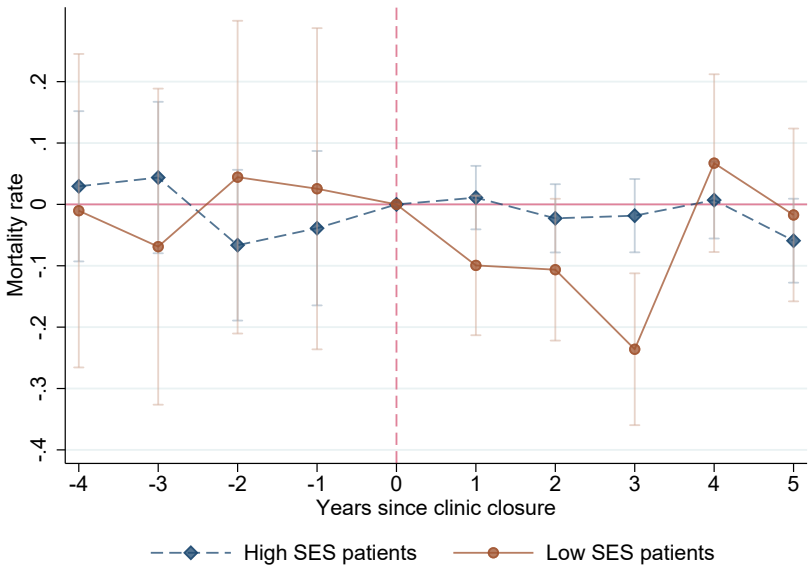
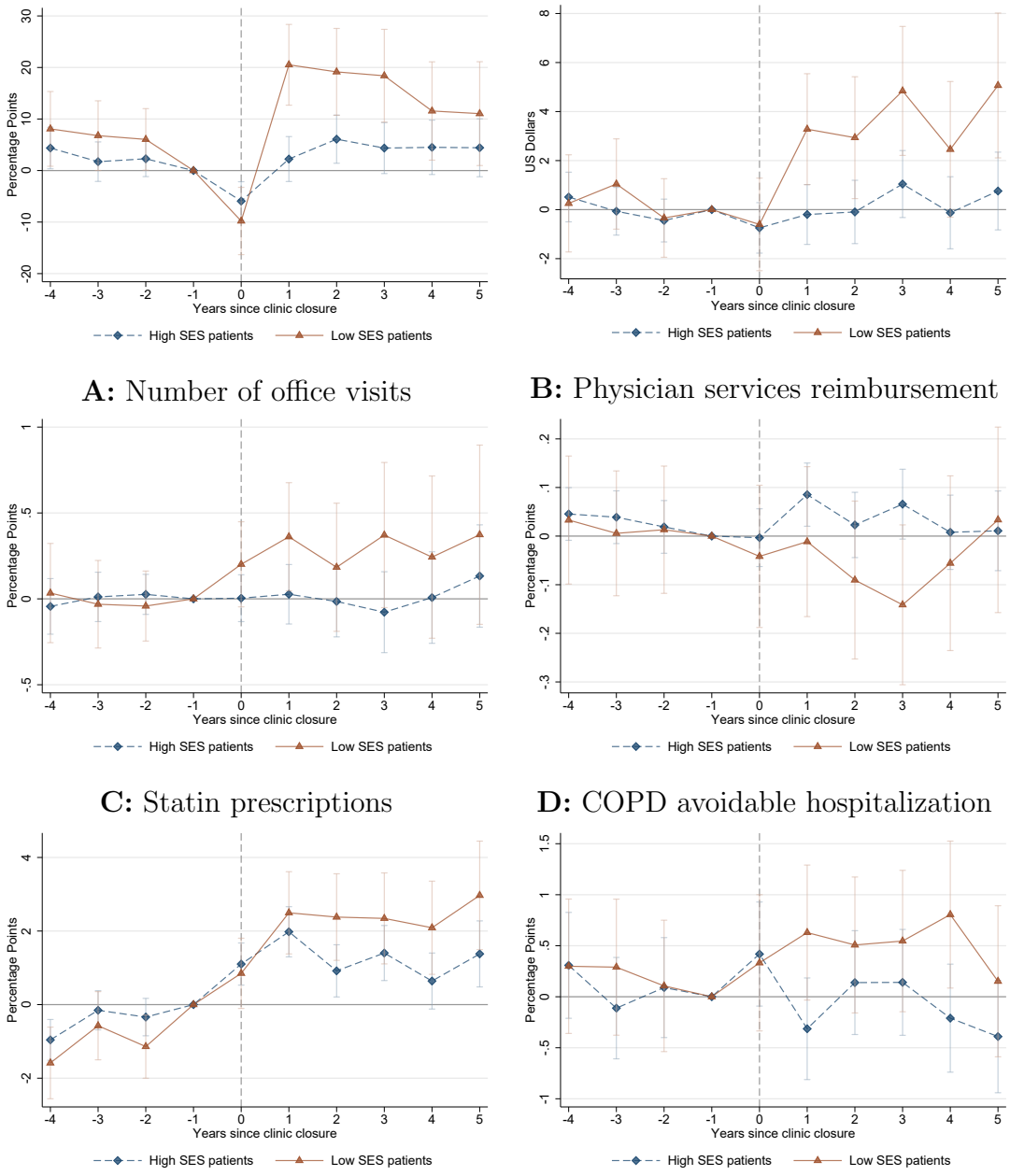


Figure III:
The Effect of Physician-Patient SES Concordance on Mortality

Note: The figure presents the effect of physician-patient SES concordance on mortality. The red solid (blue dashed) line plots the estimates and 95 percent confidence intervals of the event dummies in equation 1 using mortality as the 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 red solid (blue 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. The regressions control for old physician fixed effects, year fixed effects, new physician characteristics (aggregated on the clinic level: 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, dummies for being male, non-Danish ethnicity, and married. The estimation results can be found in Appendix Tables A9 and A10. Standard errors are clustered at the new physician level.



A: Number of office visits

B: Physician services reimbursement

C: Statin prescriptions

D: COPD avoidable hospitalization

E: Diabetes checkup

F: Lung scan for older women

Figure IV:
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 II.a for the definitions of the outcomes. The red solid (blue 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. All regressions control for patient fixed effects, year fixed effects, and patient characteristics. Patient characteristics include age fixed effects and a dummy for being married. Older females are born before 1958. The estimation results can be found in Appendix Tables A9 and A10. Standard errors are clustered by patient ID.

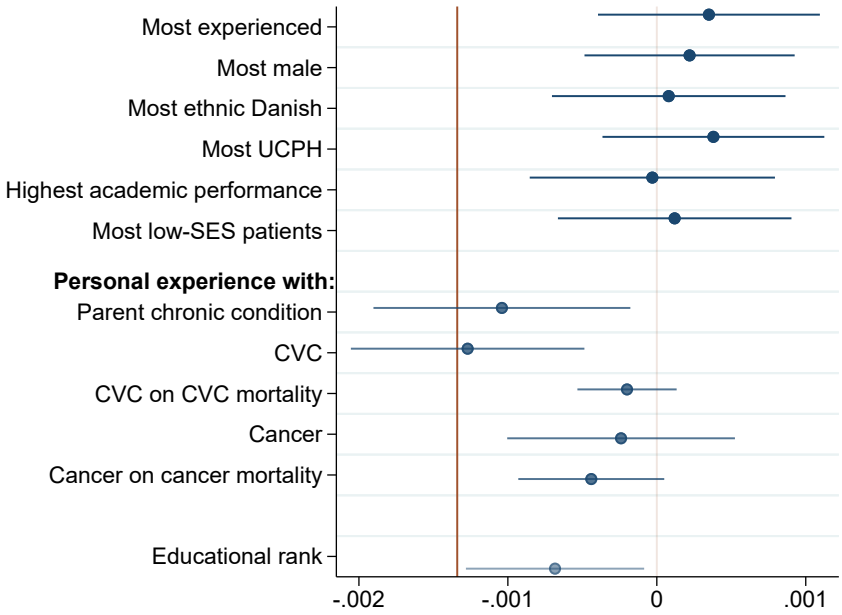


Figure V:

Effect of Physician Characteristic on the SES-Mortality Gradient

Note: The first six rows show the effect of having a physician with the corresponding characteristics on the SES mortality gradient, estimated using equation 2, replacing SES_j^p with an indicator function of the respective physician characteristic. UCPH is the University of Copenhagen. The bottom six rows show the effect of having a physician who had a parent with the indicated chronic condition on patient overall mortality and mortality caused by the corresponding condition, estimated using equation 2, but replacing SES_j^p with an indicator function that equals one if the physician's parent experiences the condition. Regression results can be found in Appendix Tables A18 and A20. The red line represents the main result reported in Table III.

Table I:
SUMMARY STATISTICS - PATIENTS, PHYSICIANS, 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. Patients are Low-SES if they have primary school as the highest level of completed education. PCP stands for primary care physician and includes all people with a master's degree in medicine working in a primary care clinic. Physicians are low-SES if one of their parents has primary school as their highest level of education. Clinics are low-SES if at least one physician in the clinic is defined as low-SES. The patient sample in column 3 is 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.

Table II:
SELECTION IN PHYSICIAN-PATIENT REASSIGNMENT AFTER CLINIC CLOSURE

	Physician characteristics			
	(1)	(2)	(3)	(4)
	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

Notes: The table tests for selection in patients' reassignment to new physicians post-clinic closures. The table shows coefficients from regressing an indicator of a physician characteristic on the same patient's 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, a dummy for being a solo clinic, number of physicians in the clinic, graduating institutions, and SES. Patient characteristics include age fixed effects, dummies for being male, non-Danish ethnicity, married, and a low-SES dummy. Standard errors are clustered at the new physician level. *** p <0.01, ** p <0.05, * p <0.1.

Table III:
THE EFFECT OF PHYSICIAN (PCP)-PATIENT SES CONCORDANCE ON MORTALITY

	(1) Death	(2) Death	(3) Death	(4) Death	(5) Death
PCP low SES	-0.00008	-0.00006	-0.00021	0.00004	
	(0.00016)	(0.00016)	(0.00023)	(0.00024)	
Patient low SES	0.00534***	0.00361***	0.00341***	0.00336***	0.00332***
	(0.00023)	(0.00022)	(0.00022)	(0.00023)	(0.00023)
PCP low SES x Patient low SES	-0.00129***	-0.00125***	-0.00129***	-0.00124***	-0.00100***
	(0.00036)	(0.00035)	(0.00035)	(0.00036)	(0.00038)
Outcome mean	.00234	.00234	.00234	.00234	.00234
Gradient for high SES physicians	.00541	.00541	.00541	.00541	.00541
Effects %	-23.81	-23.1	-23.81	-22.9	-18.44
Observations	1,331,209	1,331,209	1,331,206	1,306,151	1,328,259
Patient characteristics	N	Y	Y	Y	Y
New PCP characteristics	N	N	N	Y	N
Old PCP FE	N	N	Y	Y	N
Old x new PCP FE	N	N	N	N	Y

Notes: The table presents the effect of physician-patient SES concordance on mortality. All columns report estimates from the triple differences equation 2 with different controls and restricted to the post-period. Physician characteristics are aggregated on the clinic level and include mean age, share of male physicians, share of ethnic Danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution. Patient characteristics include age fixed effects, dummies for being male, non-Danish ethnicity, and married. "Gradient for high-SES physicians" 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). "Effects %" is calculated as (interaction estimate/gradient for high-SES physician) × 100. Column 4 is our preferred specification. Standard errors are clustered at the new physician level. *** p <0.01, ** p <0.05, * p <0.1.

Table IV:
THE EFFECT OF PHYSICIAN (PCP)-PATIENT SES CONCORDANCE ON MORTALITY CAUSED BY CHRONIC CONDITIONS

	(1)	(2)	(3)	(4)
Cause of death	CVC	Cancer	Diabetes	COPD
PCP low SES × Patient low SES	-0.00043***	-0.00040*	0.00007	-0.00003
	(0.00016)	(0.00024)	(0.00007)	(0.00010)
Outcome mean	.00042	.00098	.00007	.00011
Gradient for high-SES physicians	.00101	.00182	.00017	.00048
Effects %	-42.22	-22.22	38.71	-6.58
Observations	1,306,151	1,306,151	1,306,151	1,306,151
Patient characteristics	Y	Y	Y	Y
New PCP characteristics	Y	Y	Y	Y
Old 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 estimates from the triple differences equation 2 restricted to the post-period. Physician characteristics are aggregated on the clinic level and include mean age, share of male physicians, share of ethnic Danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution. Patient characteristics include age fixed effects, dummies for being male, non-Danish ethnicity, and married. "Gradient for high-SES physicians" 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). "Effects %" is calculated as (interaction estimate/gradient for high-SES physician) × 100. Standard errors are clustered at the new physician level. *** p <0.01, ** p <0.05, * p <0.1.

Table V:
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	-0.00110	0.13278***	0.01382**	0.00305
	(0.00172)	(0.03198)	(0.00554)	(0.00230)
Outcome mean	.83866	6.24079	1.44509	.33085
Gradient for high-SES physicians	.02435	1.4598	.05943	-.01524
Effects %	0	9.1	23.25	-19.99
Observations	3,749,654	3,140,867	3,749,654	3,749,654
Patient characteristics	Y	Y	Y	Y
Patient FE	Y	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance on healthcare utilization. All columns report estimates of coefficients from the triple-difference equation 2. Patient characteristics include age fixed effects and a dummy for being married. "Gradient for high-SES physicians" 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). "Effects %" 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 VI:
THE EFFECT OF PHYSICIAN (PCP)-PATIENT SES CONCORDANCE ON HEALTH BEHAVIORS, DISEASE DETECTION, AND TREATMENT ADHERENCE

	(1) Statins	(2) Diabetes Checkup	(3) COPD Hospitalization	(4) Lung scans	(5) All-cause mortality	(6) CVC mortality
Panel A: Health Behavior						
PCP low SES × Patient low SES × Post	0.00286*	0.01061***	-0.00119**	0.00109		
	(0.00161)	(0.00262)	(0.00049)	(0.00113)		
Gradient for high-SES physicians	.04643	.0243	0.03277	0.0344		
Effects %	6.2	43.6	-13.8	12.3		
Panel B: Detection Effect						
PCP low SES × Patient low SES × Post	0.00008	0.00685***	-0.00091***	-0.00118	-0.00064	-0.00040***
	(0.00146)	(0.00220)	(0.00031)	(0.00162)	(0.00039)	(0.00015)
Effects %	.45	35.35	-38.1	-38.1	-16.3	-47.7
Observations	3,214,944	1,563,118	3,245,792	2,176,305	833,268	1,146,758
Panel C: Adherence Effect						
PCP low SES × Patient low SES × Post	0.01423**	0.02161***	-0.00374		-0.00193***	-0.00045
	(0.00710)	(0.00648)	(0.00301)		(0.00072)	(0.00069)
Effects %	84.67	72.16	-10.24		-28.6	-32.3
Observations	464,280	494,637	433,432		472,881	159,389
Patient characteristics	Y	Y	Y	Y	Y	Y
New PCP characteristics	N	N	N	N	Y	Y
Patient FE	Y	Y	Y	Y	N	N
Old PCP FE	N	N	N	N	Y	Y

Notes: The table presents the effect of physician-patient SES concordance on health behaviors. All columns report estimates of coefficients from the triple-difference equation 2. Physician characteristics are aggregated on the clinic level and include mean age, share of male physicians, share of ethnic Danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution. Patient characteristics include age fixed effects, dummies for being male, non-Danish ethnicity, and married **Panel B** restricts the sample to patients who are not previously diagnosed, as defined by never having received the corresponding treatment in the pre-period. **Panel C** restricts the sample to patients who are previously diagnosed, as defined by having received the corresponding treatment in the pre-period. Previously- and not-previously diagnosed in Panels B and C are defined in 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 panel B uses first time use of lung scans as the outcome. Column 5 splits the mortality effect on whether the patients had been treated for any of the chronic conditions. "Gradient for high-SES physicians" 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). "Effects %" is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered by patient ID in columns (1)-(4) and at the new physician level in columns (5) and (6). *** p <0.01, ** p <0.05, * p <0.1.

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

Ida Lykke Kristiansen and Sophie Yanying Sheng

Appendix 1. CHRONIC CONDITIONS

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 hyperlipidemia and hypertension (Danish College of General Practitioners, 2022*a*). Statins reduce CVC mortality and major coronary events by 70 percent for patients at risk (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,[1] and (2) avoidable hospitalizations due to COPD.[2]

Diabetes Around 8% of the Danish adult population has been diagnosed with diabetes. Low-SES individuals 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, and

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

[2] 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).

the condition is a common cause for heart disease and stroke (Danish College of General Practitioners, 2022*c*). Guidelines published by the American Diabetes Association refer to a care model with proactive practice teams and informed activated patient as the first-line of treatment (American Diabetes Association Professional Practice Committee, 2022). The care model involves an annual checkup 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.[3]

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 (Danish Health Authority, 2009). Lung cancer is often diagnosed after the disease has spread, as symptoms do not appear in the early stages; The 1-year survival rate was 33-38 percent in the period from 2000-2009 (NORDCAN, 2022). Therefore, early detection of lung cancer is key to increasing the likelihood of survival. Unlike the three diseases described above, diagnosis and treatment of cancer primarily take place in specialists' offices or in hospital settings. Primary care physicians play a role in the initial stages by making referrals to specialists. To study physicians' behavior in relation to cancer, we look at patients' use of services related to detect lung-cancer using thorax scans (x-rays and CT-scans).

[3]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.

Appendix 2. ROBUSTNESS CHECKS

In this section we discuss robustness checks in relation to the data limitations we face.

Addressing potential selection using primary care shortage In section III, we provided evidence of that there was no selection in the formation of new physician-patient pairs. In this section, we further deal with concerns of selection by making 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 has 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 an 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 care physician shortage. We define primary care shortage as occurring in municipalities and years where the average patient per clinic exceeds 1600.[4] Closures in 458 clinics containing more than one million patients in our analysis sample satisfy this criterium. We use this sub-sample of patients to conduct the analysis on our main outcomes from section IV. Appendix Table A1 Panel A shows that our main results are robust to using this sub-sample of patients that have a limited choice of new physician.

Excluding Non-ethnic Danish patients A limitation of the data 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 patients and repeat the main analysis in Appendix Table A1 Panel B and show

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

that most of our main outcomes are robust to restricting our sample to ethnic Danes.

Alternative aggregations of Physician SES Claims data from Denmark allow 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 on the clinic level 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 consults 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 II.a, we are unable to identify the SES of physicians born before 1960. This applies to 36% of physicians in non-closing clinics. As a robustness check, we restrict our sample to clinics 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 above.

The table shows that our results are robust to excluding observations with missing SES information. While the estimates are somewhat smaller for all-cause mortality, our estimate is included in the confidence interval, hence we cannot reject that the estimates are significantly different from each other. From the table, we see that the average mortality rate and the SES gradient is smaller for all cause mortality in this restricted sample compared to in the main sample. A reason for the slightly smaller estimate could be that

the patient sample differ somewhat. For the other outcomes the coefficients are either similar or slightly larger to the main results.

Patient Survival and Switching Physicians The sample in the main analysis uses a panel that is balanced only in the pre-period. We have chosen this sample restriction to allow for patients to pass away in the post-period. Table A4 Panel A shows that our results on non-mortality outcomes are robust in a balanced sample in which patients survive at least five years after clinic closures. This illustrates that the effects we find are *not* exclusively 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 their initial new physician post-clinic closure in all five post-periods. The effects we find do not seem to be driven by patients who switch physician in the post period.

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

	(1) Death	(2) Death from CVC	(3) Number of Visits	(4) Total Reimbursement	(5) Statins	(6) Hospitalization COPD	(7) Diabetes Checkup
Panel A: Restricted choice sample							
PCP low SES x Patient low SES x Post	-0.00144*	-0.00041	0.22901***	16.76427***	0.00281	-0.00103	0.00086
	(0.00081)	(0.00033)	(0.06896)	(5.42656)	(0.00339)	(0.00115)	(0.00424)
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
Effects %	-23.8	-36.4	15.59	61.79	4.34	-9.84	7.56
Observations	333,616	333,616	869,593	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	-0.00119***	-0.00037**	0.11773***	7.22799***	0.00205	-0.00119**	0.00951***
	(0.00036)	(0.00016)	(0.03286)	(2.32242)	(0.00166)	(0.00050)	(0.00270)
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
Effects %	-22.6	-38.5	7.43	26.28	4.24	-13.5	37.99
Observations	1,187,572	1,187,572	2,785,947	3,340,833	3,340,833	3,340,833	1,852,979
Patient characteristics	Y	Y	Y	Y	Y	Y	Y
New PCP characteristics	Y	Y	N	N	N	N	N
Patient FE	N	N	Y	Y	Y	Y	Y
Old PCP FE	Y	Y	N	N	N	N	N

Notes: The table presents the effect of physician-patient SES concordance on main outcomes, see column headings. All columns report estimates of coefficients from the triple-difference equation 2. Physician characteristics are aggregated on the clinic level and include mean age, share of male physicians, share of ethnic Danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution. Patient characteristics include age fixed effects, dummies for being male, non-Danish ethnicity, and married. "Gradient for high-SES physicians" 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). "Effects %" is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered on the new physician level in columns 1 and 2 and by patient ID in columns 3-7. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A2: Robustness Check: Alternative Physician SES Aggregation to the Clinic Level

	(1) Death	(2) Death from CVC	(3) Number of Visits	(4) Total Reimbursement	(5) Statins	(6) Hospitalization COPD	(7) Diabetes Checkup
Panel A: Min							
PCP low SES x Patient low SES x Post	-0.00107**	-0.00034	0.17264***	2.93594	0.00825***	-0.00188***	0.00900**
	(0.00046)	(0.00023)	(0.04352)	(3.09964)	(0.00222)	(0.00066)	(0.00401)
Effects %	-19.8	-33.6	11.83	14.6	17.76	-21.76	37.04
Observations	1,306,151	1,306,151	3,134,653	3,749,654	3,749,654	3,749,654	2,106,068
Panel B: Mean							
PCP low SES x Patient low SES x Post	-0.00129***	-0.00044**	0.17530***	6.88500**	0.00705***	-0.00195***	0.01309***
	(0.00046)	(0.00022)	(0.04191)	(2.97633)	(0.00213)	(0.00064)	(0.00373)
Effects %	-23.9	-43.3	12.01	34.25	15.19	-22.55	53.88
Observations	1,306,151	1,306,151	3,134,653	3,749,654	3,749,654	3,749,654	2,106,068
Patient characteristics	Y	Y	Y	Y	Y	Y	Y
New PCP characteristics	Y	Y	N	N	N	N	N
Patient FE	N	N	Y	Y	Y	Y	Y
Old PCP FE	Y	Y	N	N	N	N	N

Notes: The table presents the effect of physician-patient SES concordance on the main outcomes, see column headings. All columns report estimates of coefficients from the triple-difference equation 2. Panel A ("min") defines a clinic as being low-SES if all physicians are low-SES. Panel B ("mean") uses the proportion of physicians that are low-SES in the clinic. Physician characteristics are aggregated on the clinic level and include mean age, share of male physicians, share of ethnic Danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution. Patient characteristics include age fixed effects, dummies for being male, non-Danish ethnicity, and married. "Gradient for high-SES physicians" 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). "Effects %" is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered on the new physician level in columns 1 and 2 and by patient ID in columns 3-7. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

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

	(1) Death	(2) Death from CVC	(3) Number of Visits	(4) Total Reimbursement	(5) Statins	(6) Hospitalization COPD	(7) Diabetes Checkup
Panel A: Max							
PCP low SES x Patient low SES x Post	-0.00092*	-0.00046**	0.12954***	4.80574	0.00339	-0.00175***	0.01726***
	(0.00050)	(0.00022)	(0.04230)	(3.04421)	(0.00217)	(0.00065)	(0.00373)
Effects %	-17.6	-43.4	8.87	19.6	6.56	-20.69	60.07
Panel B: Min							
PCP low SES x Patient low SES x Post	-0.00102**	-0.00042*	0.14839***	-0.64779	0.00785***	-0.00197***	0.00869**
	(0.00052)	(0.00025)	(0.04704)	(3.36604)	(0.00241)	(0.00072)	(0.00429)
Effects %	-19.5	-39.4	10.16	-2.64	15.19	-23.27	30.25
Panel C: Mean							
New PCP low SES x Patient low SES x Post	-0.00108**	-0.00050**	0.14398***	1.92854	0.00613**	-0.00199***	0.01598***
	(0.00053)	(0.00025)	(0.04738)	(3.39290)	(0.00243)	(0.00073)	(0.00427)
Effects %	-20.6	-46.4	9.85	7.87	11.86	-23.5	55.59
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	671,788	671,788	1,604,936	1,910,919	1,910,919	1,910,919	1,049,408
Patient Characteristics	Y	Y	Y	Y	Y	Y	Y
New PCP characteristics	Y	Y	N	N	N	N	N
Patient FE	N	N	Y	Y	Y	Y	Y
Old PCP FE	Y	Y	Y	Y	Y	Y	Y

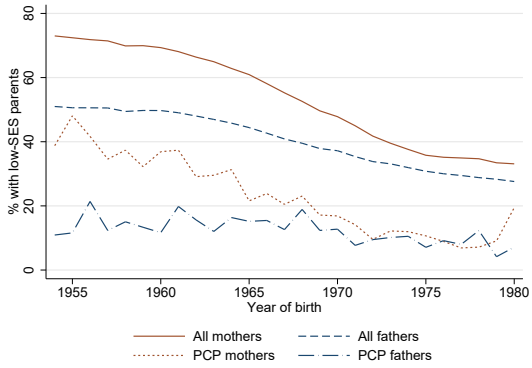
Notes: The table presents the effect of physician-patient SES concordance on selected outcomes, see column headings. All columns report estimates of coefficients from the triple-difference equation 2. Panel A ("max") defines a clinic as being low-SES if at least one physician is low-SES. Panel B ("min") 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. Physician characteristics are aggregated on the clinic level and include mean age, share of male physicians, share of ethnic Danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution Patient characteristics include age fixed effects, dummies for being male, non-Danish ethnicity, and married "Gradient for high-SES physicians" 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). "Effects %" is calculated as (Triple difference estimate/gradient for high-SES physician) × 100Standard errors are clustered on the new physician level in columns 1 and 2 and by patient ID in columns 3-7. *** p <0.01, ** p <0.05, * p <0.1.

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

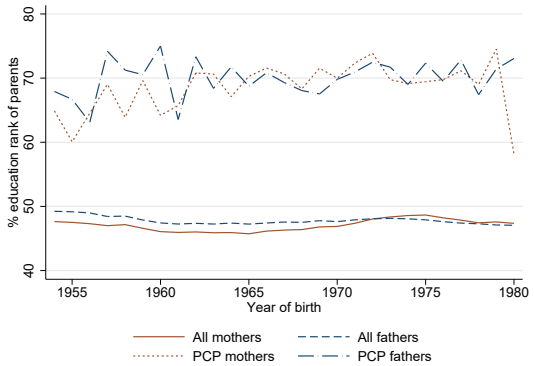
	Number of Visits (1)	Total Reimbursement (2)	Statins (3)	Hospitalization COPD (4)	Diabetes Checkup (5)
Panel A: Conditional on survival (balanced panel)					
PCP low SES x Patient low SES x Post	0.09150**	5.59857**	0.00262	-0.00106**	0.00850***
	(0.03806)	(2.59049)	(0.00190)	(0.00048)	(0.00292)
Outcome mean	6.24079	304.27259	.08433	.00394	.1129
Gradient for high-SES physicians	1.39416	17.86596	.03766	.00592	.02211
Effects %	6.56	31.34	6.95	-17.93	38.46
Observations	2,083,332	2,526,608	2,526,608	2,526,608	1,354,450
Panel B: Conditional on survival and no subsequent physician switch					
PCP low SES x Patient low SES x Post	0.09112**	4.37475	0.00344	-0.00159***	0.01024***
	(0.04269)	(2.90103)	(0.00217)	(0.00053)	(0.00342)
Outcome mean	5.93045	295.62524	.08401	.00371	.11537
Gradient for high-SES physicians	1.37038	19.54168	.03987	.00589	.02449
Effects %	6.65	22.39	8.61	-26.98	41.8
Observations	1,595,769	1,960,550	1,960,550	1,960,550	1,033,942
Patient Characteristics	Y	Y	Y	Y	Y
Patient FE	Y	Y	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance. All columns report estimates of coefficients from the triple-difference equation 2. Patient characteristics include age fixed effects and a dummy for being married. "Gradient for high-SES physicians" 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). "Effects %" 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.

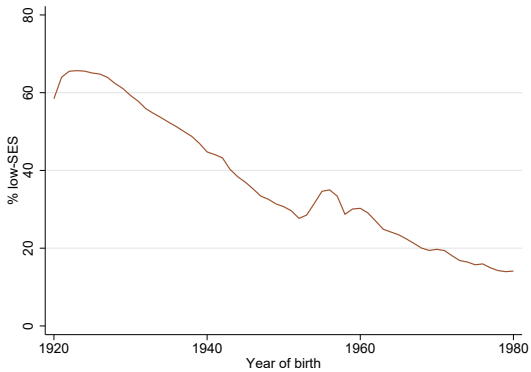
Appendix 3. Additional Figures & Tables



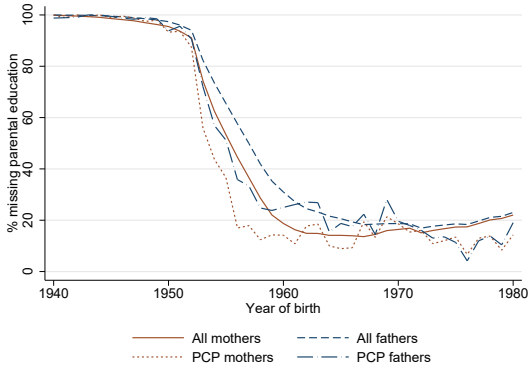
A: Share with a parent with primary school education



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

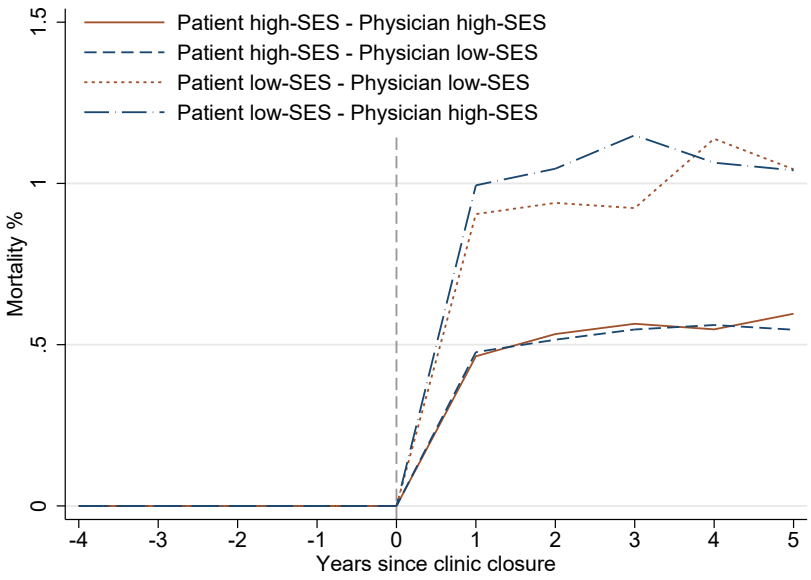


Figure A2: Physician (PCP)-Patient SES Concordance and Mortality - Raw Correlations

Note: The figure presents the effect of 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
Cardiovascular 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
Mortality	0.083	0.053	0.043	0.080
CVC death	0.017	0.009	0.007	0.014
Cancer death	0.034	0.023	0.019	0.032
Lung cancer death	0.009	0.006	0.005	0.010
COPD death	0.004	0.003	0.002	0.005
Diabetes death	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
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 II.a for the definition of the different variables, and Appendix Table A5 for the ICD and ATC codes used. PCP stands for primary care physicians. Mortality is one year mortality rates. The variables are unadjusted for age, gender and year.

Table A7: Test for Selection in Patient-Physician Reassignment by Patient Characteristics and Pre-closure Treatment on Having a Low-SES Physician Post-closure

	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 no physicians' parents' education is missing. Standard errors are clustered by old physician ID. *** p <0.01, ** p <0.05, * p <0.1.

Table A8: Test for Differences in the Length of the Patient-Physician Relationship after Clinic Closure

	Physician characteristics			
	(1)	(2)	(3)	(4)
	Low-SES	Male	Non-Danish ethnicity	Age> 60
Patient characteristics				
Low-SES	-0.00076			
	(0.00121)			
Male		0.02084***		
		(0.00126)		
Non-Danish ethnicity			0.01989***	
			(0.00314)	
Age > 60				-0.00011
				(0.00082)
Observations	474,614	474,614	474614	474,614
Patient characteristics	Y	Y	Y	Y
New PCP characteristics	Y	Y	Y	Y

Notes: The table tests for differences in the length of the post-closure physician-patient relationship. The table shows coefficients from regressing an indicator of a physician characteristic on the same patient's characteristics one year after clinic closure. The regressions include both new physician controls (on the clinic level) and patient controls, except for the focal characteristic. Physician characteristics are aggregated on the clinic level and include mean age, share of male physicians, share of ethnic Danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution. Patient characteristics include age fixed effects, dummies for being male, non-Danish ethnicity, and married. Standard errors are clustered at the old-physician level. *** p <0.01, ** p <0.05, * p <0.1.

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

Number	(1) Total of Visits	(2) Statins Reimbursement	(3) Diabetes	(4) Hospitalization Checkup	(5) Statins COPD	(6) First lung scan Men	(7) Older Females
t=-4 × Low-SES physician	0.04373**	0.51415	-0.00044	-0.00959***	0.00046*	-0.00129	0.00308
	(0.02059)	(0.51658)	(0.00083)	(0.00283)	(0.00028)	(0.00121)	(0.00265)
t=-3 × Low-SES physician	0.01726	-0.06642	0.00011	-0.00154	0.00039	-0.00023	-0.00112
	(0.01956)	(0.49649)	(0.00073)	(0.00271)	(0.00028)	(0.00107)	(0.00253)
t=-2 × Low-SES physician	0.02285	-0.44474	0.00026	-0.00339	0.00019	0.00017	0.00090
	(0.01765)	(0.44590)	(0.00059)	(0.00259)	(0.00028)	(0.00087)	(0.00250)
t=-1 × Low-SES physician							
t=0 × Low-SES physician	-0.05929***	-0.74495	0.00004	0.01103***	-0.00003	-0.00075	0.00418
	(0.01918)	(0.52516)	(0.00070)	(0.00292)	(0.00030)	(0.00100)	(0.00260)
t=1 × Low-SES physician	0.02231	-0.19846	0.00027	0.01980***	0.00085**	-0.00042	-0.00314
	(0.02223)	(0.62274)	(0.00088)	(0.00348)	(0.00033)	(0.00127)	(0.00254)
t=2 × Low-SES physician	0.06084**	-0.09459	-0.00015	0.00918**	0.00023	0.00027	0.00139
	(0.02382)	(0.65899)	(0.00105)	(0.00362)	(0.00034)	(0.00151)	(0.00260)
t=3 × Low-SES physician	0.04362*	1.04369	-0.00078	0.01402***	0.00066*	-0.00134	0.00141
	(0.02525)	(0.69712)	(0.00120)	(0.00382)	(0.00037)	(0.00173)	(0.00265)
t=4 × Low-SES physician	0.04505*	-0.12878	0.00008	0.00641*	0.00008	-0.00083	-0.00210
	(0.02691)	(0.75018)	(0.00136)	(0.00388)	(0.00039)	(0.00194)	(0.00270)
t=5 × Low-SES physician	0.04421	0.75908	0.00133	0.01378***	0.00011	0.00114	-0.00390
	(0.02870)	(0.80917)	(0.00152)	(0.00458)	(0.00042)	(0.00217)	(0.00281)
Observations	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
Patient 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 of the coefficient on the event dummies relative to $t = -1$ using equation 1. All regressions control for year fixed effects and patient characteristics. Physician characteristics are aggregated on the clinic level and include mean age, share of male physicians, share of ethnic Danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution. Patient characteristics include age fixed effects, dummies for being male, non-Danish ethnicity, and married. Standard errors are clustered by patient ID. *** p <0.01, ** p <0.05, * p <0.1.

Table A10: The Effect of Getting a Low-SES Physician (PCP) Post-Closure for Low-SES Patients by Years since Clinic Closure

	(1) Number of Visits	(2) Total Reimbursement	(3) Statins	(4) Diabetes Checkup	(5) Hospitalization COPD	(6) Statins Men	(7) first lung scan Older Females
t=-4 × Low-SES physician	0.08081**	0.25484	0.00034	-0.01586***	0.00033	0.00004	0.00299
	(0.03700)	(1.01099)	(0.00147)	(0.00497)	(0.00067)	(0.00221)	(0.00336)
t=-3 × Low-SES physician	0.06771**	1.04558	-0.00031	-0.00574	0.00006	-0.00164	0.00290
	(0.03448)	(0.93955)	(0.00130)	(0.00473)	(0.00065)	(0.00196)	(0.00340)
t=-2 × Low-SES physician	0.06043**	-0.34128	-0.00042	-0.01141***	0.00013	-0.00054	0.00106
	(0.03046)	(0.81737)	(0.00104)	(0.00439)	(0.00067)	(0.00156)	(0.00328)
t=-1 × Low-SES physician							
t=0 × Low-SES physician	-0.09790***	-0.60328	0.00201	0.00850*	-0.00042	0.00063	0.00333
	(0.03332)	(0.96376)	(0.00126)	(0.00487)	(0.00075)	(0.00188)	(0.00341)
t=1 × Low-SES physician	0.20520***	3.28153***	0.00361**	0.02496***	-0.00011	0.00323	0.00629*
	(0.03995)	(1.15426)	(0.00161)	(0.00570)	(0.00079)	(0.00237)	(0.00338)
t=2 × Low-SES physician	0.19147***	2.93484**	0.00184	0.02379***	-0.00090	0.00230	0.00507
	(0.04298)	(1.26804)	(0.00190)	(0.00600)	(0.00083)	(0.00280)	(0.00340)
t=3 × Low-SES physician	0.18390***	4.84138***	0.00371*	0.02344***	-0.00141*	0.00335	0.00546
	(0.04595)	(1.34215)	(0.00216)	(0.00631)	(0.00084)	(0.00318)	(0.00353)
t=4 × Low-SES physician	.11558**	2.45858*	0.00243	0.02090***	-0.00056	-0.00005	0.00805**
	(0.04866)	(1.41151)	(0.00241)	(0.00646)	(0.00092)	(0.00356)	(0.00367)
t=5 × Low-SES physician	0.11044**	5.06442***	0.00373	0.02970***	0.00033	0.00131	0.00152
	(0.05141)	(1.50719)	(0.00266)	(0.00753)	(0.00097)	(0.00394)	(0.00378)
Observations	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
Patient 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 of the coefficient on the event dummies relative to $t = -1$ using equation 1. All regressions control for year fixed effects and patient characteristics. Physician characteristics are aggregated on the clinic level and include mean age, share of male physicians, share of ethnic Danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution. Patient characteristics include age fixed effects, dummies for being male, non-Danish ethnicity, and married. 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 Mortality from Chronic Conditions by Gender and Birth Cohort

	(1) All Cause	(2) CVC	(3) Cancer	(4) Diabetes	(5) COPD
Panel A: Female					
PCP low SES x Patient low SES x Post	-0.00069	-0.00016	-0.00049	0.00006	-0.00005
	(0.00045)	(0.00017)	(0.00033)	(0.00008)	(0.00014)
Effects %	-13.94	-18.12	-23.81	46.1	-9.37
Panel B: Male					
PCP low SES x Patient low SES x Post	-0.00177***	-0.00070**	-0.00026	0.00007	-0.00002
	(0.00061)	(0.00028)	(0.00037)	(0.00011)	(0.00012)
Effects %	-27.54	-53.87	-15.6	26.37	-4.02
Panel C: Younger sample, year of birth>=1958					
PCP low SES x Patient low SES x Post	-0.00072**	-0.00010	-0.00010	0.00003	-0.00010*
	(0.00037)	(0.00014)	(0.00021)	(0.00006)	(0.00005)
Effects %	-25.64	-28.39	-13.66	47.75	-71.05
Panel D: Older sample, year of birth<1958					
New PCP low SES x Patient low SES x Post	-0.00162***	-0.00067**	-0.00069*	0.00010	0.00002
	(0.00058)	(0.00026)	(0.00039)	(0.00011)	(0.00016)
Effects %	-27.69	-55.18	-35.27	48.71	3.18
Patient characteristics	Y	Y	Y	Y	Y
New PCP characteristics	Y	Y	Y	Y	Y
Old 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 estimates from the triple differences equation 2 restricted to the post-period. Physician characteristics are aggregated on the clinic level and include mean age, share of male physicians, share of ethnic Danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution. Patient characteristics include age fixed effects, dummies for being male, non-Danish ethnicity, and married. "Gradient for high-SES physicians" 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). "Effects %" is calculated as (interaction estimate/gradient for high-SES physician) × 100. Standard errors are clustered at the new physician level. Female observations: 637,441; Male observations: 668,708; Young sample: 639,575; older sample: 666,574. *** p <0.01, ** p <0.05, * p <0.1.

Table A12: The Effect of Physician (PCP)-Patient SES Concordance on Healthcare Utilization by Gender and Birth Cohort

	(1) PCP Visit (Dummy)	(2) PCP Visit (N)	(3) Services per Visit (N)	(4) Specialist Visit (Dummy)
Panel A: Female				
PCP low SES x Patient low SES x Post	0.00057	0.15009***	0.02009***	-0.00040
	(0.00202)	(0.04332)	(0.00747)	(0.00332)
Effects %	4.66	9.52	42.52	1.39
Panel B: Male				
PCP low SES x Patient low SES x Post	-0.00259	0.11676**	0.00702	0.00715**
	(0.00286)	(0.04738)	(0.00821)	(0.00319)
Effects %	-12.29	10.47	18.73	-35.36
Panel C: Young sample, year of birth>=1958				
PCP low SES x Patient low SES x Post	0.00032	0.09299**	-0.00042	0.00554
	(0.00275)	(0.04706)	(0.00814)	(0.00342)
Effects %	1.55	7.21	-1.19	-28.72
Panel D: Old sample, year of birth<1958				
PCP low SES x Patient low SES x Post	-0.00218	0.12505***	0.02750***	-0.00015
	(0.00223)	(0.04384)	(0.00761)	(0.00314)
Effects %	-11.24	9.73	63	.47
Patient characteristics	Y	Y	Y	Y
Patient FE	Y	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance on healthcare utilization. All columns report estimates of coefficients from the triple-difference equation 2. Patient characteristics include age fixed effects and a dummy for being married. "Gradient for high-SES physicians" 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). "Effects %" 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 Primary Care Reimbursement

	(1) PCP	(2) Specialist	(3) Total
PCP low SES x Patient low SES x Post	2.94102***	3.79826*	6.73928***
	(0.96066)	(1.93959)	(2.26757)
Outcome mean	122.3	210.3	332.6
Gradient for high-SES physicians	32.3	-12.2	20.1
Effects %	9.1	-31.21	33.52
Observations	3,749,654	3,749,654	3,749,654
Patient characteristics	Y	Y	Y
Patient 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 estimates of coefficients from the triple-difference equation 2. Patient characteristics include age fixed effects and a dummy for being married. "Gradient for high-SES physicians" 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). "Effects %" 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 A14: The Effect of Physician (PCP)-Patient SES Concordance on Reimbursement by Gender and Birth Cohort

	(1) PCP	(2) Specialist	(3) Total
Panel A: Female			
PCP low SES x Patient low SES x Post	4.37003***	3.44736	7.81739**
	(1.34218)	(2.83641)	(3.27692)
Effects %	12.78	-13.9	83.16
Panel B: Male			
PCP low SES x Patient low SES x Post	1.46073	4.04928	5.51001*
	(1.37917)	(2.63299)	(3.12980)
Effects %	6	-31.76	47.57
Panel C: Younger sample, year of birth>=1958			
PCP low SES x Patient low SES x Post	1.37260	5.03114*	6.40374*
	(1.32288)	(2.89446)	(3.34156)
Effects %	4.8	-322.51	23.7
Panel D: Older sample, year of birth<1958			
PCP low SES x Patient low SES x Post	3.48531**	3.13168	6.61699**
	(1.36338)	(2.65637)	(3.12345)
Effects %	13	-10.1	-157.57
Patient characteristics	Y	Y	Y
Patient 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 estimates of coefficients from the triple-difference equation 2. Patient characteristics include age fixed effects, dummies for being male, non-Danish ethnicity, and married. "Gradient for high-SES physicians" 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). "Effects %" 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 A15: The Effect of Physician (PCP)-Patient SES Concordance on Health Behaviors Related to Chronic Conditions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	CVC		Cancer	Diabetes		COPD	
	Statins	ACE	Lung scan	Metformin	Checkup	Hospitalization	Medication
PCP low SES × Patient low SES × Post	0.00286*	0.00137	0.00109	0.00011	0.01061***	-0.00119**	-0.00039
	(0.00161)	(0.00164)	(0.00113)	(0.00090)	(0.00262)	(0.00049)	(0.00109)
Outcome mean	.10415	.12554	.03279	.04311	.09522	.00563	.05568
Gradient for high-SES physicians	.04643	.04235	.00887	.02309	.0243	.00866	.03277
Effects %	6.16	3.24	12.33	.47	43.66	-13.75	-1.18
Observations	3,749,654	3,749,654	3,247,973	3,749,654	2,106,068	3,749,654	3,749,654
Patient characteristics	Y	Y	Y	Y	Y	Y	Y
Patient FE	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 estimates of coefficients from the triple-difference equation 2. See section II.a.4 for the definition of the outcome measures. Patient characteristics include age fixed effects and a dummy for being married. "Gradient for high-SES physicians" 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). "Effects %" 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 A16: The Effect of Physician (PCP)-Patient SES Concordance on Health Behaviors Related to Chronic Conditions by Gender and Birth Cohort

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	CVC		Cancer	Diabetes		COPD	
	Statins	ACE	Lung scan	Metformin	Checkup	Hospitalization	Medication
Panel A: Female							
PCP low SES x Patient low SES x Post	0.00281	0.00217	0.00154	0.00053	0.01531***	-0.00050	0.00021
	(0.00220)	(0.00221)	(0.00157)	(0.00113)	(0.00370)	(0.00068)	(0.00159)
Effects %	4.12	3.61	16.25	2.21	43.23	-5.22	.51
Panel B: Male							
PCP low SES x Patient low SES x Post	0.00313	0.00059	0.00050	-0.00021	0.00560	-0.00201***	-0.00129
	(0.00236)	(0.00243)	(0.00163)	(0.00144)	(0.00368)	(0.00069)	(0.00146)
Effects %	11.44	2.07	5.93	-.79	47.92	-26.4	-6.4
Panel C: Younger sample, year of birth>=1958							
PCP low SES x Patient low SES x Post	0.00127	0.00028	-0.00045	-0.00029	0.00323	-0.00047	0.00048
	(0.00187)	(0.00200)	(0.00153)	(0.00114)	(0.00301)	(0.00052)	(0.00155)
Effects %	4.46	.97	-5.12	-1.83	22.39	-10.9	2.05
Panel D: Older sample, year of birth<1958							
PCP low SES x Patient low SES x Post	0.00358	0.00226	0.00261	0.00039	0.01140***	-0.00186**	-0.00105
	(0.00248)	(0.00248)	(0.00167)	(0.00135)	(0.00418)	(0.00076)	(0.00152)
Effects %	11.77	10.84	43.25	1.95	82.14	-17.87	-2.89
Patient characteristics	Y	Y	Y	Y	Y	Y	Y
Patient FE	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 estimates of coefficients from the triple-difference equation 2. Patient characteristics include age fixed effects and a dummy for being married. "Gradient for high-SES physicians" 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). "Effects %" 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 A17: Mechanism: The Effect of Having a Low-SES Physician (PCP) on Mortality by Patients with Different Baseline Conditions

	(1) No conditions	(2) Any conditions	(3) CVC	(4) Diabetes	(5) COPD	(5) CVC+Diabetes	(6) CVC+COPD	(7) COPD+Diabetes	(8) All three
Panel A: Low-SES patients									
PCP low SES x Post	-0.00075	-0.00171*	-0.00080	-0.00199	-0.00365*	-0.00269	0.00117	-0.00455	-0.00300
	(0.00059)	(0.00097)	(0.00128)	(0.00145)	(0.00191)	(0.00204)	(0.00410)	(0.00488)	(0.00721)
Outcome mean	.00257	.00509	.00519	.00522	.00691	.00593	.00912	.00913	.01035
Observations	221,114	152,804	90,411	72,482	54,576	42,041	16,878	13,742	8,008
Panel B: High-SES patients									
PCP low SES x Post	-0.00020	0.00045	0.00007	0.00042	0.00099	-0.00039	0.00299	0.00332	0.00223
	(0.00023)	(0.00053)	(0.00080)	(0.00073)	(0.00099)	(0.00123)	(0.00277)	(0.00275)	(0.00470)
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	612,152	320,074	177,915	158,478	98,234	80,199	24,109	21,612	11,375
Patient characteristics	Y	Y	Y	Y	Y	Y	Y	Y	Y
New PCP 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 of coefficients from the triple-difference equation 2. See Table VI for the definition of the different conditions. Physician characteristics are aggregated on the clinic level and include mean age, share of male physicians, share of ethnic Danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution. Patient characteristics include age fixed effects, dummies for being male, non-Danish ethnicity, and married. Standard errors are clustered at the new physician level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A18: Mechanism: The Effect of Physicians' (PCP) Parents' Illness on Patient Mortality

	All cause mortality	*Parental Condition* CVC mortality		Cancer mortality	
	All conditions	CVC	Cancer	CVC	Cancer
	(1)	(2)	(3)	(4)	(5)
PCP low SES x Patient low SES x Post	-0.00104**	-0.00127***	-0.00024	-0.00020	-0.00044*
	(0.00044)	(0.00040)	(0.00039)	(0.00017)	(0.00025)
Outcome mean	.00234	.00234	.00234	.00042	.00098
Gradient for high-SES physicians	.00541	.00541	.00541	.00101	.00182
Effects in %	-19.3	-23.6	-4.4	-20.1	-24.3
Observations	1,276,371	1,306,151	1,306,151	1,306,151	1,306,151
Patient characteristics	Y	Y	Y	Y	Y
New PCP characteristics	Y	Y	Y	Y	Y
Old PCP FE	Y	Y	Y	Y	Y

Notes: 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. Physician characteristics are aggregated on the clinic level and include mean age, share of male physicians, share of ethnic Danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution. Patient characteristics include age fixed effects, dummies for being male, non-Danish ethnicity, and married. "Gradient for high-SES physicians" 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). "Effects %" is calculated as (interaction estimate/gradient for high-SES physician) × 100. Standard errors are clustered at the new physician level. *** p <0.01, ** p <0.05, * p <0.1.

Table A19: Mechanism: The Effect of Physician (PCP) Parental Educational Level on Patient Mortality by Patient Education

	(1) Primary school	(2) High school	(3) Vocational education	(4) Associate degree	(5) Undergraduate degree	(5) Postgraduate degree
PCP Parent Education x Patient Education x Post	-0.00124***	-0.00052	-0.00010	0.00026	0.00003	0.00085**
	(0.00036)	(0.00085)	(0.00029)	(0.00094)	(0.00035)	(0.00036)
Outcome mean	.00234	.00234	.00234	.00234	.00234	.00234
Observations	1,306,151	1,306,151	1,306,151	1,306,151	1,306,151	1,306,151
Patient characteristics	Y	Y	Y	Y	Y	Y
New PCP characteristics	Y	Y	Y	Y	Y	Y
Old PCP FE	Y	Y	Y	Y	Y	Y

Notes: The table 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. Physician characteristics are aggregated on the clinic level and include mean age, share of male physicians, share of ethnic Danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution. Patient characteristics include age fixed effects, dummies for being male, non-Danish ethnicity, and married. Standard errors are clustered at the new physician level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A20: Internal Validity: The Role of Other Physician (PCP) Characteristics in Reducing the SES-Gradient in Mortality

	Most experience (1)	Most Male (2)	Most Ethnic Danish (3)	Most UCPH (4)	Most low-SES patients (5)	Highest academic performance (6)
PCP characteristic x Patient low SES x Post	0.00035	0.00022	0.00008	0.00038	0.00012	-0.00003
	(0.00038)	(0.00036)	(0.00040)	(0.00038)	(0.00040)	(0.00042)
Outcome mean	.00234	.00234	.00234	.00234	.00234	.00234
Gradient for other physicians	.00491	.00495	.00496	.00476	0.00497	.00541
Effects %	7.1	4.4	1.6	8	2.5	-.52
Observations	1,306,151	1,306,151	1,306,151	1,306,151	1,306,151	1,306,151
Patient characteristics	Y	Y	Y	Y	Y	Y
New PCP characteristics	Y	Y	Y	Y	Y	Y
Old 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, and marriage status. UCPH is the University of Copenhagen. The regressions include new physician characteristics except for the focal characteristic. Physician characteristics are aggregated on the clinic level and include mean age, share of male physicians, share of ethnic Danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution. Patient characteristics include age fixed effects, dummies for being male, non-Danish ethnicity, and married. "Gradient for high-SES physicians" 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). "Effects %" is calculated as (interaction estimate/gradient for high-SES physician) $\times 100$. Standard errors are clustered at the new physician level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A21: Internal Validity: The Effect of Physician (PCP)-Patient SES Concordance on Mortality by Physician Characteristic

	(1) Most experienced	(2) Least experienced	(3) Most male	(4) Least male	(5) Non-ethnic Danish	(6) Ethnic Danish	(7) UCPH	(8) Non UCPH
PCP low SES x Patient low SES x Post	-0.00146***	-0.00091*	-0.00143***	-0.00097**	-0.00074	-0.00139***	-0.00186***	-0.00075*
	(0.00051)	(0.00050)	(0.00052)	(0.00049)	(0.00073)	(0.00041)	(0.00058)	(0.00045)
Outcome mean	.00234	.00234	.00234	.00234	.00234	.00234	.00234	.00234
Gradient for high-SES physicians	.00474	.00522	.00494	.00497	.00504	.00488	.00473	.00546
Effects %	-30.9	-17.5	-29	-19.5	-14.8	-28.4	-39.3	-13.8
Observations	639,741	666,410	588,945	717,206	309,098	997,051	530,968	775,178
Patient characteristics	Y	Y	Y	Y	Y	Y	Y	Y
New PCP characteristics	Y	Y	Y	Y	Y	Y	Y	Y
Old 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, replacing physician being low-SES with another characteristic. The regressions include new physician characteristics, except for the focal characteristic. Physician characteristics are aggregated on the clinic level and include mean age, share of male physicians, share of ethnic Danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution. Patient characteristics include age fixed effects, dummies for being male, non-Danish ethnicity, and married. "Gradient for high-SES physicians" 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). "Effects %" is calculated as (interaction estimate/gradient for high-SES physician) × 100. Standard errors are clustered at the new physician level. *** p <0.01, ** p <0.05, * p <0.1.

Table A22: External Validity: The Effect of SES Concordance Using Educational Rank of the Physicians' (PCP) Parents to Define SES

	(1) Death	(2) Death from CVC	(3) Number of Visits	(4) Total Reimbursement	(5) Statins	(6) Hospitalization COPD	(7) Diabetes Checkup
PCP low SES x Patient low SES x Post	-0.00068**	-0.00051***	0.04657*	2.20272	0.00310**	-0.00072*	0.00252
	(0.00031)	(0.00013)	(0.02770)	(2.05845)	(0.00140)	(0.00041)	(0.00222)
Outcome mean	.00234	.00042	6.24079	332.64699	.10415	.00563	.09522
Gradient for high-SES physicians	.00532	.00103	1.4598	20.10358	.04643	.00866	.0243
Effects %	-12.8	-49.6	3.19	10.96	6.67	-8.35	10.35
Observations	1,306,151	1,306,151	3,134,653	3,749,654	3,749,654	3,749,654	2,106,068
Patient characteristics	Y	Y	Y	Y	Y	Y	Y
New PCP characteristics	Y	Y	Y	Y	Y	Y	Y
Old PCP FE	Y	Y	Y	Y	Y	Y	Y

Notes: The table presents the effect of physician-patient SES concordance. All columns report estimates of coefficients from the triple-difference equation 2. Physician low-SES equals one if one of the physician's parents has an education level within the bottom 33% of his or her birth cohort. Physician characteristics are aggregated on the clinic level and include mean age, share of male physicians, share of ethnic Danish physicians, solo clinic dummy, number of physicians in the clinic, and physicians' graduating institution. Patient characteristics include age fixed effects, dummies for being male, non-Danish ethnicity, and married. "Gradient for high-SES physicians" 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). "Effects %" is calculated as (Triple difference estimate/gradient for high-SES physician) × 100. Standard errors are clustered on the new physician level in columns 1-2 and by patient ID in columns 3-7. *** p <0.01, ** p <0.05, * p <0.1.