No disabled student left behind? Evidence from a social field experiment

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Abstract

We conduct a field experiment to study if student counseling offices discriminate against disabled students based on their impairment. The offices receive randomized emails from fictitious high-school graduates, requesting information on the admission process and special accommodations to ease studying. Responses are evaluated using content analysis and text mining methods, allowing us to examine different theoretical mechanisms how discriminative behaviour can emerge. We find that students with depression or dyslexia are systematically less likely to receive formal information on special admission rules and are offered disability counseling services less often compared to students with a chronic somatic disease. We find no evidence for taste-based or statistical discrimination. Instead, the results indicate that general information deficits about health conditions exist, leading to non-purposeful discrimination. Psychological and learning impairments are not recognized as disabilities and counselors are unaware of the limitations they entail. If discrimination translates into lower access to higher education and a lower probability to graduate, disadvantages for disabled individuals on the labor market are reinforced.

Keywords: Higher education, disability, discrimination, field experiment, text mining,
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1 Introduction

People with disabilities are on average considerably less well educated than their non-disabled peers (OECD 2010). Since education serves as an important buffer to protect against the negative labor market effects of a disability, access to education is an issue of crucial policy relevance (Dean and Dolan 1992, Ravaud et al. 1992, Hollenbeck and Kimmel 2008). To ensure that people with disabilities are not excluded from education, the UN Convention on the Rights of Persons with Disabilities obliges governments to provide access to the general education system, including higher education, vocational training and continuing education (Article 24).

However, little is known about the obstacles disabled students face when entering education, particularly regarding higher education.[1] To understand if policy reforms are needed to improve access to education and whether countries meet the requirements of the UN convention, it is of primary importance to analyze the inclusiveness of the education system. Previous studies in education science and disability research typically analyze obstacles faced by disabled students by questioning students or university staff directly (e.g. Vickerman and Blundell 2010, Zhang et al. 2010, Lombardi and Murray 2011). Although these studies consistently report severe barriers of access, they suffer from various limitations: Results are based on subjective assessments, focus on a small number of individuals or institutions and are particularly prone to social desirability bias.

We use a social field experiment to analyze barriers of entry to higher education institutions (HEI). We send randomly manipulated emails from prospective first-year students to student counseling offices of all German HEIs containing inquiries about special accommodations for students with disabilities. Emails vary by the type of disability of the student. Our prime interest is to study whether different disability types have similar access to information and services. The research design is similar to correspondence tests often used to detect discrimination against minority groups (e.g. Bertrand and Mullainathan 2004, Oreopoulos 2011, Jacquemet and Yannelis 2012).

Our design has a number of advantages compared to previous studies: The randomization of emails with different impairments allows us to make causal inferences. Since administrative staff is unaware of being observed, the experiment constitutes an objective test for barriers of entry and is not affected by social desirability bias. In contrast to standard applications of correspondence tests we do not focus on response rates alone, but analyze the contents of the written replies using simple text mining tools (e.g. Gentzkow and Shapiro 2010, Talamini et al. 2012, Acerbi et al. 2013). This allows us to obtain a more differentiated picture of discrimination and to infer on potential mechanisms driving discriminatory behavior. We do not restrict our

[1] The economic literature typically focuses on primary or secondary education, for example by discussing the effects of policies providing financial incentives to schools or school districts in labeling students as disabled and placing them in special education (such as Kwak 2010, Dhuey and Lipscomb 2011, Battisti et al. 2012). Others focus on the effectiveness of interventions for children with special needs or inclusive school systems on students with disabilities and their peers (see e.g. Hanushek et al. 2002, Fletcher 2009, Friesen et al. 2010, Heckman et al. 2010, McGee 2011, Andrews et al. 2012, Keslair et al. 2012, Iversen et al. 2013). Less is known about post-secondary education. Few notable exemptions are Jolls (2004) and Polidano and Mavromaras (2011) who study access participation on vocational education, or Cheatham and Elliott (2013) looking at individual incentives for disabled students to enroll in college.

analysis to a small number of institutions, but use data from all German HEIs.

Our results document that students with some of the most prevalent disabilities, i.e. psychological and learning impairments, receive less information about special provisions and are granted access to disability counseling services at lower rates compared to students with chronic somatic diseases. Content analysis and text mining methods are used to provide empirical evidence in support of common theories of discrimination. We do not find evidence relating discrimination either to preferences (as in Becker 1957) or to performance maximization (as in Phelps 1972, Arrow 1973). In contrast, our results suggest that discrimination may not be purposeful. Differences are grounded in a more simple information deficiency: Misconceptions about whether conditions qualify as a protected disability and about the limitations entailed by impairments lead to trivialization of psychological and neuro-behavioral disabilities. Counselors are oblivious to the accommodations needed by students with certain impairments, even though the conditions in our study represent the major share of common disabilities among the student population.

The remainder of the paper is structured as follows: Section 2 provides a brief overview of the higher education system in Germany. Section 3 discusses possible reasons for differences in access to information and services. Section 4 elaborates on the experimental design; section 5 discusses the data used in the empirical analysis. Results are presented in section 6. Section 7 concludes.

2 Institutional background

German legislation entitles people with disabilities to assistance in order to ensure they can access and complete higher education. Under the Framework Act for Higher Education (HRG), higher education institutions (HEIs) are obliged to ensure that disabled students do not suffer any disadvantage in their studies, that they are able to use the facilities of the institution without assistance if circumstances permit (§2 HRG), and that examination regulation considers the special needs of disabled students to preserve equality of opportunity (§16 HRG). Since higher education is the responsibility of the federal states, similar rules can be found in state legislations governing higher education. However, formal rules regarding the rights of disabled students remain vague leaving substantial autonomy in interpretation to the higher education institutions.

Of special interest for this study are special admission rules since all fictitious students ask for information on the admission process (see also section 4). Although the German constitution implies a general right of access to higher education, the access to higher education can be restricted (*numerus clausus*) due to capacity constraints. Two different types of restrictions can apply: (1) Access to degree programs in medicine, pharmaceutics, dentistry and veterinary medicine is restricted nationwide and places are allocated by a federal agency. (2) Local admission restrictions may apply for specific programs in some HEIs, whereas the same program may be freely accessible at other HEIs. Places are typically allocated on the basis of average grades, prior waiting time and other relevant qualifications.

For degrees with unrestricted access, no special admission rules for disabled students are

necessary. All students who meet the required minimum qualification can enroll in a program. Typically a secondary education degree which qualifies for access to higher education is sufficient. In case admission to a degree program is restricted, disabled students can make special requests for immediate admission (hardship applications) and exceptions in grade requirements (disadvantage compensation). These special request rules are implemented for the admission process for federally restricted degrees and many HEIs have adopted them for locally restricted degrees as-is or with only minor changes.

Due to a lack of standardization of admission rules for disabled students between degrees and states, students have to obtain information on the admission process directly from HEIs. In some cases, such information is available on HEIs' web pages. However, specific information may not be published or hard to find. For prospective students seeking information, the student counseling offices are the first point of contact and the main source of information. They provide degree-specific information regarding both admission and possible accommodations in the program itself. For this reason, it is common for disabled students to contact student counseling offices, reveal their disabilities and request information on the admission process.

3 Discrimination mechanisms

According to the Oxford dictionaries, discrimination is defined as to "make an unjust or prejudicial distinction in the treatment of different categories of people." Our hypothetical students ask questions on the admission process and special accommodations provided to students with disabilities. Our prime interest is thus to determine whether student counselors grant students with different impairments systematically different access to information and these services. Different theories have been proposed to explain discriminatory behavior. Using simple text mining tools to analyze the contents of the responses allows us to investigate the mechanisms leading to differential treatment.

Discrimination can be the consequence of taste-based discrimination (Becker 1957). Student counselors may have personal prejudices against certain types of disabilities and try to avoid contact. If taste-based discrimination is prevalent, we would not only expect less access to information and services, but also lower response rates and fewer offers for personal counseling.

On the other hand, discrimination may be grounded in information deficiencies and can arise even if student counselors have no particular preference regarding different groups (Phelps 1972, Arrow 1973). With statistical discrimination, counselors are assumed to optimize the university's output by choosing suitable inputs, i.e. students who are expected to perform well in their chosen degree. If they have incomplete information, they may purposefully discriminate against certain groups based on observable characteristics. One possibility where information deficiencies lead to discrimination is when student counselors have limited information on the intellectual capacity of prospective students. They use observable information (disability type) to infer on unobservables (future academic performance). Stereotypes lead to a situation where student counselors provide less access to information and services for the requested degree, but question the students choice and suggest alternatives, which they believe would be more suitable given the perceived skill

limitations of the respective condition. Since different study fields often require different skills, we would also expect effect heterogeneities with respect to study fields.

Another information deficiency leading to non-purposeful discrimination are misconceptions about the impairment itself. Counselors do not necessarily aim to maximize performance and may even be considerate towards handicapped students. However, they may have difficulty in distinguishing who is eligible for accommodations and how much accommodation is appropriate (see e.g. in Hampton and Gosden 2004). This channel is likely to be relevant: There is great variability in the degree to which individuals perceive certain health conditions as a disability (Kapteyn et al. 2007). Certain impairments may thus be trivialized by not being considered a disability deserving special assistance. Depression, for example, is often conceived to be a temporary issue and not recognized as a disability entailing actual limitations (Upton and Harper 2002). This is despite the fact that all chosen impairments in this study classify as a disability under German law (§SGB IX) and severely limit educational participation. With this type of information deficiency we do not only expect less access to information and services, but also that terms labeling the condition as a disability and health impairment are less often used in the replies.

From a policy perspective, misconceptions are the easiest to remedy. Relatively inexpensive awareness campaigns and targeted education measures are potential policies. Discrimination based on preferences or stigmas are more difficult to overcome. In this case, restrictive quota systems beyond special request rules, public inclusiveness rankings of institutions or possibly even subsidies per disabled are needed to provide an incentive to accept and support students with disabilities.

4 Experimental design

We send randomly manipulated emails to student counseling offices of German HEI to evaluate whether students with different impairments receive the same access to information and to services for their needs. We include three different disability types (physical, mental, and learning) and a non-disabled person with the same time restriction as a control. Each HEI thus receives four different emails. All emails describe the health condition and how the condition hampers academic performance. The sender requests information about special eligibility rules for the admission process, special accommodations during studies (i.e. exemption from compulsory attendance and accommodations/time extensions during exams), and whether the HEI provides additional support to students with disabilities.

The different disability types are selected such that they are relatively common in the student population and comparable with respect to the special accommodations needed. A representative survey of students at German universities revealed that 45% of students with a disability have a mental illness (most often depression), 20% have a chronic somatic illness, 6% have a learning impairment (most often dyslexia), 5% have a visual impairment, and 4% have a mobility impairment (Unger et al. 2012). We choose the following health conditions for our study: (1) Chronic kidney failure, requiring regular renal dialysis, represents a chronic disease.

This student misses classes for two days a week. (2) Depression represents a mental illness. This student is in therapy and misses two days of classes per week. (3) Dyslexia represents a learning impairment that requires special accommodations for exams. (4) An additional profile for a non-disabled student was added. This student misses classes for two days a week because he has to care for sick family members. This situation does not entail any entitlement to compensatory measures.[2] Each university receives one email per disability type.

To detect causal effects with respect to the disability type, emails need to be on the one hand as similar as possible to ensure that differences in the responses do not stem from different writing styles or from other characteristics of the email. On the other hand, they should be different enough to protect the experiment from detection. This is ensured by using randomized profiles across four additional dimensions: (1) Each email is sent from a different email account. The names and email accounts are random combinations of the most prevalent first names of the birth cohort graduating from high school in Germany in 2012 and the most prevalent last names (Lukas Fischer, Julia Müller, Laura Schmidt, and Jan Schneider). It is unlikely that real counterparts take harm from our experiment since we do not include any other personal information in the emails. The names are not associated with a particular socio-economic class or minority group. Note that gender is balanced to exclude any potential bias. (2) The emails are sent in four waves between March and May 2012 with approximately four weeks between each wave. (3) Four different authors formulate four different emails each (one email per disability type). Every HEI receives only one email from each author. The requests and stated limitations are the same for each type, but wording varies across authors. (4) The student expresses interest in different study subjects (i.e. economics/management, technical subjects such as engineering or computer science, medicine, and teaching with focus on Math and German). If the HEI does not offer all study subjects, it still receives four emails where the subject is randomly selected from all offered subjects. All four factors are jointly randomized.[3] This has the advantage that we are able to study effect heterogeneities (see section 6.2) and to test the external validity of our findings with respect to learning and framing effects (see section 6.3).

5 Data

In total, we send 852 emails to 214 different higher education institutions (HEI). We do not include specialized institutions such as schools of arts or music in our study because they do not offer academic programs in any of the subjects included (i.e. economics/management, technical subjects, medicine or teaching) and tend to use very different recruitment procedures. Ten HEIs (36 emails) are dropped from the sample because they share student counseling offices. The final sample comprises 816 emails to 204 different HEIs. Emails are sent directly to the general student

[2] Despite the low prevalence, a physical handicap requiring a wheelchair remains the stereotype for a disability in society (Sapey et al. 2004). We recognize it would be interesting to compare students in a wheelchair to those with other disabilities. Nevertheless, we refrained from including mobility or visual impairments in our study because they require very different accommodations mostly with respect to infrastructure.

[3] Details about the randomization design are provided in the appendix.

counseling office. The majority of institutions are universities of applied sciences (N=118) and state-owned (N=161), with an average of 10,132 students (see Table A2 in the appendix).

Our key interest is to analyze if access to information and services is prone to discrimination with respect to impairment type. Access to information is measured by an indicator whether the response email includes a link or attachment (39% of responses). Indicator variables for the keywords special requests, hardship, disadvantage compensation, admission, certificate, exam, attendance, study fees and study contents (and synonyms) are used to analyze if the respective information is provided in the text. Access to special services for students with disabilities is measured by a dummy variable which indicates if the email was forwarded to a counseling office for disabled students (20%). This relatively low number is already surprising, since approximately 90% of all universities provide such services.

To study potential mechanisms driving discriminatory behavior we construct various indicators: response and whether the counselor offers personal advice via phone or a personal meeting (to detect taste-based discrimination), whether the counselor questions the student's study choice by suggesting a different institution, a different degree or to delay studying (to detect stigmatization), or whether the response included the keywords disability, sickness or health (to detect trivialization). Details and descriptive statistics for all outcome variables can be found in Table A3 (appendix).

6 Results

6.1 Access to information and services

To analyze if access to information and services is associated with impairment type we regress impairment indicators on variables indicating whether the response includes links/attachments or the initial email is forwarded to disability counseling services. The reference category in the estimation is chronic kidney failure. The results are presented in Table 1. Since all variables are randomized, coefficients can be interpreted as average effects.

The results document that student counseling offices discriminate disabled students by impairment: Students with depression and, even more pronounced, students with dyslexia receive information via links and attachments less often compared to students with the chronic disease. In case of dyslexia, the difference is 11 percentage points and significant at the 1% level. We test for the possibility that student counseling offices substitute one transmission mode of information (links/attachments) with another (e.g. providing the same information in the text of the response). As the results in Table A4 (appendix) indicate, this is not the case. If anything, responses to emails from students with chronic diseases include even more information. The only notable exemption is that students with depression are more likely to receive information on disadvantage compensation and students with dyslexia are more likely to receive information on special accommodations during exams compared to students with chronic diseases.

Access to specialized disability counseling services is granted less often for students with depression or dyslexia. These students' requests are significantly less often forwarded to the

Table 1: Access to information and services

Dependent variable	Answer contains link or attachment	Email forwarded to disability counseling
Disability type (omitted category: chronic kidney failure)		
Depression	-0.045	-0.102***
	(0.043)	(0.036)
Dyslexia	-0.110***	-0.119***
	(0.042)	(0.038)
No disability	-0.013	-0.243***
	(0.041)	(0.035)
Constant	0.332***	0.373***
	(0.067)	(0.057)
R^2	0.04	0.06
N	692	692

Note: Results are based on linear regressions. Additional controls include indicators for the name of the student, author of the email, wave, and study subject. Standard errors are clustered by the Higher Education Institution. *** denote significance at the 1% level.

specialized counseling services (10 and 12 percentage points less, respectively).

6.2 Discrimination mechanisms

In the previous section we demonstrate that student counselors discriminate students according to impairment type. This result is not consistent with the legal requirement to provide equal opportunities for all students. To propose effective policies to resolve this problem, the mechanisms leading to discriminating behavior need to be investigated.

With taste-based discrimination, student counselors have an aversion against people with certain disabilities. If such preference-based discrimination drives observed differences in access to information and services, we would also expect that emails from students with these types of impairments also receive less replies and that personal contact is offered less often. Columns 1 and 2 of Table 2 show that this is not the case: neither response nor the variable indicating that the counselor offered contact is significantly associated with impairment type.

Another explanation for discriminating behavior are preconceived believes about students' academic potential or the ability to perform in the chosen profession (stigma). One student counselor, for example, replied to a student with dyslexia who was interested in studying medicine that she should reconsider her degree choice because there is a risk to misinterpret a written diagnosis and then further mistreat a patient, or that a pharmacist or a nurse administers a wrong medication because it was misspelled. Moreover, student counselors may have biased priors. In a response to a student with dyslexia who asked for information about a study program for engineering, the counselor replied that she would not recommend studying engineering if the student has problems to correctly write down formal contents, stating that in both mathematics and code implementations, typos immediately would lead to wrong solutions. In this case, the counselor confused dyslexia (a difficulty to spell correctly) and dyscalculia (a difficulty in

understanding numbers). Despite the fact that stigmata exist, there is not much evidence that these stigmata drive discriminatory behavior: Only in 5% of all emails, student counselors question the study choice of the student. Study choice is particularly often questioned for students with depressions but the absolute size of the effect is not very large (see table 2, column 3). Effect heterogeneities also point in the same direction. Since different study subjects require different skills, we would expect discriminatory behavior to be associated with the study subject. Empirical evidence for effect heterogeneity with respect to degree choice is presented in the appendix. Figure A2 shows a graphical representation of regression coefficients for depression and dyslexia from linear regressions in stratified samples. We find that the study choice of dyslexic students is most often questioned in teaching programs and of students with depression in engineering programs. However, we find no comparable effect heterogeneities in access to information and services, where all coefficients have the same sign and are similar in magnitude. The only exception is that students with depression are somewhat more likely to receive links and attachments when they are interested in studying medicine. However, this subject is the only federally restricted degree in the sample and most study counseling offices simply referred to the homepage of the national agency.

We then test if misconceptions about the impairment itself drive discriminatory behavior. It is likely that student counselors' impressions of a disability relate to physical handicaps, but that they do not recognize mental or learning impairments as a disability. This is likely to be the case: Response emails to students with depression, and even more to students with dyslexia include the words disability, sickness or health significantly less often. Note that these differences are systematic. Some HEIs sent almost identical responses to all students (showing that answers are very often based on text modules), but deleted all keywords related to disability in responses to students with dyslexia.

6.3 External validity

All parameters of our experiment are randomized. Consequently, any difference in responses to requests from students with different disabilities can be attributed to the type of disability and our results are internally valid. However, the key question in an experimental study is the extent to which results are also externally valid.

Our first concern regarding external validity of our experiment relates to the fact that four different emails were sent to each HEI. This is typically considered an unnecessary procedure, given that our profiles are entirely randomized (Newman 1980). Identification of our main effects also does not rely on a within-comparison. The reason for sending multiple emails is a simple power argument: There are not sufficiently many higher education institutions in Germany and sending more than one email to each institution increases the number of observations. This procedure, however, bears the risk of arousing suspicion, leading to a detection of the experiment (Riach and Rich 2004). This can happen if the emails do not differ enough or if HEIs do not often receive requests from students with disabilities. If this were the case, we could expect a dynamic effect due to learning or recognition. Emails responses to requests in later waves would

Table 2: Discrimination mechanisms

	Taste-based discrimination		Stigmatization	Trivialization
Dependent variable	Response	Offered contact	Questions degree choice	Recognized disability
Disability type (omitted category: chronic kidney failure)				
Depression	-0.022	-0.066	0.033*	-0.128***
	(0.030)	(0.044)	(0.020)	(0.046)
Dyslexia	-0.031	-0.081	0.005	-0.299***
	(0.032)	(0.049)	(0.020)	(0.046)
No disability	-0.033	-0.133***	0.038*	-0.445***
	(0.033)	(0.046)	(0.022)	(0.042)
Constant	0.823***	0.539***	0.049	0.590***
	(0.050)	(0.071)	(0.030)	(0.064)
R^2	0.022	0.026	0.009	0.143
# of HEIs	204	201	201	201
# of obs.	816	692	692	692

Note: Results are based on linear regressions. Additional controls include indicators for the name of the student, author of the email, wave, and study subject. Standard errors are clustered by the Higher Education Institution. *** denote significance at the 1% level.

then differ systematically from those sent in earlier waves. As shown in Figure A3 (appendix), effects are mostly similar in sign and magnitude. Some results for the third wave, however, go in the opposite direction. This could be a day of the week effect. Emails were sent on a Monday as opposed to later weekdays for other waves. Nevertheless, since the results of the last wave are qualitatively similar to the earlier waves, the results do not indicate a consistent time pattern which would suggest a dynamic effect.

Another threat to the external validity of our results are framing effects. Student counselors may not only react to the disability but also to other differences, such as the gender of the requesting person. If effect heterogeneities exist with respect to these differences (if for example emails by Lukas Fischer are assessed in a different way than the ones by Julia Müller), our results are internally valid but not representative of other students with disabilities. We test if the name of the sender and the author are significantly associated with our main outcome variables and if the effect of different disability types is affected by these factors (see Figure A4 and A5 in the appendix). We do not find strong evidence for effect heterogeneities with respect to the author of the emails or the name of the sender. In most cases, coefficients are similar in sign and magnitude.

7 Conclusion

This study uses a randomized field experiment to detect if student counseling offices grant students with different impairments systematically different access to information and services. We send randomly manipulated emails from fictitious students to student counseling offices of higher education institutions to ask for information on the admission process as well as for special

accommodations to ease studying. Responses to these emails are evaluated using text-mining methods. We observe substantial differences in the way student counselors reply to our fictitious students: Students with dyslexia or depression receive systematically less information on special accommodations, and are provided access to disability counseling less frequently compared to students with a chronic disease.

The most likely mechanism driving discriminatory behavior are trivial information deficiencies, despite the fact that we chose impairments that are relatively common among college students. However, these impairments are less salient compared to physical handicaps. Student counselors have incomplete or even biased information which impairments qualify as disability, about the limitations entailed by these impairments and which kind of special accommodations can be arranged.

These information deficiencies are relatively easy to overcome by targeted policies such as awareness building campaigns and special training measures for academic and administrative staff. It is necessary, however, that educational policy makers and university management recognize the lack of equal opportunities for disabled students and that active measures to resolve discrimination are initiated.

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Appendix

Randomization design

Each Higher Education Institution (HEI) received in total four emails. Each email is a random combination of the disability type (chronic kidney failure, depression, dyslexia and no disability), the field of study (economics/management, engineering/computer science, medicine, and teaching), the student's name (Jan Schneider, Julia Müller, Laura Schmidt, and Lukas Fischer) and the base text written by one of the four authors. The order in which the four emails are sent to the HEI is randomized as well. If the HEI does not offer all considered academic programs, the field of study was randomly chosen out of those considered fields that are offered. Randomization was based on a simultaneous random draw without replacement to ensure that each HEI receives every characteristic exactly once. The randomization design is visualized in Figure A1. Each side of the matrix represents a specific characteristic, while the order of the characteristics is randomized for each HEI. The combination of characteristics represented by the diagonal is chosen to construct the emails for each HEI.

The randomization was generally successful. The null hypothesis that the randomization characteristics are independent (based on Pearson's Chi-square Test for Independence) cannot be rejected in almost all cases (see Table A1). Only illness and wave are loosely associated.

Figure A1: Visualization of the randomization design

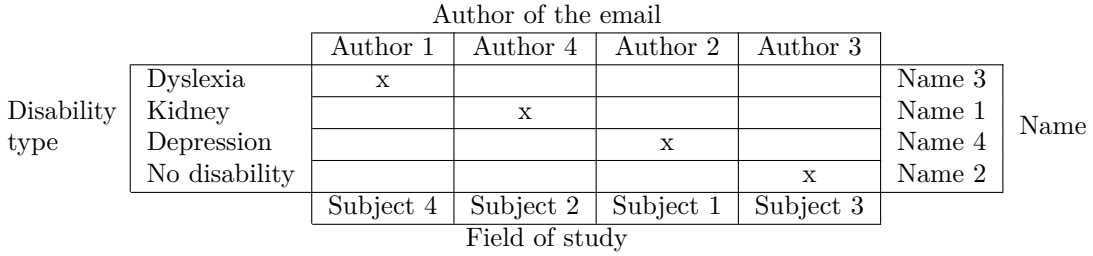


Table A1: Pearson chi-square test for independence

	Illness	Sender	Author	Subject
Sender	3.61			
Author	8.67	5.22		
Subject	5.75	5.16	3.89	
Wave	16.86*	9.29	12.43	5.13

Note: Degrees of freedom: 9. * denotes significance at the 10% level.

Table A2: Descriptive statistics: Higher education institutions

	Sum	Mean
Total number of institutions: 204		
Type: University of applied sciences	120	.588
Type: University (PhD granting)	84	.412
State-owned	164	.804
Federal state: Baden-Wurttemberg	32	.157
Federal state: Bavaria	29	.142
Federal state: Berlin	12	.059
Federal state: Brandenburg	6	.030
Federal state: Bremen	4	.020
Federal state: Hamburg	5	.025
Federal state: Hesse	16	.078
Federal state: Mecklenburg-Western Pomerania	4	.020
Federal state: Lower Saxony	17	.083
Federal state: North Rhine-Westphalia	38	.186
Federal state: Rhineland-Palatinate	8	.039
Federal state: Saarland	2	.010
Federal state: Saxony	9	.044
Federal state: Saxony-Anhalt	6	.029
Federal state: Schleswig-Holstein	9	.044
Federal state: Thuringia	7	.034
Counseling office for disabled students	65	.319
Number of students	2,054,860	10,073
Year of foundation		1913

Table A3: Descriptive statistics: Outcome variables

Variable	Mean
Access to information and services	
Email includes links/attachments	0.39
Forwarded to disability counseling	0.20
Proxies for discrimination mechanism	
Response	0.85
Offered contact	0.42
Questions decision	0.05
Recognized disability, keywords: disabled, sick, health (synonyms)	0.39
Content measures	
Keyword: special request	0.04
Keyword: hardship	0.18
Keyword: disadvantage compensation	0.47
Keyword: admission (synonyms)	0.45
Keyword: certificate (synonyms)	0.25
Keyword: exam (synonyms)	0.51
Keyword: attendance (synonyms)	0.18
Keyword: study fees (synonyms)	0.04
Keyword: study contents (synonyms)	0.26

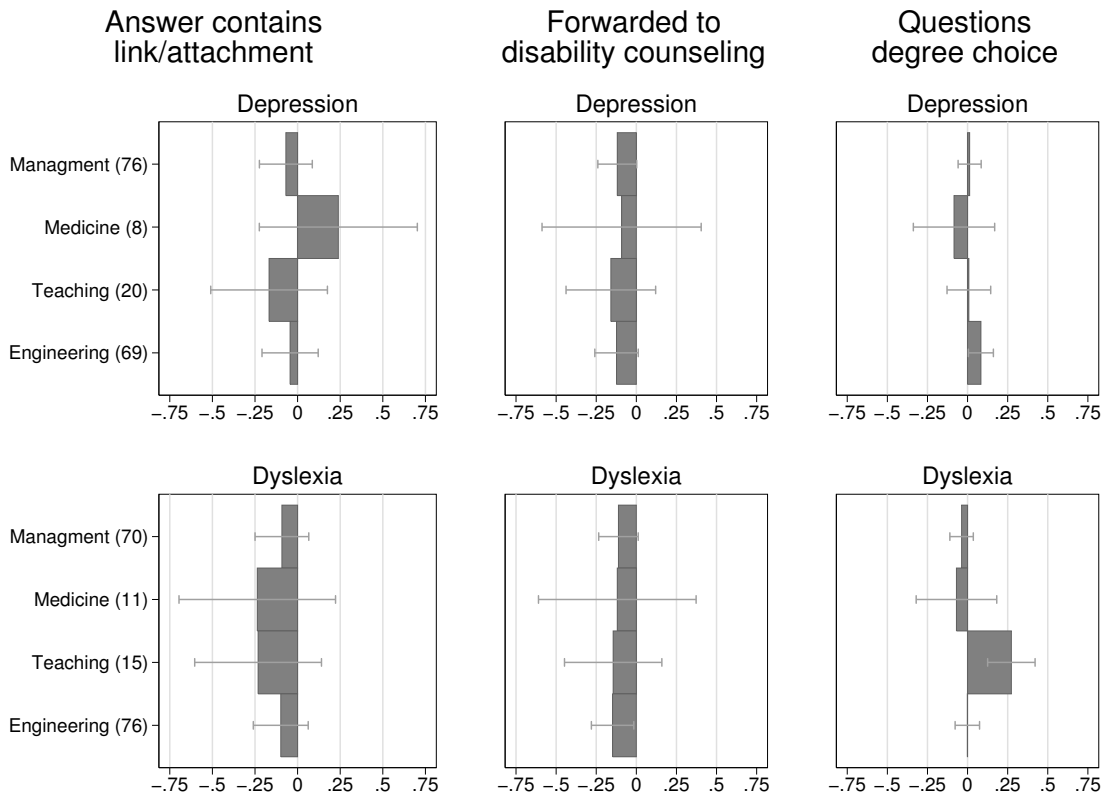
Note: Number of observations: 692.

Table A4: Content measures

Keywords/ synonyms	Special request	Hardship	Disadvantage compensation	Admission (synonyms)	Certificate (synonyms)	Exam (synonyms)	Attendance (synonyms)	Study fee (synonyms)	Study contents (synonyms)
Disability type (omitted category: chronic kidney failure)									
Depression	0.027	-0.107**	0.120***	-0.063	0.019	-0.137***	-0.092**	-0.010	-0.074*
	(0.017)	(0.042)	(0.046)	(0.048)	(0.044)	(0.048)	(0.040)	(0.020)	(0.041)
Dyslexia	-0.021	-0.123***	0.047	0.049	0.048	0.159***	-0.266***	-0.019	-0.138***
	(0.016)	(0.039)	(0.047)	(0.049)	(0.046)	(0.044)	(0.032)	(0.017)	(0.041)
No disability	0.009	-0.149***	0.030	-0.019	-0.072*	-0.181***	0.001	0.005	-0.072*
	(0.021)	(0.040)	(0.048)	(0.049)	(0.043)	(0.050)	(0.044)	(0.020)	(0.043)
Constant	0.006	0.247***	0.457***	0.595***	0.237***	0.578***	0.333***	0.049*	0.348***
	(0.022)	(0.059)	(0.072)	(0.072)	(0.065)	(0.073)	(0.054)	(0.027)	(0.059)
R^2	0.036	0.039	0.050	0.058	0.021	0.089	0.138	0.019	0.088
# of HEIs	201	201	201	201	201	201	201	201	201
# of obs.	692	692	692	692	692	692	692	692	692

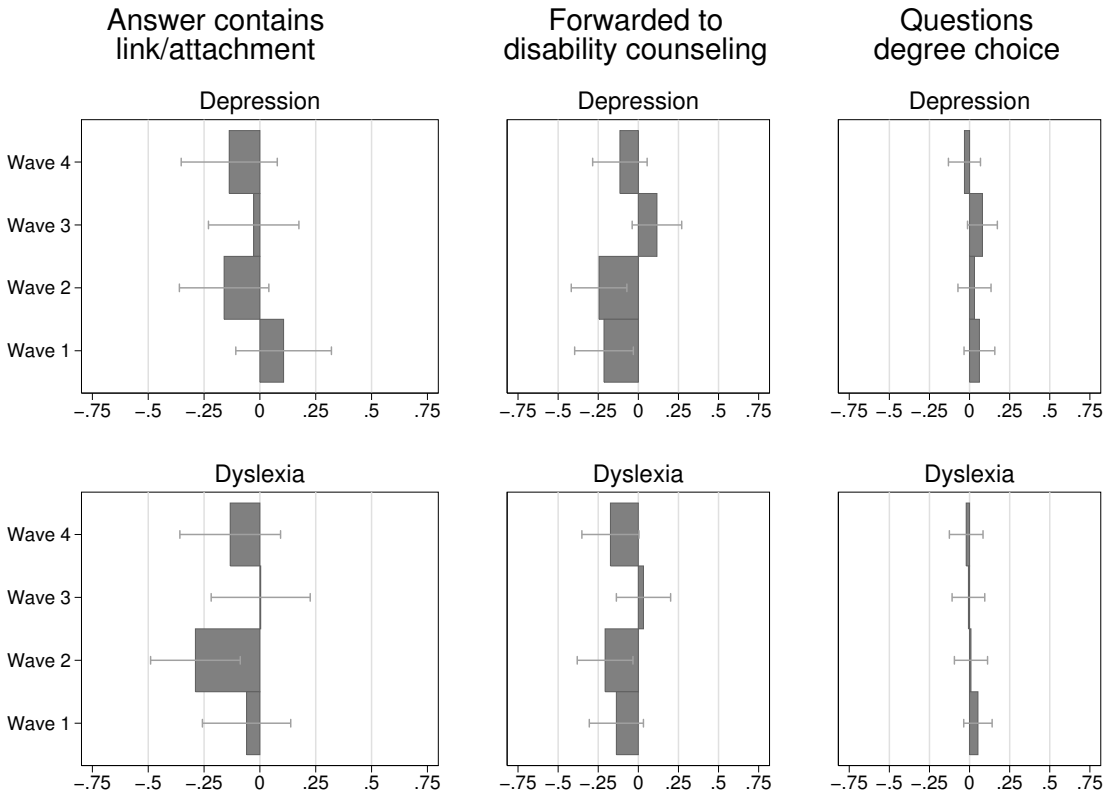
Note: Results are based on linear regressions. Additional controls include indicators for the name of the student, author of the email, wave, and study subject. Standard errors are clustered by the Higher Education Institution. *, **, *** denote significance at the 10%, 5% and 1% level, respectively.

Figure A2: Effect heterogeneity: Degree choice



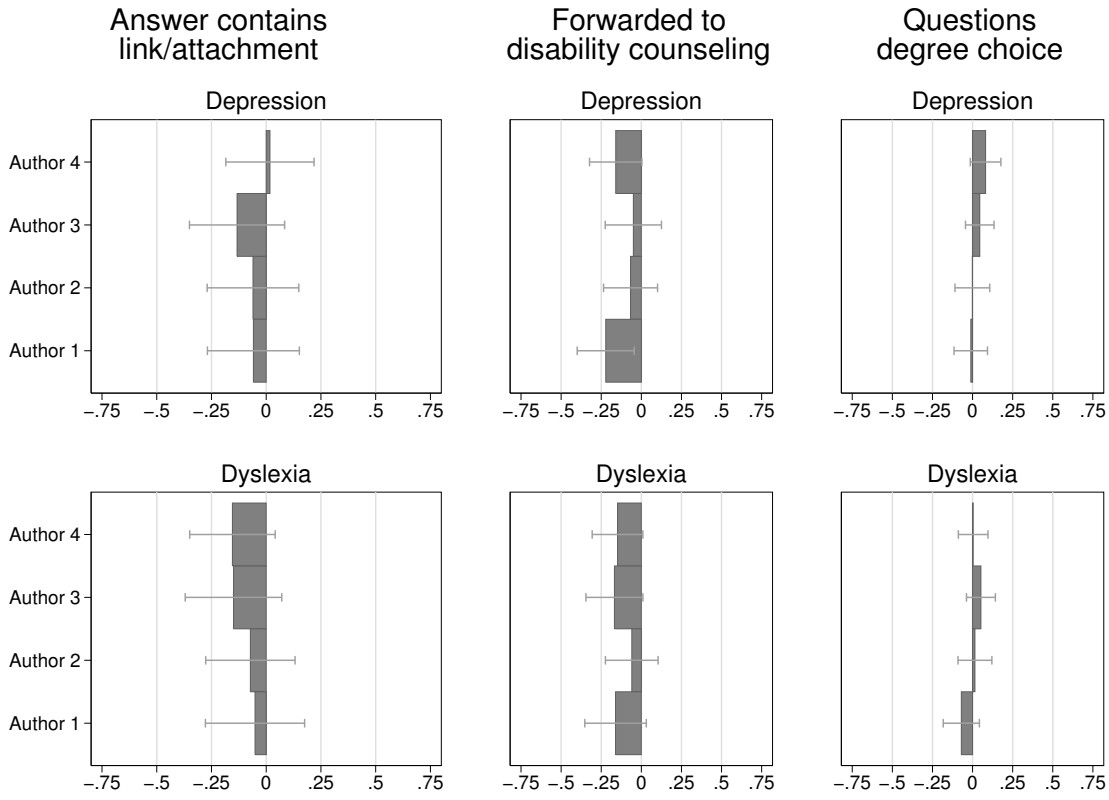
Note: Bars display the coefficients for depression and dyslexia cases in stratified linear regressions. The reference category is kidney failure. Additional controls include indicators for the no disability type, sender, author and wave. Range plots display 95% confidence intervals. The number of responses to emails from students with depression or dyslexia who expressed interest in the respective degree is given in brackets. Observations numbers are unbalanced since not every HEI offers all degrees.

Figure A3: Learning effects



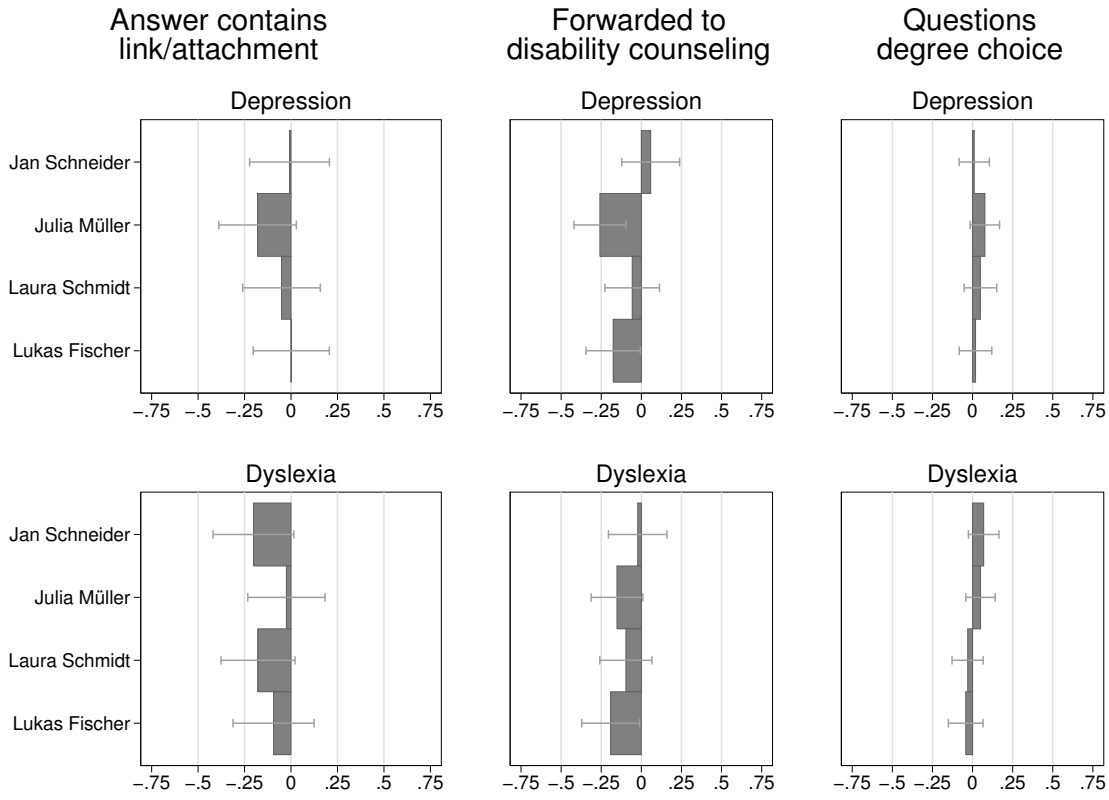
Note: Bars display the coefficients for depression and dyslexia cases in stratified linear regressions. The reference category is kidney failure. Additional controls are no disability, degree, sender, author, and wave. Range plots display 95% confidence intervals.

Figure A4: Framing effects (author)



Note: Bars display the coefficients for depression and dyslexia cases in stratified linear regressions. The reference category is kidney failure. Additional controls are no disability, degree, sender, author, and wave. Range plots display 95% confidence intervals.

Figure A5: Framing effects (sender)



Note: Bars display the coefficients for depression and dyslexia cases in stratified linear regressions. The reference category is kidney failure. Additional controls are no disability, degree, sender, author, and wave. Range plots display 95% confidence intervals.