# DISCRIMINATION IN HEALTH CARE

## A Field Experiment on the Impact of Patients' Socioeconomic Status on Access to Care

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ABSTRACT
We employ a large-scale field experiment to investigate the impact of patients' socioeconomic status on access to care. We request an appointment at more than 1,200 physicians in Austria, varying the educational level of the patient. Our results show that overall patients with a university degree receive an appointment significantly more often than patients without a degree. Differentiating between practice assistants and physicians as responders, we find that physicians provide significantly shorter response times and marginally significant shorter waiting times for appointments for patients with than without a university degree. Our results thus provide unambiguous evidence that discrimination by health providers contributes to the gradient in access to care. Furthermore, we argue that our results are consistent with implicit bias for practice assistants and statistical discrimination based on financial incentives for physicians.

KEYWORDS: access to health care, SES health gradient, discrimination, field experiment
JEL CLASSIFICATION: C93, I14

## I. Introduction

Equity in terms of access to health care is one of the key objectives of most health-care systems; nevertheless, there is extensive empirical evidence indicating the existence of inequalities associated with socioeconomic status both in health and in access to health care (Cutler and Lleras-Muney 2010; Fleurbaey and Schokkaert 2011; van Doorslaer, Masseria, and Koolman 2006; Wagstaff and van Doorslaer 2000). The 2016 National Healthcare Quality and Disparities Report of the United States, for example, shows that for all but one measure of access to health care poor people experience worse access to care compared with people with high income (AHRQ 2017). Many explanations have been put forward to explain these inequalities in access to health care. In our large-scale field experiment, we

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study discrimination in access to health care based on the patients' socioeconomic status as one potentially significant channel contributing to the observed inequalities.

We employ a fictitious test patient to request an appointment via e-mail at more than 1,200 physicians in Austria. The test patient's signature in these e-mails varies between signaling no degree, a doctoral degree, and a medical degree. We consider employing the different titles as a simple, elegant way to signal varying levels of education and thus socioeconomic status in our field experiment and thereby to examine the causal impact of socioeconomic status on access to health care. We observe whether these differences in education levels impact (1) the probability of being offered an appointment, (2) the time to receive a response, and (3) the waiting time until the next available appointment. Motivated by the two leading theories on discrimination in economics, statistical discrimination (Aigner and Cain 1977; Arrow 1973; Phelps 1972) and taste-based discrimination (Becker 1957), and the psychological literature on in-group favoritism (Tajfel 1970), we expect physicians to treat patients with higher socioeconomic status more preferentially in the three access to health-care measures on the basis of financial incentives[1] and social distance.[2] Overall, we find that patients with a university degree have an 8 percentage point higher probability of receiving an appointment via e-mail than patients without a university degree. When differentiating between practice assistants[3] and physicians as responders to the e-mail, we observe that physicians favor patients with a degree over those without a degree by providing the appointment significantly quicker and marginally significantly earlier: patients with a university degree wait on average two to three days less for an appointment compared with patients without a degree. Our results hence provide evidence that health-care providers discriminate among patients based on their socioeconomic status.

Our paper thus contributes to the existing literature on disparities in access to health care by unambiguously isolating providers' discriminatory behavior. Whereas observational studies lack control over the environment and suffer from unobserved heterogeneities between socioeconomic groups (Heckman 1998), we are the first to report evidence from a controlled randomized experiment on the impact of education on access to health care.

Identifying the drivers of disparities in access to health care is key to reaching the objective of most health-care systems, granting citizens equal access to care (Adler and Rehkopf 2008). In the literature, several drivers for disparities with respect to access to health care have been brought forward: patients of a higher socioeconomic status are more likely to have health insurance in countries without universal health insurance coverage[4] (Ross and Mirowsky 2000), may be better at navigating through the health-care system,

1 With respect to financial incentives for discrimination, we refer to the description of the remuneration system of physicians in Austria in Section II and the hypotheses in Section III.C.

2 For a more detailed description of the theories on discrimination see Section III.C.

3 Practice assistants in our setting are mostly administrative staff but may also be other health professionals such as nurses.

4 Austria provides universal health insurance coverage (see Section II for a short description of the Austrian health-care system).

and may have better communication skills when expressing their needs (Ashton et al. 2003; Howard, Sentell, and Gazmararian 2006). Furthermore, patients of higher socioeconomic status may have a different type of demand for health care because of divergent underlying risk and time preferences (Castillo et al. 2011; Peretti-Watel, L'Haridon, and Seror 2013), may differ in their choices of health service providers (Kaarboe and Carlsen 2014), and may be favored based on statistical and/or taste-based discrimination (Balsa and McGuire 2001, 2003; van Ryn and Burke 2000; Balsa et al. 2003).[5] This paper focuses on providers' discrimination based on the patients' socioeconomic status as one potential channel. According to the World Health Organization (WHO), "Discrimination in health care is widespread across the world and . . . violates the most fundamental human rights" (WHO 2017).

Most closely related to our study is the public health literature on discrimination. Schulman et al. (1999) is one of the earlier papers to address differential treatment based on ethnic group and gender. In a computerized survey, the authors ask physicians for a treatment recommendation, varying the patient's race, sex, and age. The results reveal discrimination based on sex and race: women and African Americans were less likely to be referred for catheterization when reporting chest pain than men and whites. More recently, Brekke et al. (2018) provide evidence of differential treatment of patients based on socioeconomic status by general practitioners (GPs) in Norway using administrative data with patient-level information on the services provided by GPs. Whereas Schulman et al. (1999) and Brekke et al. (2018) focus on differences in treatment decisions, our paper contributes to the literature on differences in access to health care.

Access to health care is mostly measured in terms of waiting time for an appointment in the literature. The literature shows that disparities with respect to waiting times for an appointment are correlated with patients' socioeconomic status (Alter et al. 1999; Cooper et al. 2009; Johar et al. 2013; Kaarboe and Carlsen 2014; Laudicella, Siciliani, and Cookson 2012; Monstad, Engesæter, and Espehaug 2014; Moscelli et al. 2018; Reibling and Wendt 2010; Sharma, Siciliani, and Harris 2013; Siciliani and Verzulli 2009). However, only a few of these studies actually analyze the underlying reasons leading to these disparities. Kaarboe and Carlsen (2014) show that attachment of patients to certain hospitals explains part of the differences in access to health care. Moscelli et al. (2018) investigate self-selection as a possible channel but do not find supporting evidence. The empirical studies are limited in the explanation of the causal relations because of both data quality and data availability issues. Administrative data often cannot account for socioeconomic status on the individual patient level. Furthermore, patients may signal different preferences during a physician visit that cannot be controlled for in the observational studies.

To the best of our knowledge, the only experimental study on the impact of socioeconomic status on access to health care is performed by Lungen et al. (2008) in Germany. Varying the patients' type of insurance between statutory and private, the authors show that privately insured patients have shorter waiting times than statutory insures. However, a clean identification is still difficult as physicians receive a higher reimbursement for a given procedure by a private than a statutory insurer. Hence, both the patients'

5 For a description of statistical and taste-based discrimination, see Section III.C.

socioeconomic status and the physicians' reimbursement are varied at the same time. Our field experiment solves the mentioned shortcomings and allows for an unambiguous identification of the effect of education on access to health care. Moreover, our results allow a comparison of discriminatory behavior between physicians and assistants.

The outline of the paper is as follows. In the next section, we provide a brief account of the Austrian health-care system. Section III presents the design of the field experiment, the procedure, and the hypotheses derived from the economics literature on discrimination. The results are presented in Section IV. Section V provides a discussion of the results, and Section VI concludes the paper.

## II. A Brief Account of the Austrian Health-Care System

The Austrian health-care system is characterized by a solidarity-based funding principle whereby 99.9 percent of the population is covered by social health insurance (Hauptverband der österreichischen Sozialversicherungsträger 2018). Social insurance protection is linked to employment and is compulsory by law as it grants access to a wide range of services. Because of historical developments and the federalist structure of the country, there are currently 22 social security providers responsible for health, retirement, and accident insurance, 19 of which offer health insurance.[6] There is no competition between insurance providers because individuals are insured based on the type and location of their employment.[7]

The two main sources of financing for the Austrian health-care system are taxes and social insurance contributions, which cover more than 75 percent of total health expenditures. The rest is financed privately via out-of-pocket payments, private health insurance, and nonprofit organizations. Out-of-pocket payments include prescription fees for pharmaceutical products, coinsurance for selected insurance providers, and direct payments for services not covered by health insurance, as well as for services provided by physicians who do not have a contract with a health insurance provider. Medical services that are sufficient and appropriate are normally covered by health insurance. An explicit list indicating services that are not covered by insurance does not exist.

Our paper focuses on outpatient care:[8] In Austria, general practitioners (GPs) have no gatekeeping role, and patients can freely choose their preferred health service provider. Access to primary and secondary care is thus almost unrestricted. When choosing doctors in the outpatient sector, patients can select among two types of physicians: (1) those with a contract with their respective health insurance provider (SHI doctors) and (2) physicians not linked to that provider (non-SHI doctors). If patients consult non-SHI doctors, they must directly pay for the services themselves, with 80 percent of the fee that the service would cost at an SHI doctor reimbursed by the health insurance provider. For SHI doctors, patients may be asked to make direct payments only in few instances where treatments are

6 Austria consists of nine states, one of which is the capital, Vienna.

7 People not in the labor force are either coinsured via a family member (husband or parent), insured on a voluntary basis if coinsurance is not possible, or insured via the public pension scheme if retired.

8 In our setting, outpatient care is defined as health services provided by physicians in their own practices.

not covered by health insurance. A list of covered treatments is provided in the contract between the physician and the health insurance provider.

In the outpatient sector, physicians are remunerated with a mix of fee for service (FFS) for specific services and a case-based flat rate (CFR) for basic provision.[9] The proportion of FFS to CFR payments depends on the specialty of the practitioner, with GPs receiving most of their remuneration from CFR payments and specialists from FFS payments. Non-SHI doctors set the prices for all treatments themselves, whereas SHI doctors can set the prices only for the few treatments not covered by health insurance (Hofmarcher and Quentin 2013).[10]

## III. The Field Experiment

### A. METHOD AND PROCEDURE

In order to test the effect of socioeconomic background on access to health care, we conducted a correspondence study[11] in Austria in which three fictitious patients asked medical specialists in the outpatient sector for appointments via e-mail.[12] Following the seminal paper of Bertrand and Mullainathan (2004), correspondence studies have been widely applied in field experiments on discrimination; in contrast to audit studies, the use of fictitious people guarantees that observed differences in the outcomes measured between groups will be caused exclusively by the manipulation of the experimenter and not by other factors that may be difficult to control for when real people are used (Bertrand and Duflo 2017).

In total, 1,249 physicians in the fields of ophthalmology, dermatology, otolaryngology, and gynecology were contacted by our fictitious patients, who asked for a regular checkup appointment to be scheduled. The three fictitious patients were female and only differed with respect to the educational attainment signaled in the signature of the e-mail. The three variations were (1) no university degree (NO TITLE), (2) a doctoral degree (DR TITLE), and (3) a medical degree (DR MED TITLE).[13] Table 1 summarizes

9 CFR is a flat payment. In contrast to capitation payments, physicians do not get a fixed payment per patient but per case on a quarterly basis.

10 Prices set by non-SHI doctors can be a multiple of the prices set by health insurance providers (Österreichische Ärztezeitung 2004).

11 The two most prevalent experimental methods to measure discrimination in the field are correspondence studies and audit studies. Audit studies use real people who are matched on most observable characteristics except for the one under investigation (e.g., race, gender, socioeconomic status), while correspondence studies create fictitious people who correspond via e-mail (Bertrand and Duflo 2017).

12 This study could only be conducted in a health system with direct access to secondary care. Austria represents a perfect fit because unlike other European countries (e.g., Italy, Portugal, Finland, Denmark, Norway, and the United Kingdom), GPs have no gatekeeping role (see Section II for a brief account of the Austrian health system).

13 The use of titles in e-mail signatures is a very common practice and thus a natural signal for a patient's socioeconomic status. Hence, not stating a title in the e-mails in the NO TITLE condition unambiguously signals that patients do not have a university degree. We deliberately omit the bachelor's (master's) degree

**TABLE 1.** Experimental conditions by specialists

| Specialty | NO TITLE | DR TITLE | DR MED TITLE | SUM |
|---|---|---|---|---|
| Ophthalmologist | 80 (33.6) | 80 (33.6) | 78 (32.8) | 238 |
| Dermatologist | 66 (32.4) | 69 (33.8) | 69 (33.8) | 204 |
| Otolaryngologist | 55 (34.8) | 52 (32.9) | 51 (32.3) | 158 |
| Gynecologist | 212 (32.7) | 217 (33.4) | 220 (33.9) | 649 |
| SUM | 413 (33.1) | 418 (33.5) | 418 (33.5) | 1,249 |

Note: Each cell contains the number of observations, with the percentages by specialty provided in parentheses.

the distribution of experimental conditions by specialty. Depending on the specialty of the physician, we asked for a vision test, a hearing test, an examination of moles, or a Pap test. These are all standard nonurgent examinations (for the exact wording of the e-mails and the educational attainment specifications, see Online Appendix C, http://www.mitpressjournals.org/doi/suppl/10.1162/ajhe_a_00124).

The assignment of experimental conditions to physicians was administered randomly in a between-subjects design such that each physician received only one e-mail. In order to ensure a balance of experimental conditions over subgroups and regions, randomization was stratified on (1) the specialty of the physician, (2) whether he or she was an SHI doctor, and (3) the state of the practice site. We opted for a between-subjects design for two reasons. First, between-subjects designs are considered to be the most conservative way of investigating differences in experimental conditions, since confounding due to experimenter-demand effects is not an issue (Charness, Gneezy, and Kuhn 2012). Apart from internal validity concerns, external validity is also enhanced with this procedure because practitioners rarely receive multiple appointment requests via e-mail at the same time that would require practitioners to prioritize.

The experiment was conducted between April 26 and June 2, 2017, with the use of Gmail's GMass extension. In order to fine-tune the experimental procedure and to test the technical aspects of GMass, a pilot study was conducted on April 26. In order to avoid the unnecessary occupation of an appointment slot, the scheduled checkup was cancelled with a short time delay after receipt of the appointment.[14]

### B. DESCRIPTION OF THE SAMPLE AND TEST OF RANDOMIZATION

In total, 3,387 physicians from the four specialist fields were registered with the Austrian Medical Chamber. Depending on the specialty, between 36 percent and 48 percent had an e-mail address that was available online.[15] Registrations with the Austrian Medical

as a separate condition in order to allow for the maximum effect size of socioeconomic status on access to health.

14 For a detailed description of the experimental procedure, see Online Appendix B.

15 This subset of physicians may differ from the total population with respect to background characteristics. However, because it is highly likely that the population studied in our experiment may be younger than

Chamber are based on the practice site, and thus there can be double counts for physicians working in more than one medical practice. Excluding all double counts left us with 1,310 physicians who could be contacted via e-mail for an appointment. Of these, 5 percent had delivery problems because the e-mail address was invalid or no longer used by the recipient. In the rest of the paper, our analysis is based on the 1,249 physicians who could be contacted without delivery problems. In this final sample, almost 90 percent answered the e-mail (for the sample description, see Table A1 in Online Appendix A).[16] These answers were provided either by the physician directly or by the practice assistant. Using the information provided in the signature of the e-mail, 92 percent of the answers ($N = 1{,}006$) could be unambiguously ascribed to either the physician ($N = 474$) or the assistant ($N = 532$).

To test whether the randomization successfully balanced physician, practice site, and experimental procedure characteristics across the three experimental conditions, we investigated whether the set of covariates can predict the status of experimental condition. Table 2 reports relative risk ratios and *p*-values of multinomial logistic regressions for each covariate separately, with the experimental conditions as the dependent variable and the condition NO TITLE as the reference group. The multinomial logistic regressions are of the form

$$\log\left(\frac{\pi_i^{(j)}}{\pi_i^{(NO\ TITLE)}}\right) = \beta_0^{(j)} + \beta_1^{(j)} Covariate_i$$

with $j = DR\ TITLE, DR\ MED\ TITLE$.

None of the 68 comparisons in the 34 regressions yield a relative risk-ratio $e^{\beta_1^{(j)}}$ that is significant at the 5 percent level. Regressing the status of experimental conditions on all covariates simultaneously produces a *p*-value for joint significance of 1. Therefore, randomization was successful. Table 2 also contains summary statistics on the most important covariates.

### C. HYPOTHESES

The hypotheses are derived from the two leading theories on discrimination in economics: (1) statistical discrimination, as described by Phelps (1972), Arrow (1973), and Aigner and Cain (1977), and (2) taste-based discrimination, which was proposed by Becker (1957). According to the statistical discrimination theory, the differential treatment of groups is caused by an information extraction problem. Individual-specific information on background characteristics (productivity in the labor market; income in our context) is

the total population, our findings will be a lower bound on the existence of discriminatory behavior, as older generations are in general more conservative than younger generations, and conservatism is characterized by less inequality aversion compared with liberalism (Jost et al. 2003; Cornelis et al. 2009).

16 The replies to the fictitious patient contained either an offer for an appointment or a request to arrange an appointment by phone or to provide further information (e.g., social security number) or various other information (e.g., that scheduling an appointment was not necessary, that no new patients were being admitted, or that the requested procedure was not offered).

**TABLE 2.** Descriptives and test of randomization

| | | Relative risk ratios from multinomial logistic regressions (*p*-values) | |
|---|---|---|---|
| | (1) | (2) | (3) |
| COVARIATES[1] | Mean [SD] | DR vs. NO TITLE | DR MED vs. NO TITLE |
| Ophthalmologist (=1) | 0.191 | 0.985 (0.933) | 0.955 (0.794) |
| Dermatologist (=1) | 0.163 | 1.039 (0.837) | 1.039 (0.837) |
| Otolaryngologist (=1) | 0.127 | 0.925 (0.706) | 0.905 (0.630) |
| Gynecologist (=1) | 0.520 | 1.024 (0.867) | 1.053 (0.708) |
| Non-SHI doctor (=1) | 0.649 | 0.987 (0.928) | 0.987 (0.928) |
| Female (=1)[2] | 0.427 | 0.844 (0.230) | 0.909 (0.501) |
| Physician as responder (=1)[3] | 0.471 | 1.216 (0.209) | 0.919 (0.585) |
| No. of morning openings per week[4] | 1.998 [1.782] | 0.998 (0.953) | 0.998 (0.969) |
| No. of afternoon openings per week[4] | 1.849 [1.442] | 1.026 (0.601) | 1.013 (0.794) |
| Group practice (=1) | 0.141 | 1.264 (0.251) | 1.313 (0.180) |
| No. of inhabitants practice site | 636,299 [831,782] | 1 (0.707) | 1 (0.803) |
| Physician density[5] | 11.165 [5.322] | 1.017 (0.207) | 1.007 (0.596) |

Notes: Column 1: sample means for $N = 1{,}249$; standard deviations in brackets (for non-dummy variables). Column 2 (3): relative risk ratio from comparing DR (DR MED) and NO TITLE in multinomial logistic regressions (*p*-values in parentheses) with the experimental conditions as dependent variable and the experimental condition NO TITLE as the reference group. Regressing the status of experimental condition jointly on all covariates yields a *p*-value for joint significance of 1.000. [1]In total 33 covariates are regressed on the status of experimental condition; covariates not shown in the table include the 9 states and the 13 days of conducting the experiment. [2]$N = 1{,}229$ because physicians working in a mixed-gender group practice ($N = 20$) are excluded from this regression. [3]$N = 1{,}006$ for all answers with an unambiguous identification of the responder. [4]Opening hours are split into morning opening hours and afternoon opening hours; the variables No. of morning/afternoon openings per week report the number of times the practice is open in the morning/afternoon per week. Physicians not indicating any opening hours are coded 0 for both variables. [5]Physician density is measured as the number of physicians per specialty per 100,000 inhabitants at the district level.

missing, and it may be possible to extract this information from an affiliation to a specific group. Discrimination can therefore be a rational decision for a profit-maximizing agent. For both SHI and non-SHI doctors, patients may be asked to make direct payments not covered by social health insurance; a university degree can provide a signal for profit-maximizing prospective physicians of higher income and thus a greater willingness to pay, resulting in preferential treatment of this group. This is even more pronounced in the case of affiliation with the same profession (DR MED TITLE), since the information

extraction in this case is more precise and thus less risky—which, in the presence of risk aversion, will lead to more statistical discrimination (Aigner and Cain 1977). The model presented by Becker (1957) explains that the differential treatment of specific groups is based on a prejudice that results in distaste toward a group and ultimately in discrimination. The model has primarily been applied to the job market to investigate the racial wage gap between African Americans and white people (Charles and Guryan 2008, 2011; Guryan and Charles 2013) but also to investigate gender disparities (Sano 2009; Marom, Robb, and Sade 2016). Besides the job market, the model has also been extended to other markets such as housing (see for instance, Lee and Warren 1976; Courant 1978). Although an exact microfoundation of the theory is lacking, social psychologists have investigated the roots of prejudice extensively. One of the major contributions in this area is the work on social identity conducted by Tajfel (Tajfel 1970, 1981; Tajfel and Turner 1986) demonstrating the importance of social categorization in differential treatment, mainly in the form of in-group favoritism. In particular, Tajfel (1970) shows in his experiment that even a completely arbitrary assignment of people into groups leads to favoritism of in-group members. In our experiment, in-group favoritism would lead to the following ranking of preferential treatment from the most preferred to the least preferred group due to social distance: (1) DR MED TITLE, (2) DR TITLE, and (3) NO TITLE.[17]

We therefore expect (1) patients with a university degree (either a doctoral or a medical degree) to have greater access to health care than patients without a university degree, and (2) patients with a medical degree to have greater access to health care than patients with a doctoral degree.[18] Access to health care in our experiment is measured in three ways: (1) receipt of an appointment (whether the fictitious patient received an appointment via e-mail), (2) feedback time (measured in hours from e-mail dispatch to the response), and (3) waiting time for an appointment (measured in hours from e-mail dispatch to the scheduled checkup). With regard to all of these dimensions of access to health care, our hypotheses are as follows.

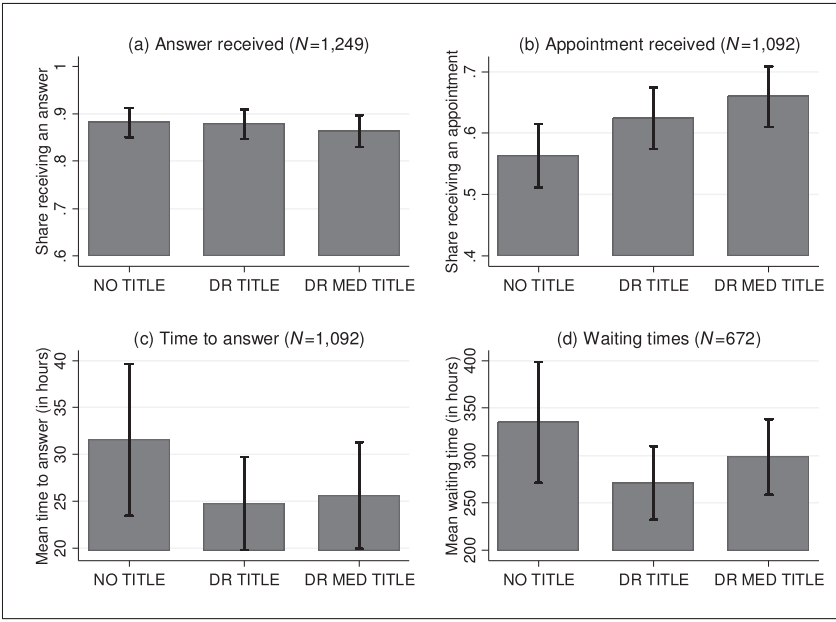
**H1 (DR TITLE and DR MED TITLE versus NO TITLE):** Patients with a university degree (1) have a higher probability of receiving an appointment, (2) wait less time for feedback, and (3) wait less time for an appointment than patients without a university degree.
**H2 (DR MED TITLE versus DR TITLE):** Patients with a medical degree (1) have a higher probability of receiving an appointment, (2) wait less time for feedback, and (3) wait less time for an appointment than patients with a doctoral degree.

Regarding the identity of the responder, differences in discriminatory behavior between physicians and assistants could be present. As assistants are generally paid a fixed salary instead of being on commission, we expect assistants to discriminate less often

17 Patients with a medical degree represent the closest in-group to the physician in our experiment because they share both a university degree and the professional discipline. Patients with a doctoral degree represent the wider in-group since membership only depends on having a university degree or not. Finally, the most distant patient group in our setting represents the patients without a university degree.

18 Since the two theories give the same predictions, we cannot disentangle statistical discrimination from taste-based discrimination.

**FIGURE 1.** Access to outpatient care by experimental conditions




Note: Error bars indicate 95% confidence interval.

based on a patient's socioeconomic status than physicians with respect to discrimination due to financial incentives. However, financial incentives could also work indirectly if assistants want to please their bosses to get a higher raise or to keep their jobs.[19] For taste-based discrimination, the direction of the results is unclear and could depend on the educational background of the assistant.

## IV. Results

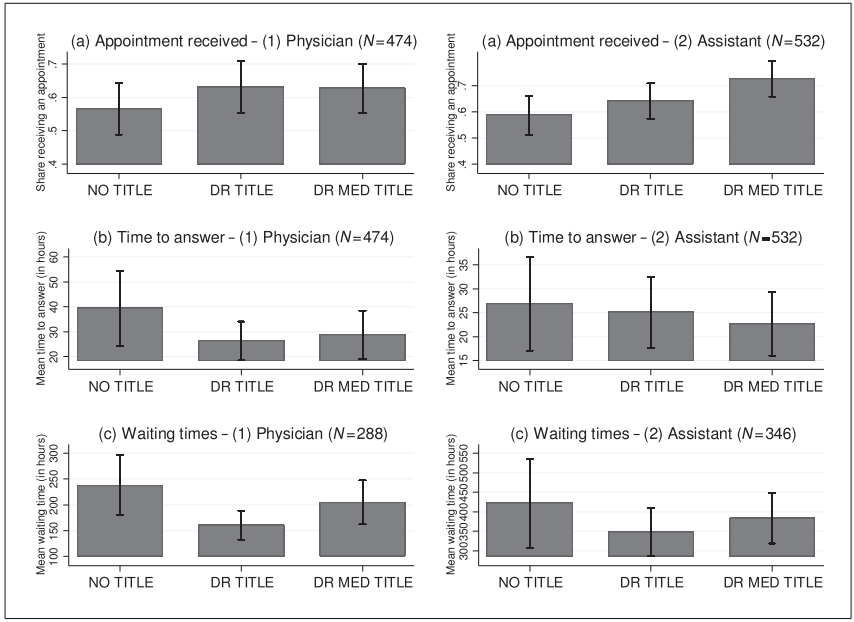
### A. NONPARAMETRIC ANALYSIS

Figure 1 illustrates our experimental results with respect to the different outcomes by experimental condition. Panel a shows that about 90 percent of the patients receive an answer to their appointment request independent of the patient's education. Panel b reveals that patients with a university degree are offered an appointment significantly more often than patients without a degree (DR TITLE and DR MED TITLE pooled versus NO TITLE: $p < 0.05$, $\chi^2$-test).[20] Whereas patients with a medical degree receive an appointment in 66 percent of the cases, patients without a degree are offered an appointment in only 56 percent of the cases ($p < 0.01$, $\chi^2$-test). Panel c reports the average time span in hours from the

19 We thank the editor for pointing this out to us.

20 See Table A2 in Online Appendix A for all tests between experimental groups for each outcome.

**FIGURE 2.** Access to outpatient care by responder and experimental conditions




Note: Error bars indicate 95% confidence interval.

sending of the e-mail to the receipt of the answer, ranging from 24 hours for DR TITLE patients and 25 hours for DR MED TITLE patients to 31 hours for NO TITLE patients. Even though patients without university degrees wait longer for their answers, the difference is not significant ($p > 0.1$ for all pairwise comparisons, Mann-Whitney $U$ tests). Finally, panel d shows the average waiting times in hours from the sending of the e-mail to the appointment (weekends and holidays excluded), with DR TITLE patients waiting on average 271 hours (11 workdays), DR MED TITLE patients 299 hours (12.5 workdays), and NO TITLE patients 335 hours (14 workdays) for an appointment.

As the results on discrimination may depend on the identity of the responder, we split the analysis by illustrating the results of physicians in panels 1 and those of assistants in panels 2 in Figure 2.[21] With respect to the probability of receiving an appointment (panels a), we find no differences between the different experiment conditions for physicians, whereas assistants discriminate in favor of patients with a university degree (DR TITLE and DR MED TITLE pooled versus NO TITLE). Patients with a university degree receive the response to their request answered by physicians 12 hours sooner than patients without a degree ($p < 0.05$, Mann-Whitney $U$ tests). Analogously, with respect to waiting times

21 See Table A2 in Online Appendix A for all tests between experimental groups for each outcome and by the identity of the responder.

for an appointment, we find that physicians favor patients with a university degree, especially DR TITLE patients compared with NO TITLE patients ($p = 0.055$, Mann-Whitney $U$ test). For assistants, we neither find differences with respect to response time nor find differences in terms of waiting time for an appointment.

Overall, with respect to our two hypotheses, H1 could be confirmed regarding the probability of receiving an appointment via e-mail (a). When the sample is split by the identity of the responder, H1 could be confirmed with respect to response times (b) and waiting times for an appointment (c) for physicians, whereas for assistants H1 was confirmed only with respect to the probability of receiving an appointment via e-mail (a). We do not find any support for H2.

### B. REGRESSION ANALYSIS

In Table 3, we corroborate the results reported in the previous section over all subjects with six regression models controlling for further background variables and with state and day fixed effects. The first two columns represent linear probability models whose dependent variable is an indicator of whether an appointment was offered; columns three to six report the results from ordinary least squares (OLS) regressions with the dependent variables as the response time (in hours) and the waiting time for an appointment (in hours), respectively.[22] Model 1 of each regression reports the overall differences between the experimental conditions, and model 2 introduces interaction terms between the experimental conditions and whether the practice has a contract with a social security provider in order to investigate differences in experimental conditions for SHI and non-SHI physicians separately. In line with the results from the nonparametric analysis, we find significant differences for the probability of receiving an appointment: DR MED TITLE patients have a 10.2 percentage point higher probability of receiving an appointment via e-mail than NO TITLE patients ($p < 0.01$). No differences exist between DR TITLE and NO TITLE or between DR MED TITLE and DR TITLE (see the Wald tests beneath Table 3), or between the experimental conditions in the other two dimensions of health-care access. Only for non-SHI physicians do we find marginally significant differences between DR, respectively DR MED and NO TITLE in the response times (see the Wald tests beneath Table 3 of model 2 with the $p$-values 0.0543 and 0.0535).

Besides the results on our experimental variation, we find that the probability of receiving an appointment is higher for physicians who lack a contract with an SHI provider. Waiting times for an appointment are lower for practices situated in areas with high physician density, and are higher for female than for male physicians, suggesting more part-time employment among female doctors and/or a higher demand of female gynecologists among female patients. Furthermore, there are differences between the types of specialists in all three dimensions of health-care access. With respect to receiving an appointment via e-mail, the probability is higher for ophthalmologists and otolaryngologists than for

22 While the use of OLS for discrete dependent variables is inferior compared with logit or probit models because of the linearity assumption, it is preferable when incorporating interaction terms (Ai and Norton 2003). Note, however, that the results remain qualitatively unchanged when we apply a probit model instead (see Table A3 in Online Appendix A).

**TABLE 3.** Determinants of access to outpatient care (OLS regressions)

| | Appointment received | | Time to answer (in hours)[5] | | Waiting time (in hours)[5] | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (1) | (2) | (1) | (2) |
| DR TITLE (=1)[1] | 0.064[c] | 0.086 | −0.223 | −0.001 | −0.075 | 0.151 |
| | (0.036) | (0.062) | (0.139) | (0.228) | (0.103) | (0.204) |
| DR MED TITLE (=1)[1] | 0.102[a] | 0.122[b] | −0.184 | 0.115 | −0.024 | 0.068 |
| | (0.035) | (0.062) | (0.140) | (0.234) | (0.101) | (0.191) |
| Ophthalmologist (=1)[2] | 0.081[c] | 0.080[c] | −0.348[b] | −0.351[b] | 0.302[b] | 0.309[b] |
| | (0.042) | (0.042) | (0.166) | (0.166) | (0.123) | (0.122) |
| Dermatologist (=1)[2] | −0.003 | −0.003 | −0.533[a] | −0.533[a] | 0.240[b] | 0.248[b] |
| | (0.043) | (0.044) | (0.171) | (0.172) | (0.112) | (0.112) |
| Otolaryngologist (=1)[2] | 0.155[a] | 0.155[a] | −0.405[b] | −0.403[b] | −0.736[a] | −0.730[a] |
| | (0.050) | (0.050) | (0.188) | (0.187) | (0.152) | (0.152) |
| Non-SHI doctor (=1) | 0.117[a] | 0.138[b] | −0.175 | 0.091 | −0.167 | −0.010 |
| | (0.038) | (0.059) | (0.150) | (0.224) | (0.113) | (0.185) |
| Female (=1) | 0.042 | 0.042 | −0.000 | 0.002 | 0.238[a] | 0.239[a] |
| | (0.030) | (0.030) | (0.119) | (0.119) | (0.088) | (0.088) |
| Physician density[3] | −0.002 | −0.002 | −0.010 | −0.010 | −0.030[a] | −0.030[a] |
| | (0.003) | (0.003) | (0.013) | (0.013) | (0.009) | (0.009) |
| Non-SHI × DR TITLE (=1) | | −0.032 | | −0.335 | | −0.321 |
| | | (0.076) | | (0.287) | | (0.233) |
| Non-SHI × DR MED TITLE (=1) | | −0.030 | | −0.453 | | −0.126 |
| | | (0.076) | | (0.294) | | (0.222) |
| Further controls[4] | YES | YES | YES | YES | YES | YES |
| Constant | 0.454[a] | 0.440[a] | 2.644[a] | 2.468[a] | 5.192[a] | 5.068[a] |
| | (0.083) | (0.088) | (0.337) | (0.359) | (0.260) | (0.288) |

**TABLE 3.** *Continued*

| | Appointment received | | Time to answer (in hours)[5] | | Waiting time (in hours)[5] | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (1) | (2) | (1) | (2) |
| # Observations | 1,092 | 1,092 | 1,092 | 1,092 | 672 | 672 |
| $R^2$ | 0.072 | 0.072 | 0.080 | 0.082 | 0.156 | 0.159 |
| Wald tests ($p$-values) | | | | | | |
| $H_0$: No difference between . . . | | | | | | |
| . . . DR MED TITLE and DR TITLE | 0.287 | | 0.777 | | 0.594 | |
| . . . ophthalmologists and dermatologists | 0.089 | 0.090 | 0.352 | 0.360 | 0.649 | 0.656 |
| . . . ophthalmologists and otolaryngologists | 0.172 | 0.171 | 0.786 | 0.801 | 0.000 | 0.000 |
| . . . dermatologists and otolaryngologists | 0.005 | 0.005 | 0.542 | 0.537 | 0.000 | 0.000 |
| $H_0$: No difference for non-SHI between . . . | | | | | | |
| . . . DR TITLE and NO TITLE | | 0.225 | | 0.054 | | 0.144 |
| . . . DR MED TITLE and NO TITLE | | 0.035 | | 0.054 | | 0.616 |
| . . . DR MED TITLE and DR TITLE | | 0.377 | | 0.992 | | 0.333 |
| $H_0$: No difference for SHI between DR MED TITLE and DR TITLE | | 0.559 | | 0.598 | | 0.644 |
| $H_0$: No difference between non-SHI and SHI for . . . | | | | | | |
| . . . DR TITLE | | 0.067 | | 0.270 | | 0.057 |
| . . . DR MED TITLE | | 0.058 | | 0.108 | | 0.376 |

Notes: [1]The reference category is NO TITLE. [2]The reference category is gynecologists. [3]Physician density is measured as the number of physicians per specialty per 100,000 inhabitants at the district level. [4]State and day fixed effects are included and additional controls are included for the number of morning and afternoon opening hours per week and whether the practice is a group practice. [5]The two dependent variables time to answer (in hours) and waiting times (in hours) for an appointment are ln-transformed in order to improve the model fit. [a]0.01 or 0.001 level, [b]0.05 level, [c]0.10 level.

gynecologists, and lower for dermatologists than for otolaryngologists. Regarding the second outcome, gynecologists answer less quickly than the other three specialists. Concerning waiting times for an appointment, patients wait longer for appointments with ophthalmologists and dermatologists than with gynecologists and otolaryngologists, and they wait less time for appointments with otolaryngologists than gynecologists.

The distinct results on discriminatory behavior by physicians and assistants are replicated in Tables A4 and A5 in Online Appendix A. Table A4 (A5) shows the same six regression models as Table 3 with the subsample of physicians (assistants) as responders. We find that patients with a DR MED TITLE have a 13 percentage point higher probability of receiving an answer from an assistant than patients without a university degree. For physicians, we find that patients with a DR TITLE (DR MED) wait on average 41.4 percent (47.6 percent) fewer hours for receiving an answer and 26.3 percent fewer hours for an appointment relative to patients without a university degree. In addition to the overall results on differences in the experimental conditions, Table A4 illustrates that the discriminatory behavior in feedback time and waiting times for an appointment is driven by non-SHI doctors (see model 2 in the feedback time and waiting times domain). This result could be motivated by the fact that non-SHI doctors are paid directly by patients for all procedures, not only for nonstandard procedures, and thus have more financial incentives to favor higher socioeconomic groups than SHI doctors. Moreover, Table A5 shows that the difference in the probability of receiving an appointment between DR MED and NO TITLE is mainly driven by assistants working for non-SHI doctors (see model 2 in the appointment received domain).

## V. Discussion

Our results show that discrimination in health-care access based on socioeconomic status exists, but it does not persist across all the dimensions of access studied in this paper. Specifically, over all the subjects contacted, we find differential treatment in the probability of receiving an appointment via e-mail, where patients with a university degree have an 8 percentage point higher probability of receiving an appointment than patients without a university degree, but no differences with respect to waiting times for an appointment and response times. When distinguishing between physicians and assistants as responders, we find that physicians discriminate with regard to both response times and waiting times for an appointment. Patients with a university degree wait on average two to three working days less for an appointment than patients without a university degree. Assistants, in contrast, only discriminate with respect to offering an appointment via e-mail. This suggests that the inequalities in waiting times for specialist visits, elective surgery, and other procedures found in previous studies (see, e.g., Laudicella, Siciliani, and Cookson 2012; Siciliani and Verzulli 2009; Moscelli et al. 2018) could in part be directly driven by discriminatory behavior by health professionals. Moreover, the differential treatment in providing an appointment via e-mail can create a delay in the scheduling of appointments for patients without university degrees; through this indirect channel, such differential treatment may contribute to the existing waiting times gradient by socioeconomic groups. Furthermore, the discrimination found in the different dimensions of access to health care may also

exacerbate the inequalities observed in the use of health care (Reibling and Wendt 2010; van Doorslaer, Masseria, and Koolman 2006) by making access for lower socioeconomic groups more difficult and hence discouraging these groups from the use of health-care services. Therefore, even though the effect size for each dimension of access to health care is limited, the economic significance of discrimination in the contribution to the observed differences in access to health care based on socioeconomic status is more pronounced when also considering indirect effects.

Both taste-based and statistical discrimination (Phelps 1972; Becker 1957; Arrow 1973; Aigner and Cain 1977) could be the driving forces behind the differences we observed in our three dimensions of access to outpatient care. However, as assistants are generally paid a fixed salary instead of being on commission, statistical discrimination based on financial incentives is a less likely candidate to explain the differential treatment in the probability of offering an appointment for assistants. Additionally, if financial incentives were driving the results on the provision of appointments via e-mail, one would also expect assistants to discriminate in the other two dimensions of health-care access. Therefore, the discriminatory behavior observed among assistants may instead be driven by an unconscious, implicit bias in the sense of Bertrand, Dolly, and Mullainathan (2005) that arises in situations involving time pressure, cognitive load, ambiguity, and/or inattentiveness to the task. Searching for the next possible appointment requires more attention than the decision to offer an appointment via e-mail and may thus make the professional norm of equitable treatment more salient.

The discriminatory behavior of physicians, in contrast, is most likely driven by financial incentives, rather than a taste for discrimination, since the preferential treatment of patients with high socioeconomic status in terms of feedback time and waiting times for an appointment is found primarily for doctors who lack a contract with a social security provider (non-SHI doctors). Because non-SHI doctors have more financial incentives to discriminate in favor of higher socioeconomic groups, statistical discrimination based on financial incentives is a good candidate to explain this result.

Concerning our hypothesis of differential treatment between DR MED TITLE and DR TITLE patients, we could not find any evidence of discriminatory behavior in favor of the former group. Rather, our data suggest that physicians treat DR MED TITLE patients somewhat worse than DR TITLE patients in terms of waiting times for an appointment. One reason this group of patients may not be favored could be the fact that physicians lose some of their information advantage when treating patients with a medical degree compared with patients without a medical degree. Because this information asymmetry is known to influence the doctor-patient interaction, with overtreatment as one of the consequences (Domenighetti et al. 1993), financial incentives are at stake when physicians are consulted by medical doctors for treatment. Thus, with regard to financial incentives, treating patients with a medical degree may actually result in lower prospective payments than treating other patients.

Besides the reasons for preferential treatment stated in Section III.C, physicians may have a preference for patients with high socioeconomic status and therefore treat them preferentially if they think that the treatment is easier or takes less time since they are in better health or because they have better communication skills and thus can communicate

their health problem better (Howard et al. 2006; Willems et al. 2005) or if they think that patients with lower socioeconomic status are noncompliant (Bernheim et al. 2008). Furthermore, having patients with high socioeconomic status may also help the physician in building up reputation.[23]

However, the main shortcoming of our study is that the underlying form of discrimination in the observed results can only be speculated upon, since our design does not allow us to directly disentangle statistical from taste-based discrimination. Understanding which form of discrimination is driving the results is key to a deeper understanding of why discrimination exists, how it affects health-care markets, and ultimately how policy makers can be guided to reduce the disparities observed (Guryan and Charles 2013).

## VI. Conclusion

This paper investigates discriminatory behavior of health-care providers based on the patients' educational level as one potential channel contributing to the gradient in access to health care. Using a randomized controlled field experiment, we provide evidence of the existence of preferential treatment of patients based on their educational background. In the experiment, more than 1,200 physicians in Austria were contacted via e-mail to schedule an appointment for a regular checkup. Three fictitious patients varying only in the educational level signaled through the signature in the e-mail allowed for an unambiguous identification of discrimination based on socioeconomic status. The three educational variations were (1) no university degree, (2) a doctoral degree, and (3) a medical degree. Our results show that, overall, patients with a university degree have an 8 percentage point higher probability of receiving an appointment via e-mail than patients without a university degree. In addition, when discriminating between assistants and physicians as responders we find that physicians favor higher socioeconomic groups by providing shorter response and waiting times: patients with a university degree wait on average two to three days less for an appointment compared with patients without a degree. This differential treatment in access to health care contributes to the existing waiting-time gradient by socioeconomic status and may discourage people from lower socioeconomic groups to make use of health-care services, in particular in preventive health care.

A future avenue of research may focus on disentangling the type of discrimination that we find in our paper. Understanding whether statistical or taste-based discrimination is driving the results is key to the design of effective policy interventions directed at reducing discrimination in access to health care.

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23 We thank an anonymous referee for pointing this out to us.

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