The educational gradient in self-rated health in Europe: Does the doctor–patient relationship make a difference?

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Abstract

Research suggests that doctor–patient relations have evolved from a doctor-centered, paternalistic approach towards a more patient-centered, egalitarian model of interactions between physicians and their patients. Given the long-running debate on the positive relationship between education and health, the question arises how this development in doctor–patient relations affects social inequalities in health. First, we test in how far egalitarian (e.g. discussing treatment decisions with patients) doctor–patient relations are underlying the education–self-reported health association. Second, we test whether egalitarian and paternalistic (e.g. withholding some information from patients) doctor–patient relations show differential effects on self-reported health across different educational groups. Analyses of the European Social Survey (ESS 2004/05) for 24 countries demonstrate that a more egalitarian doctor–patient relationship does not substantially reduce educational inequalities in self-reported health. However, some direct positive effects of egalitarian and direct negative effects of paternalistic doctor–patient relations on health ratings can be found. Finally, results show how the health status of the lower educated can improve with a more egalitarian and less paternalistic doctor–patient relationship.

Introduction

Social inequality in health and disease is a pervasive phenomenon, both over time and across societies. The mechanisms underlying it, however, are not fully understood (Elo, 2009). Earlier research has suggested that one important cause of social inequality in health are differences in quality of health care (Beckfield et al., 2015; Fiscella et al., 2000). Quality of health care comprises both the effectiveness of and the access to health care (Campbell et al., 2000). Focusing on a crucial aspect of access to health care, namely the doctor–patient relationship, we examine the effects of different models of doctor–patient interactions on educational inequalities in self-reported health.

Education is a crucial indicator of socioeconomic status and low education is an important risk factor for poor health (Gesthuizen et al., 2012; Mirowsky and Ross, 2003). The lower educated suffer from poorer health compared to their better educated counterparts; for instance, with respect to self-rated health or mortality (Mackenbach et al., 2008; Präg et al., 2014). While remaining largely stable over the life course, education is a major predictor of future life chances. It is strongly connected to access to resources important for health, such as material resources and social connections (Ellwardt et al., 2014).

The aim of this study is to examine whether some aspects of doctor–patient relations exacerbate or compress health inequalities. Existing research points in this direction. Firstly, it has been shown that doctor–patient communication is affected by patient's SES in the sense that doctors convey less information and directions to patients from the lower social strata of a society, deploy a more directive consulting style, and give patients fewer positive socio-emotional responses (Willems et al., 2005). Secondly, aspects of doctor–patient relationships have been shown to be related to outcomes such as patient satisfaction, coping with disease,

and recall and understanding of information received from the physician (Ong et al., 1995), as well as to self-reported and objective health measures (Stewart, 1995a; Griffin et al., 2004). However, there has been little research connecting the two issues of the SES–health gradient and SES differences in the doctor–patient relationship. Our study fills this gap by explicitly addressing the role of doctor–patient relations in relation to educational inequalities in self-rated health.

The current drastic transformations in the doctor–patient relationship makes it a particularly interesting factor in the study of inequalities in health. There are strong tendencies towards a more egalitarian relationship between physicians and their patients, in part due to the growing awareness of the crucial role of doctor–patient relations for health outcomes. The traditional 'doctor-centered' model (Byrne and Long, 1976), with its dominance of the doctor's role, is gradually being replaced with the 'patient-centered' model that gives greater weight to patients' needs and preferences, and aims at a partnership between the doctor and patient. For our analyses, we rely on survey data from 24 European countries. As there are no empirical data on doctor–patient relations over a longer period of time, these cross-national data allow us to increase the available variation in doctor–patient relations and allow for additional validity checks of our findings.

By addressing the role of patient–doctor relations in a model of the social gradient in health, we are extending existing research on health inequalities. Our central argument is that the differences in the doctor–patient relationship could affect the social gradient in health in two ways. First, a more egalitarian relationship between doctors and patients might be accompanied by a more egalitarian distribution of health outcomes. Thus, an egalitarian doctor–patient relationship could potentially compress the social gradient in health. The doctor–relationship could hence be a pathway factor that *mediates* the relationship between education and self-rated health.

Second, differences in the doctor–patient relationship could potentially affect the health of different educational groups in different ways. Compared to the lower educated, higher educated individuals might command greater psychosocial resources and have greater experience negotiating with high status actors such as doctors, irrespective of the doctor–patient relationship. The lower educated might thus benefit to a greater extent from a more egalitarian doctor–patient relationship. We will test whether aspects of the doctor–patient relationship *moderate* the relationship between education and health, i.e. testing whether educational groups are differently affected by different forms of the doctor–patient relationship.

Theoretical background

The doctor–patient relationship

The relationship between doctors and patients is a complex phenomenon. It involves communication about issues of vital importance, but is often emotionally laden, sometimes involuntary, requires close cooperation, and is based upon interaction between individuals in unequal positions (Ong et al., 1995). Traditionally, the doctor–patient relationship is an asymmetric one, with the doctor being advantaged in several ways. Firstly, doctors command superior knowledge with regard to health and illness. Secondly, doctors have a gatekeeper function with respect to many aspects of health and illness, both in a formal (e.g. sickness certifications for employers) and an informal way (e.g. the sick role, Parsons, 1951). Thirdly, doctors have great power in steering interactions with patients, e.g. in terms of waiting times and the content of meetings.

There is a long-standing tradition in sociology of research on the doctor–patient relationship (Henderson, 1935; Heritage and Maynard, 2011) and some classical works of sociology deal with the diffusion of innovations among physicians (Coleman et al., 1957) or interactions between physicians and patients (Parsons, 1951). However, there are relatively

few studies which focus on the relationship between the doctor–patient relationship and health outcomes. A number of studies have shown that aspects of doctor–patient relationships can impact patient well-being and behavior, such as the ability to understand medical information, compliance with treatment regimes, coping with illness, satisfaction with care, overall quality of life, and health status (Griffin et al., 2004; O'Connor et al., 2009; Ong et al., 1995; Stewart, 1995a; Stewart, 1995b; Weiner et al., 2013; Williams et al., 2000).

The existing literature identified different pathways along which aspects of the doctor–patient relationship can impact health. One potential pathway is the quality of health care. A review of 139 studies revealed that the doctor–patient relationship is the most important predictor of patient-perceived quality of health care (Crow et al., 2003). Another possible pathway is adherence to doctors' recommendations. Stavropoulou (2011) shows that individuals' reports of adherence to medication recommendations depends on their relationships to their doctors, corroborating results of earlier studies (Bultman and Svarstad, 2000; Stavropoulou, 2012).

Paternalistic and egalitarian models

The asymmetry between doctors and patients is fundamental for different models of the doctor–patient relationship. Two different models are treated here, namely, the 'paternalistic' or 'doctor-centered' model and the 'egalitarian' or 'patient-centered' one. The paternalistic model actively builds upon the asymmetry between doctor and patient, as the doctor's role as an expert is crucial for this model to function. The general idea of the model is straightforward: Based on their superior medical knowledge, doctors give advice to their patients, who, in turn, comply with this advice. Driven by a desire to appear competent (White, 1959), i.e. to make correct decisions, and aiming at behavioral confirmation (Ormel et al., 1997), patients defer to the doctors' authority (Cialdini and Griskevicius, 2010). This authority is based on the doctors' expert status and their superior skills and knowledge. As

the model greatly draws upon characteristics of the doctor while the patient holds a largely passive role, this model is sometimes called the 'doctor-centered model' (Byrne and Long, 1976).

In the last decades, however, the doctor-centered model has given way to the egalitarian model (Kaba and Sooriakumaran, 2007; Peck and Conner, 2011; Steinhart, 2002). This model tries to bridge the asymmetry between doctor and patient by also conceiving the patient as an expert, namely an expert for their own situation (Department of Health, 2001) and assigning them a more active role. This development has been fostered by campaigns encouraging patients to ask their physicians questions (Judson et al., 2013). Reasons for this shift of paradigms are numerous, with the most important ones being the crisis of the expert role in society (Beck, 1992), the greater availability of medical information for patients in self-help groups and internet sites (Neuberger, 2000), the increasing role of chronic, incurable diseases (Charmaz and Rosenfeld, 2010), and medical progress that has created more treatment options and, thus, more opportunities for decision-making in the cure process. The general idea of the model consists of multiple aspects: Both the doctor and patient are seen as experts—the doctor for conveying medical information, and the patient for their own preferences and living situation. The doctor's task is seen less as providing the patient with binding advice, but more to communicate medical information about diseases and treatments to the patient and to discuss the information with them, such as benefits and risks of different treatment options. If decisions are to be made, they will be made jointly (Barry and Edgman-Levitan, 2012), taking into account not only the medical facts, but also the patient's preferences.

The mechanism at the core of the patient-centered model is also different from the one underlying the doctor-centered one. Instead of satisfying the needs for competence and behavioral confirmation via complying with doctors' orders, the patient-centered model

fulfills the desires for patient competence and autonomy by informing the patient and treating

them as capable of deciding for themselves. According to self-determination theory

(Djundeva et al., 2015; Ryan and Deci, 2000), a combination of competence and autonomy

will induce intrinsic motivation in patients. Feelings of competence can be achieved via the

provision of information, but these feelings of competence need to be accompanied with a

sense of autonomy to result in intrinsic motivation (Deci et al., 1999). Intrinsic motivation is

potentially of crucial importance in the cure process, as individuals with intrinsic motivation

have more interest, confidence, and self-esteem, and perform better in comparison to

individuals who are externally controlled (e.g. merely following orders).

Socioeconomic status and doctor–patient relations

There are two ways doctor–patient relations can operate in the context of the educational

gradient in self-rated health. Firstly, there might be an educational gradient in the doctor–

patient relations. Previous research has shown that doctor–patient relations vary with

patients' SES. Doctor–patient communication is affected by patient's SES in the sense that

doctors give lower-SES patients fewer positive socio-emotional responses, convey less

information and directions, and make use of a more directive consulting style with less

involvement in treatment decisions (Willems et al., 2005). Furthermore, doctors are able to

identify the SES of their patients: Psychologist demonstrated that individuals can reliably

identify the approximate income and SES of others within seconds (Kraus and Keltner,

2009). These differences appear to be both driven by patients' characteristics as well as the

perceptions of doctors: High-SES patients communicate more actively and are able to elicit

more information from their physician, whereas doctors often misperceive the need for

information of low-SES patients (Willems et al., 2005). Given the evidence that higher SES

might be associated with a different, more egalitarian model of doctor–patient relations

(Willems et al., 2005) and the evidence suggesting that a more egalitarian model of doctor–

patient relations is associated with better wellbeing and health outcomes (Griffin et al., 2004; O'Connor et al., 2009; Ong et al., 1995; Weiner et al., 2013; Williams et al., 2000; McMillan et al., 2013; Rathert et al., 2013), the relationship between education and self-rated health might be at least partially due to differences in the doctor–patient relationship. In line with this reasoning, we formulate the following expectation:

> H1: An egalitarian doctor–patient relationship reduces the size of the positive association between education and self-rated health.

Secondly, the models of the doctor–patient relationship might have differing effects on different educational groups. On the one hand, the lower-educated might particularly benefit from a more patient-centered approach that takes their living conditions into account (e.g. Lutfey and Freese, 2005). In turn, the paternalistic approach might be particularly detrimental for the lower educated, as it does not pay attention to special needs they might have. Furthermore, if doctors give fewer positive socio-emotional responses, convey less information and directions to lower-educated patients than to higher-educated patients (Willems et al., 2005), then it follows by implication that lower-educated individuals benefit more from a more egalitarian style than higher-educated individuals. On the other hand, the higher educated can be expected to be less affected by different types of the doctor–patient relationship: The higher educated know better how to deal with directive high-status actors, as they have more self-confidence and other important psychological resources (Schnittker and McLeod, 2005) and more experience in negotiating and asking, irrespective of the style of the other party. Based on this, we further hypothesize:

> H2: The doctor–patient relationship moderates the education–health relationship as follows: (a) An egalitarian doctor–patient relationship is associated with higher self-rated health, and that this is more strongly the case for the lower educated than for the higher educated, and (b) A paternalistic doctor-patient relationship is associated with

lower self-rated health, and that is more strongly the case for the lower educated than for the higher educated.

Data and methods

Data

This study exploits the second round of the European Social Survey (ESS, Jowell et al., 2007), a large-scale survey conducted in 26 countries in 2004/05. This survey does not only comprise information on education and health, it also includes items on the doctor–patient relationship, making it a unique resource for our endeavor. We include 24 countries in our study, namely Austria, Belgium, Switzerland, the Czech Republic, Germany, Denmark, Estonia, Spain, Finland, Great Britain, Greece, Hungary, Italy, Ireland, Iceland, Luxembourg, The Netherlands, Norway, Poland, Portugal, Sweden, and Slovenia. Turkey and the Ukraine were excluded from the analysis, as first results revealed substantial cultural and socioeconomic differences to the other countries in the sample. The quality of the ESS data collection process is generally considered to be high (Koch et al., 2009), as in all countries random probability samples are drawn and face-to-face interviews are conducted, following standardized procedures and strict quality controls to ensure representativeness and comparability of the data. Response rates are on average 61.8%, ranging from 43.6% (France) to 78.8% (Greece). More detailed descriptions of the ESS, including detailed information on data collection and response rates for all countries are available on the ESS web site (http://www.europeansocialsurvey.org/).

Our study excludes respondents 25 years old or younger, as a substantial share of them has not yet finished education, which is one of our focal predictors in this study. Our sample size is further reduced by respondents who have missing values on any of the study

variables. Descriptive statistics of the final sample of 31,189 respondents are provided in

Table 1.

Table 1: Descriptive statistics (uncentered variables), $N = 31,198$

	Mean	Std. dev.	Min.	Max.
Self-rated health	2.73	.91	0	4
Education				
Lower education	.34	—	0	1
Medium education	.42	—	0	1
High education	.24	—	0	1
Egalitarian model				
Easy to understand	3.30	1.15	1	5
Treat patients as equal	3.20	1.26	1	5
Discuss decisions	3.33	1.24	1	5
Paternalistic model				
Patients reluctant to ask questions	2.56	1.14	1	5
Keep truth from patients	2.26	1.07	1	5
Doctors deny mistakes	4.16	1.07	1	5
Age	50.83	15.50	26	101
Female	.54	—	0	1
Married/cohabiting	.70	—	0	1
Migrant	.08	—	0	1
Single mother	.07	—	0	1
Children in the household				
None	.54	—	0	1
One child	.20	—	0	1
Two children	.18	—	0	1
Three+ children	.08	—	0	1

Health outcome: Self-rated health

The outcome variable of this study is self-rated health. Self-rated health was measured on a

five-point scale ranging from 'very bad' (0) to 'very good' (4). Self-rated health is a general

assessment of one's health status, not connected to any specific illness, but covering mental,

physical, and social aspects of health (Idler et al., 1999). It has been shown to predict

mortality and morbidity and has high test–retest reliability in a number of studies (Idler and

Benyamini, 1997). Furthermore, this variable has been recommended by the WHO for

comparative research (De Bruin et al., 1996) and a large number of researchers have followed

this advice (Huijts and Kraaykamp, 2012; Präg et al., 2016). Research has also shown that

the associations between objective health indicators and self-perceived health are largely similar across countries (Bardage et al., 2005).

Predictor variables

Doctor–patient relationship. The ESS questionnaire contains six items covering different aspects of the doctor–patient relationship. Respondents were asked how often statements applied to doctors in general. These six statements largely correspond to the two models of doctor–patient relations described previously and are reproduced in Table 2.

All answers are recorded on a five-point scale, ranging from 'never or almost never' (0) to 'always or almost always' (4). Zero-order correlations between the six items are low to moderate (.05 to .42, see Table 2). The items of the egalitarian model and the paternalistic model are positively correlated among one another and negatively correlated with the items of the other model, yet a factor analysis (shown in the On-line Supplement) do not yield a clear two-dimensional structure. This points to the fact that the items capture distinct features of the doctor–patient relationship, but however does not allow for the creation of composite scores that would be more reliable than the single-item indicators we use for our analyses. Table 2 also shows that the bivariate relationships between the indicators of the doctor–patient relationship and education are substantively small (yet mostly statistically significant). For the times of the egalitarian model, the higher educated have higher approval for the statement that doctors are not difficult to understand and that doctors treat their patients as equal, yet there is no statistically significant difference between the educational groups for the statement that doctors discuss treatment decisions with their patients. The direction of these associations however is not always straightforward: For the items of the paternalistic model, approval to the statement that doctors keep the whole truth from their patients is lower among the higher educated, yet for the statement that they are not willing to admit their mistakes, approval is higher among the higher educated.

Table 2: Indicators of doctor–patient relationship by educational group and correlations between indicators

	Average by educational group				Item correlations				
	Lower educated	Medium educated	Higher educated	*F*-test	1)	2)	3)	4)	5)
Egalitarian model:									
1) Doctors use words or phrases that their patients do not find difficult to understand *(Item reversed)*	3.25	3.26	3.45	*F* = 82.46, *p* = 0.01	1.00				
2) Doctors treat patients as their equals	3.20	3.15	3.30	*F* = 32.94, *p*= 0.03	.15	1.00			
3) Before doctors decide on a treatment, they discuss it with their patient	3.34	3.34	3.31	*F*= 1.60, *p* = 0.46	.11	.41	1.00		
Paternalistic model:									
4) Patients are reluctant to ask their doctor all the questions they would like to ask	2.53	2.59	2.54	*F* = 8.24, *p* = 0.11	-.26	-.13	-.09	1.00	
5) Doctors keep the whole truth from their patients	2.31	2.28	2.14	*F* = 62.45, *p* = 0.02	-.18	-.11	-.08	.18	
6) Doctors are not willing to admit their mistakes to their patients *(Item reversed)*	4.08	4.21	4.14	*F*= 43.63, *p* = 0.02	-.09	-.22	-.22	.05	.05

Notes: *F*-tests are based on OLS regression models that regress the respective doctor–patient relationship item on two education dummies to assess the correlation between education and the item. For all *F*-tests, the degrees of freedom are *N*–1 = 31,195 and *K*–1 = 2. Item correlations are Pearson product-moment correlation coefficients.

Education. We rely on education as our focal indicator of socioeconomic status. Based on the International Standard Classification of Education, we distinguish between three educational groups: low (ISCED 0–2), medium (ISCED 3–4), and the higher educated (ISCED 5–6). There are several reasons for relying on education for our purposes. Firstly, education reflects both individuals' material and non-material resources and their social status in a broad fashion. Secondly, the ISCED, with its high degree of cross-national standardization, allows to meaningfully compare educational groups across countries. Thirdly, educational attainment is usually completed in early adulthood and remains stable across the life course, thus reducing the chance of reverse causation: unlike occupational status, educational degrees do not change even when an adult experiences a health shock (Elstad, 2004). Fourthly, compared to income, which usually comes with a large proportion

of non-respondents, education is a comparably easy-to-measure indicator of SES. Finally, education is a meaningful measure for the SES of both men and women (Lahelma, 2010).

Control variables. As individual-level control variables, the models contain marital status/cohabitation (0 = not married or cohabiting with a partner, 1 = married/cohabiting with a partner), sex (0 = male, 1 = female), age, migrant status (1 = yes, 0 = no), being a lone mother (1 = yes, 0 = no), and number of children (ranging from no children to three and more children, as a set of dummy variables).

Method and modeling strategy

For analyzing a clustered dataset, multilevel (random effects) modeling is often recommended (Snijders and Boskers, 2012). Given the relatively low number of countries (Bryan and Jenkins, 2016; Mills and Präg, 2016) and our prime interest in the relationship between variables at the individual level, we present results as obtained from OLS regression models. These models account for the country variance by including country fixed effects and correct for the clustering in the data by reporting cluster-robust standard errors. We have centered our predictor variables at their respective country means, allowing us to obtain unbiased estimates of the within-country regressions (Allison, 2009). Alternative estimation strategies (which do lead to the same substantive conclusions) are reported in the On-line Supplement.

Results

Model 1 reported in Table 3 confirms the presence of an educational gradient in health. Respondents with medium and high education report significantly better health than lower educated respondents. A Wald test further confirms that the coefficients for medium and highly educated respondents differ from one another ($F(1, 23) = 196.82$, $p = .000$), indicating that there is not a single dividing line between the lower educated and anyone with higher

education, but that the health benefits of education increment gradually. The control variables in the model behave as can be expected from the literature: Older respondents and females report worse health, and those with a partner report better health. A comparison of the coefficients shows that—apart from age—education is the most important predictor of health.

Table 3: Self-rated health regressed on education and doctor–patient relationship, OLS regression

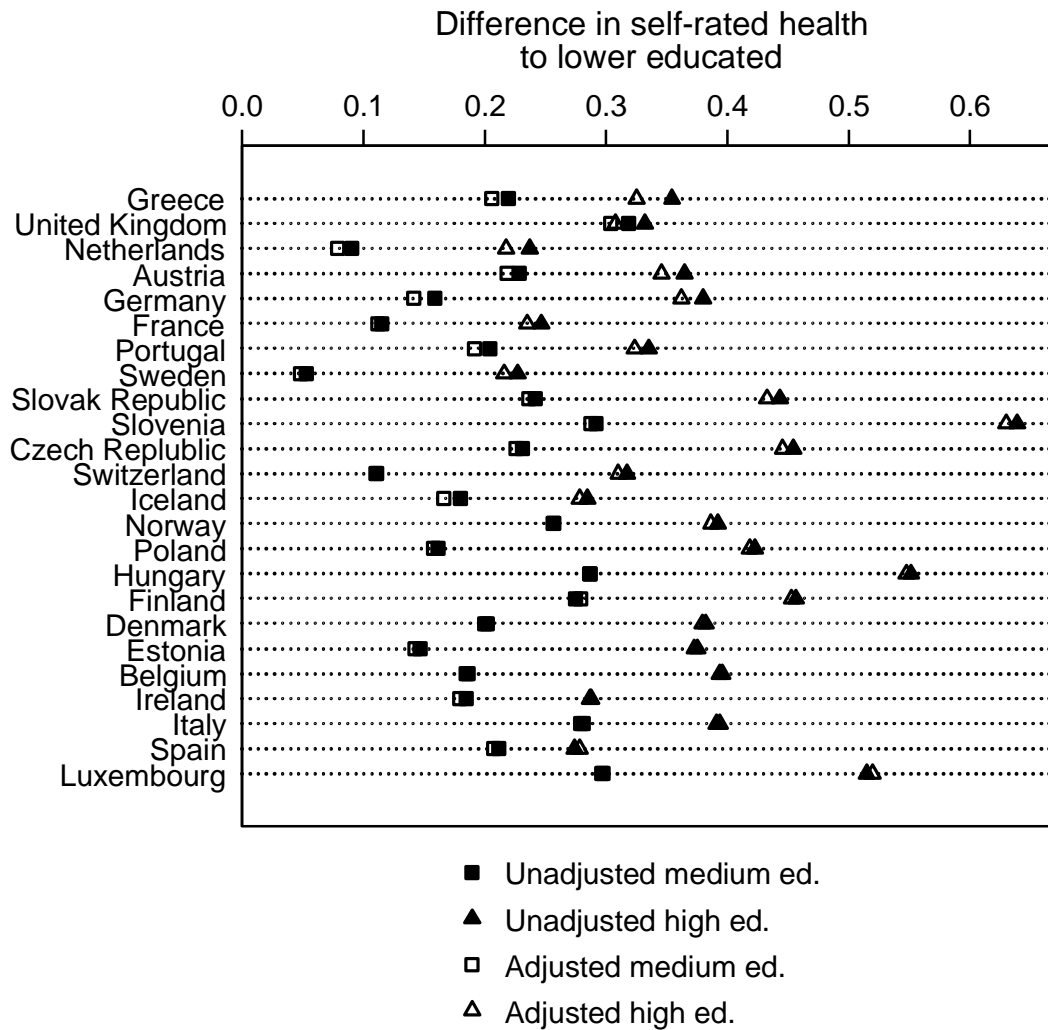|	(1)	(2)	(3)
Education (*ref.* low education)			
Medium education	0.192***	0.187***	0.191***
	(0.019)	(0.019)	(0.020)
High education	0.358***	0.349***	0.353***
	(0.021)	(0.021)	(0.022)
Egalitarian model			
Easy to understand		0.022***	
		(0.005)	
Treat patients as equal		0.026***	
		(0.005)	
Discuss decisions		-0.002	
		(0.004)	
Paternalistic model			
Patients reluctant to ask questions			-0.004
			(0.004)
Keep truth from patients			-0.026***
			(0.006)
Doctors deny mistakes			-0.013
			(0.007)
Age	-0.018***	-0.018***	-0.017***
	(0.001)	(0.001)	(0.001)
Female (*ref.* male)	-0.055**	-0.054**	-0.055**
	(0.018)	(0.019)	(0.018)
Married/cohabiting (*ref.* not m./c.)	0.065***	0.063***	0.065***
	(0.017)	(0.017)	(0.017)
Single mother (*ref.* not s.m.)	-0.033	-0.032	-0.034
	(0.032)	(0.032)	(0.033)
Migrant (*ref.* not migrant)	-0.063*	-0.059*	-0.061*
	(0.025)	(0.026)	(0.026)
Children in household (*ref.* none)			
One child in household	0.023	0.023	0.024
	(0.013)	(0.013)	(0.013)
Two children in household	0.087***	0.088***	0.088***
	(0.014)	(0.013)	(0.013)
Three+ children in household	0.069**	0.071***	0.070**
Intercept	2.865***	2.869***	2.868***
	(0.014)	(0.015)	(0.014)
Country dummies included	YES	YES	YES
N countries	24	24	24
N individuals	31,198	31,198	31,198

Robust standard errors in parentheses. Coefficients for country dummies not displayed.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The indicators of an egalitarian doctor–patient relationship are entered in Model 2 of Table 3. Reporting that doctors are easy to understand and that they treat their patients as equals is associated with significantly better health, whereas the third indicator, whether doctors discuss their decisions with patients, is unrelated to self-reported health. Hypothesis 1, which had posited that a more egalitarian doctor–patient relationship attenuates the educational gradient in health, has to be rejected. When comparing the coefficients for education as obtained from Model 1 and Model 2, barely any difference can be detected, indicating that by and large, more egalitarian doctor–patient relations do not reduce educational differences in self-rated health. A reason for this is that, as shown before, the educational differences in the doctor–patient relationship are comparably small.

In order to assess differences between countries for this finding, we have run separate regression models by country and report the education coefficients before and after adjusting for the egalitarian doctor–patient relationship in Figure 1. The size of the educational gradient in health varies considerably across countries, but closer inspection reveals that differences between the adjusted and unadjusted coefficients are negligible, indicating that the finding of no meaningful reduction in the educational gradient in health in case of a more egalitarian doctor–patient relationship holds for all countries under study.

Figure 1: Educational gradient in health by country, before and after adjusting for egalitarian doctor–patient relationship, based on country-specific OLS regression models.

Note: All models control for age, sex, marital status, migrant status, single motherhood, and number of children.

For the indicators of a paternalistic doctor–patient relationship, Model 3 of Table 3 indicates direct negative associations with self-rated health for one of the three indicators. When patients report that doctors keep the truth from patients, it goes along with statistically significant poorer self-rated health. Reporting about a reluctance to ask questions and about doctors denying mistakes have negative effects that are not statistically different from zero. The size of the educational gradient in health is, however, unaffected by including indicators

of a paternalistic doctor–patient relationship, as can be seen from comparing the coefficients

for education between Models 1 and 3.

Table 4: Self-rated health regressed on education and doctor–patient relationship including interaction terms, OLS regression

	(4)	(5)	(6)	(7)	(8)	(9)
Education (*ref.* lower)						
Medium education	0.186***	0.187***	0.188***	0.191***	0.190***	0.190***
	(0.020)	(0.020)	(0.019)	(0.020)	(0.020)	(0.020)
High education	0.349***	0.349***	0.349***	0.354***	0.353***	0.354***
	(0.022)	(0.021)	(0.022)	(0.022)	(0.021)	(0.022)
Egalitarian model						
Easy to understand	0.039***	0.022***	0.022***			
	(0.010)	(0.005)	(0.005)			
Medium ed. X Easy to understand	-0.024*					
	(0.011)					
High ed. X Easy to understand	-0.036**					
	(0.012)					
Treats patients as equal	0.026***	0.032**	0.026***			
	(0.005)	(0.009)	(0.005)			
Medium ed. X Treats patients as equal		-0.009				
		(0.008)				
High ed. X Treats patients as equal		-0.011				
		(0.011)				
Doctor discuss decisions	-0.002	-0.002	0.002			
	(0.004)	(0.004)	(0.008)			
Medium ed. X Discuss decisions			-0.005			
			(0.011)			
High ed. X Discuss Decisions			-0.008			
			(0.010)			
Paternalistic model						
Patients reluctant to ask questions				-0.020**	-0.004	-0.004
				(0.006)	(0.004)	(0.004)
Medium ed. X Patients reluctant to ask questions				0.023*		
				(0.008)		
High ed. X Patients reluctant to ask questions				0.029**		
				(0.009)		
Keep truth from patients				-0.026***	-0.031**	-0.026***
				(0.005)	(0.011)	(0.005)
Medium ed. X Keep truth from patients					0.005	
					(0.013)	
High ed. X Keep truth from patients					0.011	
					(0.0105)	
Doctors deny mistakes				-0.013	-0.013	-0.011
				(0.007)	(0.007)	(0.010)
Medium ed. X Doctors deny mistakes						0.003
						(0.012)
High ed. X Doctors deny mistakes						-0.011
						(0.014)
Age	-0.018***	-0.018***	-0.018***	-0.018***	-0.018***	-0.018***
	(0.001)	(0.0014)	(0.001)	(0.001)	(0.001)	(0.001)
Female (*ref.* male)	-0.054**	-0.054**	-0.054**	-0.056**	-0.055**	-0.055**
	(0.019)	(0.019)	(0.019)	(0.018)	(0.018)	(0.018)
Married/cohabiting (*ref.* not m./c.)	0.063***	0.063***	0.063***	0.065***	0.064***	0.065***

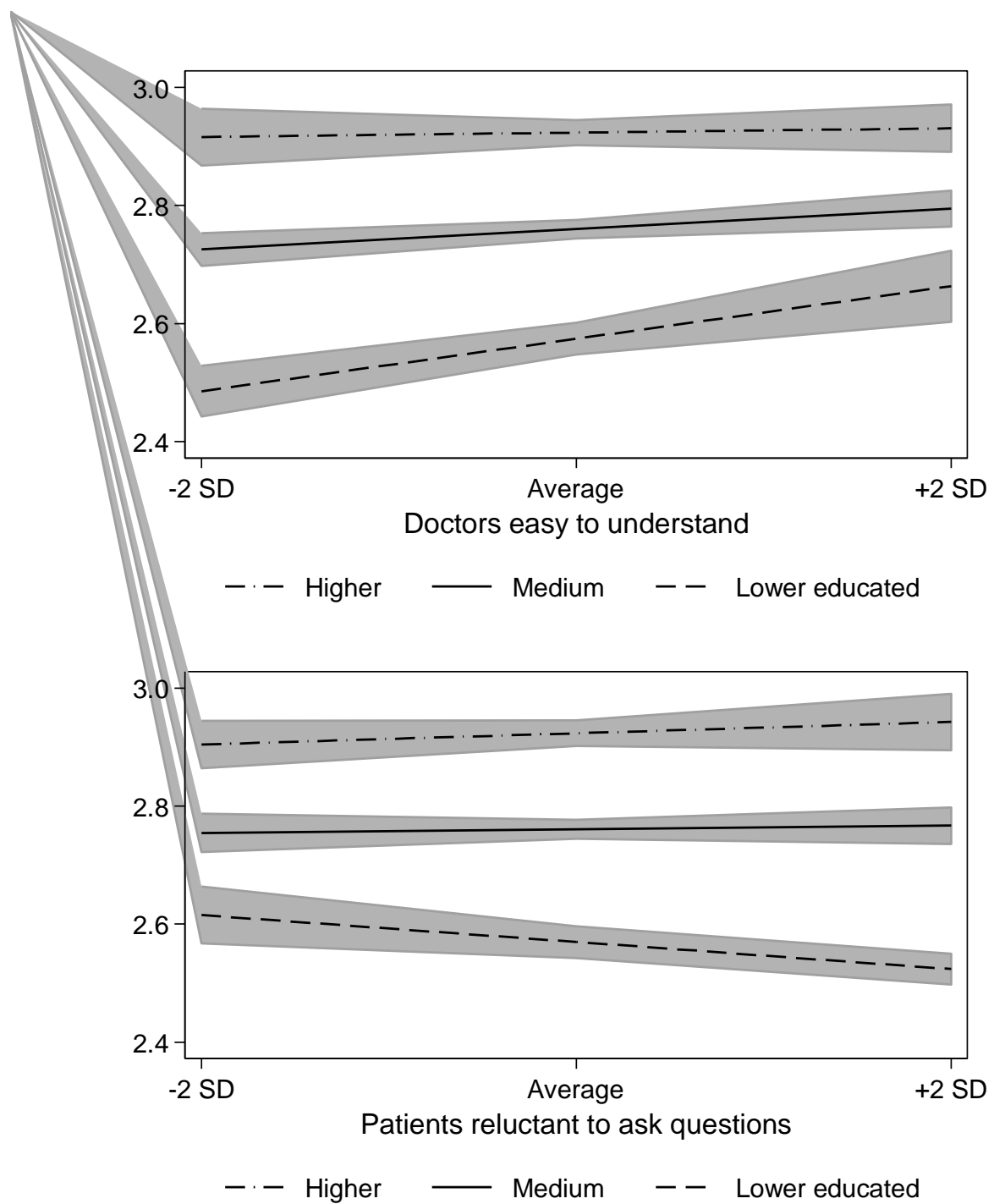|						
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Single mother (*ref.* not s.m.)	-0.031	-0.032	-0.032	-0.033	-0.034	-0.034
	(0.032)	(0.032)	(0.032)	(0.032)	(0.033)	(0.033)
Migrant (*ref.* not migrant)	-0.059[*]	-0.059[*]	-0.059[*]	-0.061[*]	-0.061[*]	-0.061[*]
	(0.027)	(0.025)	(0.026)	(0.027)	(0.026)	(0.026)
Children in household (*ref.* none)						
One child in household	0.023	0.023	0.023	0.024	0.023	0.024
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Two children in household	0.088[***]	0.088[***]	0.088[***]	0.087[***]	0.088[***]	0.088[***]
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Three+ children in household	0.071[***]	0.071[***]	0.071[***]	0.070[**]	0.070[**]	0.070[**]
	(0.019)	(0.019)	(0.019)	(0.020)	(0.019)	(0.019)
Constant	2.872[***]	2.870[***]	2.869[***]	2.867[***]	2.869[***]	2.868[***]
	(0.015)	(0.015)	(0.015)	(0.014)	(0.014)	(0.014)
Country dummies included	YES	YES	YES	YES	YES	YES
N countries	24	24	24	24	24	24
N individuals	31,198	31,198	31,198	31,198	31,198	31,198

Standard errors in parentheses
[*] $p < 0.05$, [**] $p < 0.01$, [***] $p < 0.001$

Table 4 reports the interactions between indicators of the doctor–patient relationship and education. For two of the six indicators, we can detect a statistically significant interaction with education, namely when respondents report doctors to be easy to understand (Model 4 of Table 4) and when patients are reluctant to ask questions (Model 7 of Table 4). To facilitate interpretation, we have plotted the interactions in Figure 2. The upper panel of Figure 2 plots the interaction of Model 4 from Table 4. It shows that whether doctors are easy to understand plays virtually no role for the self-rated health of the higher and medium educated; the slopes of their predicted lines are virtually flat over the continuum of how easy doctors are to understand. For the group of the lower educated, however, we can see a marked increase in self-rated health as the reports of doctors being easy to understand increase. The plot provides evidence that it is the lower educated who benefit from a more egalitarian doctor–patient relationship, giving support for Hypothesis 2a. The lower panel of Figure 2 plots the interaction of Model 7 of Table 4. Again, for the higher educated and for those with medium education, it shows that there is virtually no association of self-rated health with reporting that patients are reluctant to ask questions, as the slopes of the predictions are flat. However, for the lower educated, we can see a falling slope as the

agreement to the statement that patients are reluctant to ask questions gets stronger. Substantively, this means that a reluctance to answer questions is irrelevant for those with educational degrees classified as medium and high, but for the lower educated, such a reported reluctance is associated with worse self-rated health. This gives support for Hypothesis 2b.

95% confidence intervals based on robust standard errors

Figure 2: *Upper* **panel: Plot of the 'doctors easy to understand' X education interaction.** *Lower* **panel: Plot of the 'Patients reluctant to ask questions' X education interaction.**

Note: Calculations based on Model 4 of Table 4 (upper panel) and Model of Table 4 (lower panel).

Sensitivity analyses

The On-line Supplement to this article shows the following robustness checks: We were able to replicate our findings from pooled OLS models with country dummies and robust standard errors by using random effects models without obtaining substantially different results. We also ran analyses making use of the weights calculated by the data providers, leading to substantively identical findings. We furthermore replicated our analyses dropping one country at a time or dropping all Eastern European countries altogether, yielding substantively similar findings.

Discussion

How doctor–patient relations affect the educational gradient in health is largely unknown. Drawing on a large European general population survey, our study generated several new insights into this field.

Firstly, our analyses showed that two different models of the doctor–patient relationship, namely the traditional paternalistic model and the more egalitarian, 'patient-centered' model are directly associated with self-rated health. Reports that doctors are easy to understand and treat their patients as equals go along with better self-rated health. Conversely, reports that doctors do not tell the whole truth are associated with worse self-ratings of health. This confirms findings from previous studies, which have suggested that a more egalitarian doctor–patient relationship is associated with better wellbeing and health outcomes (Griffin et al., 2004; O'Connor et al., 2009; Ong et al., 1995; Stewart, 1995a; Stewart, 1995b; Weiner et al., 2013; Williams et al., 2000).

Secondly, the different models of the doctor–patient relationship do not mediate the educational gradient in self-rated health. Despite the evidence for differential treatment of patients by their doctors according to their SES in the literature (Willems et al., 2005), our

data show that differences in doctor–patient relations are substantively small. Accounting for those differences does not decrease the education–self-rated health association.

Thirdly, when doctors are more paternalistic and less egalitarian, educational differences in self-rated health can indeed be larger. We found a number of interactions between education and indicators of the different models of doctor–patient relations. For the lower educated, reporting that doctors are easy to understand—an indicator of the egalitarian model of doctor–patient relations—is associated with better self-rated health, while for those with medium and high educational degrees this does not translate into better health,. Also, reports that patients are reluctant to ask questions—an indicator of the paternalistic model of the doctor–patient relationship—is negatively associated with self-rated health for the lower educated, but for medium and higher educated there is no negative association. This finding has important policy implications, as measures to improve doctor–patient relations can have a positive impact on overall population health, and can be expected to compress the social gradient in health.

As has prominently been argued by Marmot (2015), doctors should engage with the social background of their patients. Marmot encourages doctors to recognize (and improve) the social context (e.g. homelessness) in which poor health develops when treating patients, suggests that doctors should cooperate with other community actors such as social workers, and engage in advocacy to improve the living conditions of their patients. Yet rather than expanding the responsibilities of doctors, our findings however build on the core business of physicians and show how doctors' bedside manners go along with particular health effects and the educational gradient in health. We believe that this can have easier and greater impact on population health and health inequalities rather than overburdening doctors with new tasks and new arenas for action.

Furthermore, future research should engage with the effects different health care systems have on doctor–patient relations. While our study focused on the micro-level processes between doctors and patients that govern the educational gradient in health, introducing the level of health care systems would be a promising next step (Wendt, 2009; Blom et al., 2016), which however needs careful theorizing to disentangle the mechanisms that govern the macro–micro link between health care systems and doctor–patient relations. As a first step, our study already documented important country differences in the strength of the education–self-rated health relationship, yet future research is necessary. Exploiting differences in health care system financing would also allow to further investigate any effects of a marketization of health care.

We acknowledge that our conclusions are based on a cross-sectional, observational study. Our results are associational and cannot make any claims about causality. Despite these caveats, we believe that our study gives important impulses for future research under improved methodological conditions. Drawing on longitudinal data would help to rule out causality issues and could yield greater insights as to how the change in doctor–patient relations occurred over time. Also, using validated and more comprehensive indicators of the different models of the doctor–patient relationship could strengthen the case for the arguments laid out in this manuscript. Additional health outcomes that do not rely on self-reports would help overcome any biases that might stem from cross-national or individual (e.g. education-related) heterogeneity (Manderbacka, 1998; Jylhä, 2009). However, our results proved to be robust to a multitude of model specifications and were not sensitive to the selection of countries, making it unlikely that institutional or cultural specificities (Wendt 2014; Hall and Lamont, 2009) are driving our findings. Notwithstanding these limitations, our study was the first to show that in a large European population sample the move towards a more egalitarian model of doctor–patient relations can have positive effects on reducing

social inequality in health, which opens up avenues for further research on the social gradient in health.

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