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Original Article

Experimental Evidence of Discrimination in the Labour Market: Intersections between Ethnicity, Gender, and Socio-Economic Status

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Abstract

This article presents evidence of ethnic discrimination in the recruitment process from a field experiment conducted in the Danish labour market. In a correspondence experiment, fictitious job applications were randomly assigned either a Danish or Middle Eastern-sounding name and sent to real job openings. In addition to providing evidence on the extent of ethnic discrimination in the Danish labour market, the study offers two novel contributions to the literature more generally. First, because a majority of European correspondence experiments have relied solely on applications with male aliases, there is limited evidence on the way gender and ethnicity interact across different occupations. By randomly assigning gender and ethnicity, this study suggests that ethnic discrimination is strongly moderated by gender: minority males are consistently subject to a much larger degree of discrimination than minority females across different types of occupations. Second, this study addresses a key critique of previous correspondence experiments by examining the potential confounding effect of socio-economic status related to the names used to represent distinct ethnic groups. The results support the notion that differences in callbacks are caused exclusively by the ethnic traits.

Introduction

In many European countries, non-western immigrants face substantial employment deficits and wage differentials. This has grave consequences for the unemployed individuals and for the societies they inhabit, and has given rise to intense political debates about the rights and obligations of ethnic minorities (Dancygier and Laitin, 2014). There are a multitude of possible explanations for such labour market differentials, but several studies suggest that discrimination in the hiring process is an entry barrier to ethnic minorities (Carlsson and Rooth, 2012; Kaas and Manger, 2012; Baert *et al.*, 2015; Arai, Bursell and Nekby, 2016; Birkelund, Heggebø and Rogstad, 2017). A range of designs have been leveraged to study labour market discrimination, but field experiments are seen as a significant methodological advance (Bertrand and Duflo, 2016; Neumark, 2016). So-called *correspondence experiments*, where applications are submitted to job advertisements in the name of fictitious applicants, are an increasingly common tool for social science researchers. These experiments enable researchers to identify if, and to what extent, group affiliations—signified by names—affect the chances of getting a job interview.

Despite the fact that an increasing number of field experiments have examined labour market discrimination,

important questions remain unanswered. First, in a European context, many correspondence studies have refrained from randomly assigning both ethnicity and gender, and therefore have overlooked the possible intersections between the two. By only using male applicants and assuming effect homogeneity across gender, many previous studies might not have told an accurate story about the overall ethnic disparities. If anything, the evidence from studies that do manipulate both traits points towards larger ethnic penalties among male applicants. Recent studies on gendered ethnic discrimination suggest that the interaction between gender and ethnicity is highly dependent on the composition of jobs included in the experiment, e.g. the share of private sector jobs or the gender composition in the occupations included (Bursell, 2014; Midtbøen, 2016). Hence, considering varying effect sizes across gender and across different occupations is essential to ensure generalizability when studying ethnic or racial discrimination. If such intersection between ethnicity and gender exists, it poses an important question of why members of the same ethnic group face different outcomes.

Second, correspondence experiments face a challenge related to the internal validity when using names to manipulate characteristics of interest. Names do not exclusively signify racial or ethnic affiliation but contain a bundle of information. For example, the applicants' socio-economic status (SES) might be inferred from their names, and if the popular majority names used in correspondence experiments are perceived as having a higher SES than the distinct ethnic or racial minority names, it confounds the ethnic trait (Bertrand and Mullainathan, 2004; Fryer and Levitt, 2004). In other words, if popular majority and ethnic minority names are also a comparison across SES, it violates the excludability assumption that the effect is caused solely by the ethnic trait (Butler and Homola, 2017). Ultimately, this implies that it is not known whether ethnic or SES discrimination causes the ethnic disparities found in previous experiments.

To address these questions, we conducted a field experiment in which 800 generic applications were sent to job openings in the Danish labour market. Each job opening received two equally qualified applications, which were randomly assigned either a traditional Danish-sounding name or a Middle Eastern-sounding name. Applicants' ethnicity and gender were randomly assigned to study the interaction between applicant gender and ethnicity. Furthermore, to examine whether the SES of applicants' names confounds the effect of ethnicity, half of the majority names were randomly assigned from a pool of names associated with low SES. The pool of jobs applied for was diverse, representing various skill sets and spanning both the public and the private sector. The applications contained relevant experience and education as well as markers signalling that the applicants were competent, tolerant, and likeable people. In other words, the applicants were highly qualified for the jobs they applied for, which, according to previous empirical studies, is likely to minimize the employers' incentive to discriminate (Agerström *et al.*, 2012; Kaas and Manger, 2012; Birkelund *et al.*, 2017).

The article reports three main findings. First, similar to other studies, we find evidence of considerable discrimination in the hiring process with a callback ratio of 1.52 for job interviews between applicants with traditional Danish-sounding names and Middle Eastern-sounding names. This means that applicants with Middle Eastern-sounding names on average have to apply for 52 per cent more jobs to receive the same number of callbacks as applicants with Danish-sounding names. Second, the results show that discrimination varies substantially by gender, with a larger ethnic difference among male applicants. The interaction between ethnicity and gender exists across sector and in gender-balanced occupations as well as in occupations that are highly gender-dominated. Third, we find no evidence that the SES of the majority applicants' names moderates the effect of the ethnic treatment, which supports the notion that the differences between treatment groups are caused by the ethnic trait and are not associated with SES.

The Danish Context

The motivation for examining discrimination against workers with Middle Eastern-sounding names in Denmark is 2-fold. First, there has been a rapid increase in the number of non-Western immigrants and descendants in Denmark in the past 30 years, most of whom are of Middle Eastern origin, with the largest groups being from Turkey, Lebanon, Pakistan, and Iraq. The immigration from non-Western countries was originally intended to supply the booming labour market in the late 1960s, but since the mid-1970s, most of the migration has consisted of asylum seekers and family reunifications. Today, non-Western immigrants and descendants are a significantly larger group than immigrants and descendants from Western countries and comprise approximately 8.5 per cent of the total Danish population (Statistics Denmark, 2017). Second, immigrants and descendants of Middle Eastern origin have been and still is a very salient group in the persistent political debate over immigration and integration in Denmark (Simonsen, 2017). Discussions about the economic and cultural integration of immigrants of Middle Eastern origin revolve around the comparatively high unemployment rates and the fact that minorities of

Middle Eastern origin fare worse on a number of socio-economic indicators such as education, income levels, and crime rates (Statistics Denmark, 2017). This is reflected in attitudes among native Danish citizens who generally recognize immigration and integration as vital political topics. Anti-immigrant attitudes in Denmark are equivalent to most other European countries (Dinesen and Sonderskov, 2015), which also manifests in support for parties running on an immigration sceptical platform (Rydgren, 2008; Mudde, 2013). Finally, while research on actual discrimination in Denmark is limited, studies on perceived discrimination show that large shares of non-western immigrants have experienced labour market discrimination (Jensen *et al.*, 2013) and that employers perceive language and cultural issues as barriers when hiring ethnic minorities (Slot, 2008).

Existing Evidence and Theoretical Background

A wealth of research has examined attitudes towards ethnic minorities and self-reported experiences of discrimination, but since discrimination is a sensitive topic and events can be misjudged or overlooked, it remains unclear to what extent experiences of discrimination correspond to a reliable representation of reality (Pager and Shepherd, 2008). However, correspondence experiments makes seemingly 'immutable characteristics' manipulable by exposing units to signals of the given characteristic (Sen and Wasow, 2016). The basic idea is to hold constant anything but the group characteristic being examined. By exposing employers to randomly assigned traits associated with a given group—e.g. gender, race, or ethnic categories—any difference in outcomes can be ascribed to the treatment. Conducting the experiments in the field is key to measuring actual behaviour when studying a highly sensitive topic such as discrimination.

A body of research covering a large number of countries has accumulated evidence that corroborates the existence of discrimination of outgroups in labour markets.[1] In a review of correspondence experiments conducted in the period 1990–2015, Zschirnt and Ruedin (2016) conclude that experimental research consistently finds proof of ethnic or racial discrimination in the hiring process across Organisation for Economic Co-operation and Development (OECD) countries. It should be kept in mind that results from different correspondence experiments cannot be compared directly, since variations in experimental designs and the demand for labour in local contexts vary across studies. Nevertheless, when averaging across studies, minorities have to apply for 50 per cent more jobs to receive the same number of job interviews as the majority group (Zschirnt and Ruedin, 2016). In summary, these differences are consistent and substantial across a large number of countries.

Theories of Discrimination

Following the empirical evidence of differential treatment, the question of *why* ethnic or racial discrimination occurs is obviously of immense interest. Two theories of discrimination dominate the literature. In the *taste-based discrimination* model introduced by Becker (1958), discrimination is seen as the result of an irrational distaste towards certain groups. In other words, because of prejudiced employers, co-workers, or customers, there is a disamenity value to employing minority workers, resulting in preferential hiring and wage differentials (Guryan and Charles, 2013). An alternative explanation for discrimination is found in the so-called *statistical discrimination* models (Phelps, 1972). The foundation of these models is that employers have limited information about applicants' productivity, giving them an incentive to utilize their knowledge on the average productivity of the applicants' group in the evaluation of individual applicants. Thus, if ethnicity correlates with undesired traits, discrimination based on ethnicity becomes an optimization strategy (Arrow, 1998).

While the theoretical premises of the two models of discrimination are fundamentally different, it has proven difficult to empirically differentiate between them (Bertrand and Mullainathan, 2004; Dancygier and Laitin, 2014). First, and most fundamental, it is difficult to elicit distinct observable implications between the two theories, and therefore to distinguish between them empirically.[2] Second, different types of discrimination might interact over time. Disadvantages initially caused by taste-based discrimination can eventually initiate real group differences in education or labour market outcomes, creating a basis for statistical discrimination. Even if one type of discrimination is successfully identified at one point in time, it can be a complex result of preceding processes (Dancygier and Laitin, 2014). With these limitations in mind, well-designed correspondence experiments enable researchers to identify which components trigger discrimination (Sen and Wasow, 2016). When the particular ways in which group characteristics, alone and in combination, result in disparities is understood, discrimination is much more likely to be recognized and addressed.

Intersections between Ethnicity and Gender in the Hiring Process

While the combination of gender and ethnicity in labour market discrimination has been under-researched in the field experimental literature, the broader literature on intersections between gender and ethnicity is vast. Two of the most prominent notions about gendered ethnic discrimination outline very different empirical implications; first, from the perspective of intersectionality, it is argued that minority women will suffer the largest disadvantage, since they occupy the lowest position in both social categories, being female and belonging to an ethnic minority group (Ransford, 1980; Harnois, 2015). This dual oppressive system—whether it is the notion of additive jeopardies (Beal, 1970) or multiplicative jeopardies (King, 1988)—can be translated into a 'supplementary discrimination hypothesis' that expects a larger ethnic gap among female applicants.

An alternative prediction is found in the social psychology literature. Social dominance theory, a general model of hierarchically structured relationships among social groups, argues that ethnic conflict is primarily executed by and targeted against males (Sidanius and Pratto, 2001). It is claimed that minority males are perceived as a greater threat and therefore are the primary target of discrimination, while outgroup females are less susceptible to discrimination. This is also known as the 'outgroup-male-target hypothesis' (Navarrete *et al.*, 2010). Arguably, both notions can be understood along the lines of taste-based discrimination, with a focus on factors unrelated to the productivity-related characteristics. However, interactions between ethnicity and gender can be a result of statistical discrimination too. For example, minority males in general have lower educational credentials than minority females, and they are overrepresented in the criminal justice system, which can be expected to translate into different levels of discrimination.

Although the majority of European correspondence experiments rely on male applicants, there is good reason to consider the importance of gender in studies on ethnic discrimination. Evidence from labour market field experiments that manipulate applicants' gender is scarce and mixed. While some research supports the outgroup-male-target hypothesis (Andriessen *et al.*, 2012; Arai, Bursell and Nekby, 2016; Liebkind, Larja and Brylka, 2016; Midtbøen, 2016), the findings are not consistent. Some correspondence experiments find little or no variation in ethnic discrimination across gender (Blommaert, Coenders and van Tubergen, 2014; Bursell, 2014; Derous, Ryan and Nguyen, 2012). Moreover, recent studies emphasize how intersections between ethnicity and gender differ substantially across different occupations. In a study conducted in the Swedish labour market, Bursell (2014) finds a larger ethnic difference among males in male-dominated occupations, and in the Norwegian labour market, Midtbøen (2016) finds that the effect of the ethnic trait is larger among male applicants, but not in gender-integrated occupations in the private sector. This is especially important, since most of the aforementioned studies adjust the research design according to patterns in gender stratification such that job openings within occupations that were very male-dominated only received applications by male applicants and vice versa.[3] In this study, we randomly assigned pairs of applicants with the same gender to each job, which allows us to compare callback rates across ethnicity and gender without any adjustments to the types of job applied for. In addition, we can assess effect heterogeneity by breaking down the results across occupations according to gender composition.

Using Names as Proxies for Ethnicity and Potential Confounding

Correspondence studies examining ethnic discrimination rely on the assumption that differences in callbacks are exclusively due to the signal that the name provides about ethnicity. However, perceptions about names might be influenced not only by the population racial/ethnic composition of a name but also its population SES (Gaddis, 2017). This becomes an issue in correspondence studies where distinct minority names might be perceived as low-status compared to the distinct majority names. Hence, it is possible that studies relying on racial or ethnic distinct names are picking up a confounding relationship between ethnicity/race and SES (Fryer and Levitt, 2004). Thus far, this notion is largely theoretical and the evidence supporting it is limited and ambiguous.[4] In the American context, two recent correspondence experiments in the labour market did not replicate the previous results of racial disparities (Darolia *et al.*, 2016; Deming *et al.*, 2016). One possible reason for this is that the names used to signal race had different connotations of SES than previous correspondence experiments. On the other hand, the divergence from previous research could also be due to employers not being able to precisely identify applicants' race, which attenuates the effect.[5]

In a European context, Jackson (2009) conducted a field experiment in the United Kingdom to examine if different traits signifying social class had an effect on callbacks from employers. Overall, the combination of different high-status characteristics only resulted in

small advantages, but the largest observed (positive) effect of an individual treatment, although only borderline significant, was attributed to holding an elite name. Hence, there is good reason to examine potential effects of SES related to names to obtain a valid measure of ethnic discrimination and provide new information for the discussion of the importance of SES.

Since Middle Eastern-minorities in Denmark fare worse on a number of socio-economic indicators compared to native Danes, it is plausible that employers perceive them as a low-status group. One way to address this in the research design is to match majority and minority applicants on social class (Gaddis, 2015). However, since there is no reason to believe that employers are able to distinguish between high- and low-SES minority names, it is only possible to manipulate the SES component among majority applicants.[6] The section on the study's research design outlines the strategy for choosing the specific names.

Hypotheses

Based on the discussion in the previous section, we examine three hypotheses that were all pre-registered at the EGAP.org database.[7] In answering these hypotheses, we rely on the framework outlined by Sen and Wasow (2016), conceptualizing ethnicity as a composite variable rather than a single uniform entity. In this framework, ethnicity is a fusion of several factors, such as region of ancestry, religion, or SES, which might trigger discrimination in different ways. By exposing employers to different manipulations of randomly assigned characteristics, we can disentangle how different aspects alone and in combination affect behaviour. This is a useful methodological starting point that enables a deeper understanding of which and when social groups are subject to differential treatment.

First, we are interested in the overall difference, ceteris paribus, between the two ethnic groups. Based on the consistent findings of ethnic discrimination in previous European correspondence experiments in mind, we hypothesize that there will be an overall significant difference between the majority group and the ethnic minority group:

H1: Applicants with Middle Eastern-sounding names are less likely to receive a callback than applicants with traditional Danish-sounding names.

Since perceptions of males and females within the same ethnic group might differ, it is essential to include both groups in the treatment to get a general measure of ethnic discrimination. Following the theoretical and empirical work outlined in the previous section, we test the gendered nature of ethnic discrimination in a second hypothesis:

H2: The difference in callbacks between majority and minority applicants is larger among male applicants than among female applicants.

Finally, we examine if the SES of the names used to signal ethnicity might be a confounding variable by manipulating the SES of the majority applicants' names.

H3: The difference in callbacks between majority and minority applicants is larger when the majority applicant holds a popular name than when the majority applicant holds a low-SES name.

Experimental Design and Implementation

The experimental design in correspondence studies, especially the quality of the applications and the jobs applied for, can influence results substantially (Neumark, 2012). In this study, we aimed for a design that minimizes employers' incentive to discriminate against the minority applicants. These design features and the implementation of the experiment are described in detail in the following sections.

Treatments and Randomization Details

We randomized the assignment of three different treatments—*ethnicity, gender*, and *SES*—using names as proxies. The applicants' gender was also explicitly stated in the CVs to avoid potential misconceptions of the treatment. Each job received two applications, one with a Danish-sounding name and one with a Middle Eastern-sounding name. Gender was randomly assigned pairwise, so the applicants for any given job were either two males or two females. In other words, we randomized ethnicity *within* and gender *across* the job ads (Figure 1). Finally, to study if SES affects chances of a callback, the traditional Danish-sounding names were randomly assigned from two pools: either the most popular Danish names or Danish low-status names.

Presumably, it is difficult for most employers to differentiate the SES of various Middle Eastern-sounding names, which is why we only manipulated the SES of the pool of Danish-sounding names. We can test the importance of SES by comparing, on the one hand, the difference in callbacks between minority applicants and applicants with the most popular Danish-sounding names, and, on the other hand, the difference in

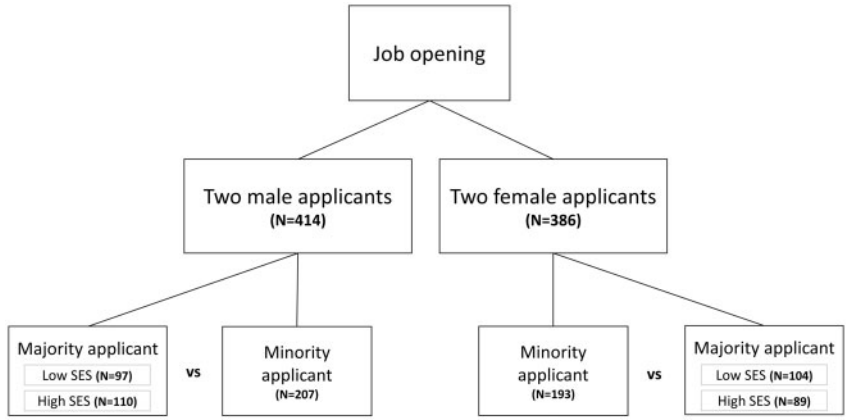

Figure 1. Assignment to treatment and control groups

callbacks between minority applicants and applicants with low-status Danish-sounding names.

We used a large number of different names (so-called stimuli sampling) to ensure that effects are caused by the categories of interest and not the unique characteristics of a specific name (Wells and Windschitl, 1999). The names can be divided into three groups: a pool of the most common Danish-sounding male and female first names, a pool of the most common male and female first names used by Middle Eastern minorities in Denmark (Statistics Denmark, 2015), and a pool of Danish male and female low-status names. Furthermore, two pools of surnames with the most common traditional Danish-sounding (Middle Eastern-sounding) surnames were randomly paired with the pool of Danish-sounding (Middle Eastern-sounding) first names.[8]

It is essential that the names serve as distinct signals of ethnicity and gender (Riach and Rich, 2002). The ethnic minority names were identified from a dictionary of Middle Eastern first names that are in frequent use in Denmark (Meldgaard, 2005) and are among the 20 most popular Middle Eastern-sounding names in Denmark. Furthermore, since all candidates have a distinct Middle Eastern-sounding first name *and* a Middle Eastern-sounding surname, we effectively rule out any confusion about the precision of the ethnic signal. It might be expected that some minority names evoke stronger Muslim connotations (e.g. Mohammed) that result in larger ethnic penalties, but callbacks are evenly distributed across names (Supplementary Appendix J).

To identify the pool of low-SES names, we used a data set on the social characteristics of Danish citizens. We constructed an index of SES by using data on average income, crime rates, and unemployment for Danish citizens with a given name.[9] Furthermore, we excluded first names with an average age below 20 years or above 40 years. Hence, we identified the low-SES names from the bottom decile of the index and chose American-inspired names that fit a common Danish stereotype of being low-status (see details in Supplementary Appendix A).

Constructing Applications and CVs

The applications were designed to meet three criteria: (i) they should be perceived as real applications, (ii) each application in a pair should be different to avoid arousing suspicion, and (iii) the applicants should be equally qualified (Midtbøen and Rogstad, 2012). We adhered to the standard procedure in the Danish labour market by submitting a one-page application letter and a CV with the inclusion of a phone number and email. We constructed the generic applications building on four paragraphs: introduction, motivation, experience, and personal interests. For each paragraph, we constructed two slightly different texts (A and B). By utilizing all possible combinations of the A and B paragraphs, we got 16 unique pairs of applications where each pair consisted of each other's opposite (e.g. one possible pair is A-A-B-B and B-B-A-A). We randomized the assignment of CVs to each application and randomized which application to send first (the elapsed time between the two applications was 2–3 days). There were no differences in callbacks for job interviews across the different application pairs and CVs, which supports the notion that employers perceived them as equally qualified (Supplementary Appendix B).

The applications were largely generic but held a few empty spaces that were completed in each specific case to match an application with a particular job (See Table 1). For example, the applicant states: 'I enjoy working [...]', and we added 'independently' or 'in a team' depending on the given job. If the job ad explicitly

Table 1. Application templates

	A	B
Introduction	I believe the job as [] represents an excellent opportunity for me. I am highly motivated and have experience working as []. I am currently employed at [], but I recently moved to [] which is why I am looking for a job closer to my new home.	I would like to put forth my candidature for the position as []. I am very motivated and believe I have the experience to meet the requirements. I am currently employed as [] but after [] years I now feel it is time to look for new challenges.
Motivation	I enjoy working [*in a team/on my own*] and I will thrive in a position as []. I am familiar with [] and know you are among the [*most ambitious/most professional/best*] workplaces. I am very passionate about my work and would love to be part of a team with a professional and positive attitude.	Working [*independently/ with good colleagues*] motivates me, and I see the job at [] as a great match. [] is without doubt a great place to work and I would love to be part of that. I am devoted to my career and it is essential to me that I carry out a professional job. I have managed to do so in my previous jobs and hope to continue at [].
Experience	I am a very ambitious [] and I work hard to achieve good results. In my previous jobs, I have always been given responsibility and I have been an esteemed employee. I hope that I can achieve the same in the job at []. From [*year*] to [*year*] I worked in [] with []. The last [] years I have worked in [] why I bring experience to the job.	I have always worked hard and with great dedication. As [] I have been a trusted employee with a lot of responsibility. In my jobs at [] and [] where I worked for [] and [] years, respectively, we managed to [*increase sale/provide a great service/do a professional job each day*]. I hope to continue in the job at [].
Personal information	I am a very positive and social person who believes good relationships in the workplace is important. In my spare time, I do a lot of sports and run several times a week together with good friends. Besides that, I love to travel and scuba dive with my boy[/*girl*]friend. I am very excited to learn more about this opportunity and share how I will be a great fit for [] Sincerely, [*Name*]	In my spare time, I love to do sports and I do triathlon in the summer season. I also spend a lot of time cooking with my boy[/*girl*]friend. I am an optimistic person with a good sense of humour. Having a good relationship with my colleagues is important to me. I would appreciate the opportunity to meet with you and discuss how my qualifications can benefit your organization [/*company*]. Sincerely, [*Name*]

requested specific requirements, these were incorporated into the CVs (software skills, a driver's licence, etc.). The modification of the applications for each job secured a sufficient chance of receiving a callback. It is impossible to know the relative quality of the applications, since it depends on other applicants applying; however, the absolute quality can be adjusted (Neumark, 2012). While underqualified applications will receive few or no answers, over-qualified applications will rule out statistical discrimination by receiving a callback too often. Broadly speaking, qualifications can be divided into cultural characteristics and professional characteristics. Our applicants have strong professional characteristics, possessing the necessary educational background and relevant experience from previous jobs.[10] The cultural characteristics are signalled in the perfectly written Danish and the fact that applicants love to cook with their boyfriend/girlfriend, do triathlons, or jog with good friends. These markers of a Danish middle-class lifestyle were included to reduce the perceived cultural differences between the applicants, hence minimizing the incentive to discriminate against the minority applicant. Finally, in the CV it was stated that the applicant was born in 1984 and the gender of the applicant was indicated explicitly. In summary, the applicants were highly qualified for most of the jobs applied for, which is also indicated by the high callback rates. Following previous studies, the high standard of the applications can be expected to reduce the ethnic discrimination (Kaas and Manger, 2012; Birkelund *et al.*, 2014). As such, the study constitutes a least-likely case for observing differential treatment.

The Sample

The empirical analysis builds upon experimental data collected between September 2015 and June 2016. In

total, 800 applications were sent in response to 400 job openings. We sampled the jobs from the online employment portal, Jobindex.dk. Jobindex is the largest employment portal in Denmark and covers a broad array of jobs across 10 occupational categories.

To provide a comprehensive picture of potential discrimination, we applied for 23 different types of occupations within six different occupational categories: Office and administrative support, Education, Health care, Retail, Construction and extraction, and Marketing and sales (see all occupations in Supplementary Appendix D). We maximized the geographical variation and applied for jobs from all five Danish regions. In total, 278 of the ads were private sector jobs. Hence, the sample comprises a broad geographical scope and covers a relatively large segment of the Danish labour market.

We excluded academic jobs as well as highly technical jobs from the sample, since these would require detailed knowledge of essential skills, specific applications, recommendations, and lengthy CVs that would exceed the generic applications used in this experiment. The sample includes occupations that are dominated by either women or men and occupations where the labour force is mixed. We coded all jobs according to the gender composition in the specific occupation. Using a threshold of 20 per cent, we identified 112 jobs as female-dominated and 90 jobs as male-dominated, while the remaining 198 jobs had at least 20 per cent male and female workers (Supplementary Appendix D). To minimize the risk of receiving an answer before sending the second application, we only applied for jobs where the expiration date from the job advertisement was 2 weeks or more. Some job ads demanded a picture of the candidate, in which case we did not apply.

Randomization and Handling of Answers

For each job ad, we initially registered background information (sector, number of employees, language requirements, and contact information) and adapted the application and CV templates to the specific job before both applicants were finally assigned a gender and each application was assigned an ethnic affiliation. By finishing both applications first and randomly assigning names afterwards, we avoided the risk of unintentionally biasing the quality of the applications. If employers contacted one or both of the applicants, the job interview offer was politely declined. We define a callback as a personalized contact in the form of a message on the answering machine or an email from the potential employer with an invitation for a job interview. In a few cases, employers contacted applicants with additional questions or they asked for proof of education, which did not qualify as a callback. All communications with employers were archived on either email or answering machines. In 178 of 222 callbacks, we received an email.

Ethical Considerations

There is a large body of literature on the ethical considerations involved when conducting correspondence experiments, including advice on how to minimize harm to subjects involved (see Riach and Rich (2004) and Zschirnt (2016) for an extensive discussion of ethics in correspondence experiments). Central arguments for the legitimacy of carrying out correspondence experiments include (i) the question of discrimination is of high societal importance, (ii) that there is no other way to credibly retrieve this vital information, and (iii) if the research is prepared and carried out carefully, there is only a very limited detrimental effect on the employers tested (Riach and Rich, 2004; Zschirnt, 2016).

On the last point, we conducted a pilot study to confirm that the experimental set-up and the logistic of sending and handling the callbacks operated efficiently. Furthermore, to ensure sufficient statistical power without having to contact an excessively large number of employers, we conducted a power analysis before the collection of data. Finally, we carefully considered how to minimize any inconveniences to the employers that were contacted as a part of the experiment. The main cost to employers is time, so we answered all requests as quickly as possible, explaining that the applicant had just found another job.[11] We did not debrief employers to avoid the risk of making them doubt the credibility of future (minority) applicants. Furthermore, we analysed data on an aggregated form to ensure the anonymity of all individual employers to avoid associations between specific companies and this study.

Balance Check

We performed a balance check to judge whether the random assignment procedure seems to be reliable (Gerber and Green, 2012). The main treatment, ethnicity, is necessarily balanced across covariates, since all job ads received an application from both a majority and a minority applicant. However, this is not the case for gender and SES, and therefore, we tested whether observed covariate imbalances are larger than expected from chance alone. To examine this, we regressed the treatment indicators (gender and SES, respectively) on the available covariates[12] and calculated the heteroscedasticity-robust Wald statistic for the

hypothesis that all the coefficients on the covariates are 0 (Lin, Green and Coppock, 2016). To calculate the related *P*-values, we used randomization inference to create a distribution of Wald statistics under the null hypothesis of no systematic imbalance. The results show no reason to reject the null hypothesis that the pre-treatment covariates are not systematically related to the treatment (*P*-values: 0.43 and 0.92), and we therefore consider the assignment of treatments to be balanced (see Supplementary Appendix C for further details).

Results and Interpretation

To recap, this experiment answers three main questions. First, are equally qualified applicants with either a Danish-sounding name or a middle Eastern-sounding name treated differently by employers? Second, is the effect of having a minority name moderated by applicants' gender? Finally, is ethnic discrimination exclusively caused by the ethnic trait or does SES confound the effect? All *P*-values and standard errors reported in the analysis are obtained from randomization inference with 100,000 iterations.[13]

Main Results

In total, 800 applications were sent to 400 jobs and at least one applicant received a callback with an invitation for a job interview in 39.5 per cent of these. Since each job opening received two equally qualified applications, we can observe two potential callbacks for each workplace. As is evident from Table 2, the callbacks were not equally distributed, with a substantial gap between minority and majority applicants. The majority applicants received a callback rate of 33.5 per cent, which is a substantially higher share than the minority applicants, who received a callback on 22 per cent of the applications. The difference corresponds to a ratio of 1.52, implying that minority applicants need to send 52 per cent more applications to receive the same number of invitations as applicants with traditional Danish names. In the literature there are different ways to report outcomes from correspondence experiments. In this study, we first and foremost pay attention to the relative callback ratio and the difference-in-means (DIM), but Table 2 also reports the level of net discrimination, which is a common measure of discrimination in the literature. For all applicants, the net discrimination rate is 0.29, while it is 0.41 and 0.15 for male and female candidates, respectively.[14]

Table 2 also reports the DIM estimates and the related standard errors obtained from randomization inference with 100,000 iterations under the sharp null hypothesis, assuming no effect of ethnicity for all applicants (Supplementary Appendix F). It is extremely unlikely ($P < 0.001$) that the overall ethnic difference in means of 11.5 percentage points would have occurred by chance. If we break down the results into occupational categories, we see that although the relative difference varies, the majority applicant is preferred over the minority applicant in all six occupational categories (see Supplementary Appendix D for details). Overall, the results suggest that employers across occupations use ethnicity as an important decision rule when evaluating applications, and hence, that applicants with a Middle Eastern background are subject to discrimination.

Table 2. Callbacks across ethnicity and gender

	Males	Females	Total
Callback majority	36.2	30.6	33.5
Callback minority	19.3	24.9	22
Ratio	1.88	1.23	1.52
DIM	16.9***	5.7*	11.5***
	(3.66)	(3.15)	(2.41)
Neither invited	121	121	242
Both invited	29	35	64
Only majority invited	46	24	70
Only minority invited	11	13	24
Net discrimination	0.41	0.15	0.29
N	207	193	400

*$P < 0.1$; **$P < 0.05$; ***$P < 0.01$.
Note: Standard errors are in parentheses.

Callbacks across Gender and Ethnicity

From the results reported in Table 2, it is noticeable that the ethnic difference in callbacks seems to be gender-reliant. The results are visualized in Figure 2A, showing the difference in callbacks between majority and minority applicants for female applicants, male applicants, and all applicants, respectively.

To test if the interaction between ethnicity and gender is significant, we regress a callback dummy on ethnicity and gender of the applicant as well as the interaction between the two.[15] *H2* implies that the interaction term between ethnic minority and female should be positive and significant. As is evident from Figure 2B the estimate of the interaction effect is noisy, but the effect is substantial (11.2 percentage points) and statistically significant ($P = 0.016$).

While there is a large penalty for belonging to the ethnic minority group and a small (insignificant) penalty for being female within the majority group, these differences are not additive. Instead, the interaction term

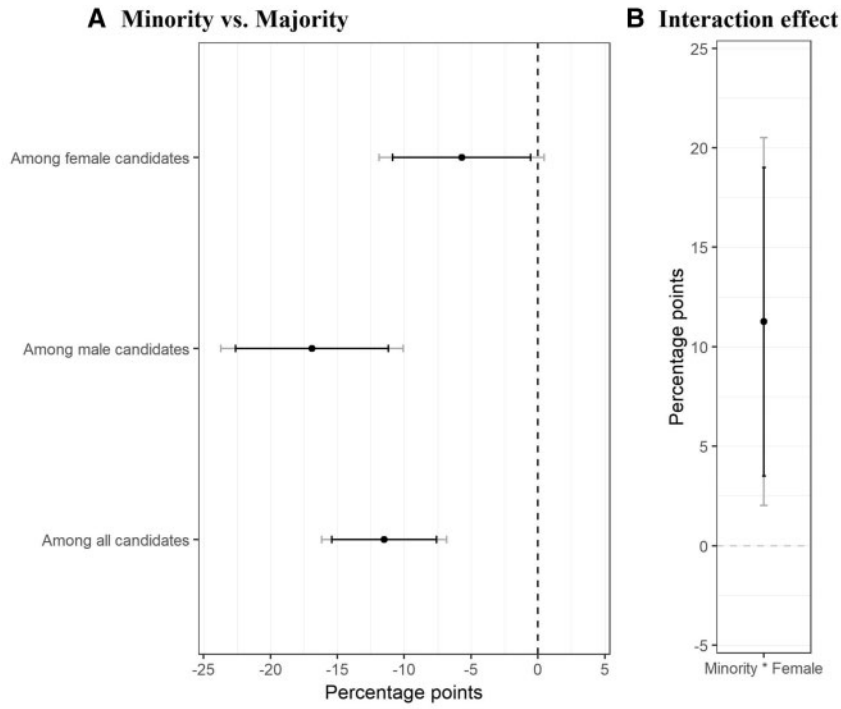

Figure 2. (A) Difference in callbacks between majority and minority candidates across gender. (B) The interaction between gender and ethnicity.

Note: CI are shown at the 95 and 90 per cent level.

denotes that minority females receive a substantively higher callback rate than we would expect if the ethnic and gender differences were purely additive.

As pointed out previously, heterogeneous effects across occupations can be decisive for the overall effects in correspondence experiments (Bursell, 2014; Midtbøen, 2016). Could the interaction effect between ethnicity and gender to some extent be an artefact of the sample's composition of occupations? We explore this notion in two steps. First, we re-weight callback rates by occupational categories and examine the results given the sample consisting of equally sized occupational categories. As is evident from Table 3, although the relative differences are slightly smaller in the re-weighted sample, the same overall pattern of gendered differences in ethnic discrimination is consistent. For female applicants, the re-weighted ratio is 1.18 compared to 1.22 in the original sample, while for male applicants the callback ratio alters from 1.88 in the original sample to 1.76 in the re-weighted sample. The total ratio between majority and minority applicants is reduced from 1.52 to 1.44.

Secondly, we explore results in subsets of the sample based on the gender stratification in the labour market.

Table 3. Callback rates re-weighted by occupational category

	Female	Male	Total
Majority	31.5	38.1	34.9
Minority	26.7	21.6	24.1
Ratio	1.18	1.76	1.44

We identify 112 jobs in female-dominated occupations (share of males <20 pct.) and 90 jobs in male-dominated occupations (share of females <20 pct.), while the rest is denoted as gender-balanced occupations. Female-dominated occupations in the sample include jobs as nurses, pedagogues, social and healthcare assistants, social workers, receptionists and secretaries, and cleaning workers, while male-dominated occupations include building and construction workers, mechanics, warehouse workers, IT supporters, and drivers (Supplementary Appendix D).

As reported in Table 4, the overall gendered difference in ethnic discrimination is consistent in all three subsets of the data. In each subset, minority males received fewer callbacks than both majority males and majority females.

Table 4. Callbacks across gender-segregated occupations

	Gender-balanced occupations		Male-dominated occupations		Female-dominated occupations	
	Female	Male	Female	Male	Female	Male
Majority	29	37.8	28.9	36.5	34.5	33.3
Minority	24	24.4	21	9.6	29.1	19.2
Ratio	1.2	1.54	1.38	3.8	1.19	1.73
N	100	98	38	52	55	57

Table 5. Callbacks conditioned on SES of the majority applicant

	Competing pairs when majority candidate has a popular name	Competing pairs when majority candidate has a low-SES name
Majority	35.7	31.3
Minority	25.1	18.9
Difference in means	10.6***	12.4***
	(3.2)	(3.3)
N	198	202
Difference in differences		−1.8 (4.8)

*$P < 0.1$; **$P < 0.05$; ***$P < 0.01$.
Standard errors are in parentheses.

Hence, the ratios are substantially smaller among female candidates vis-à-vis male candidates. The relative difference between majority and minority applicants is most substantial in the male-dominated jobs, where minority males received a callback rate of 9.6 pct. compared to 36.5 pct. of the majority males, implying a relative difference of 3.8. The smallest ratio of 1.19 is observed among female applicants in female dominated occupations where the ratio is 1.73 among male applicants.[16]

In summary, the exploratory analysis shows that the effects do not seem to be an artefact of the composition of occupational categories in the sample. Moreover, the interaction between gender and ethnicity is present in both gender-balanced, male-dominated and female-dominated occupations. However, the relative difference among majority and minority applicants is substantially larger in male-dominated jobs, suggesting that males both execute and become the target of ethnic discrimination more often than females.

Does SES Confound the Use of Names as a Signal for Ethnicity?

To examine if the ethnic traits are confounded by notions of SES, we randomly assigned the majority names from two groups: the first group consisted of the most popular Danish names, while the other group consisted of names from the bottom percentile of the SES index. On this basis, we test if the difference between ethnic minority and majority candidates is confounded by the status of the majority applicants.

We seek to estimate the differences in treatment effects of ethnicity conditional on the information about SES related to the majority applicants. Hence, the quantity of interest in this section is a difference in differences represented by the following expression:

$$(E[\text{Callback}|\text{Majority Popular}] - E[\text{Callback}|\text{ Minority competing against Majority Popular}]) - (E[\text{Callback}|\text{ Majority lowSES}] - E[\text{Callback}|\text{ Minority competing against Majority lowSES}])$$

This estimand captures the degree to which effects of SES are consequential for the relative difference in callbacks. If having a low-SES name reduces the chances of receiving a callback, the estimand should be positive.

Table 5 shows callback rates for competing pairs of majority and minority applicants. The immediate comparison of callbacks to majority applicants indicates that having a low-SES name reduces the chances of receiving a callback by roughly 4 percentage points. However, the relative difference in callbacks between majority and minority applicants is actually slightly larger when the majority candidate has a low-SES name (12.4 percentage points) compared to jobs where the majority candidate has a popular name (10.6 percentage points). Hence, the difference in differences is negative, which suggests that that ethnic discrimination is not altered by the status of the majority candidate. While the estimate is imprecise, we can reject the third hypothesis that SES related to majority applicants' names is a significant factor.

One concern is that our sample size may be too small to detect effects of SES, but the fact that the difference in differences is actually negative supports the conclusion that providing information on SES among majority

candidates does not substantially affect levels of ethnic discrimination. We also explore the intersections between gender, SES, and ethnicity but find no major differences from the overall pattern (see Supplementary Appendix I).

In conclusion, the excludability assumption seems to hold: the differences between ethnic majority and ethnic minority candidates are not affected by the SES related to the majority applicants' names. This bolsters the validity of the use of distinctive names to signal ethnicity.

Conclusion and Discussion

This article sheds new light on the disparate treatment of ethnic minorities in the labour market, a topic that has received substantial interest in the scholarly community as well as having been the subject of intense public debate. The results show that when equally qualified applicants apply for a job, an applicant with a Middle Eastern-sounding name is significantly less likely to receive a callback compared to an applicant with a Danish-sounding name. The overall result is strikingly similar to the findings of previous correspondence studies conducted in a number of European countries (Zschirnt and Ruedin, 2016). The difference is particularly notable in light of the fact that the fictitious applicants used in this experiment were highly qualified for the jobs applied for, which should have minimized the incentive to discriminate.

The findings demonstrate that discrimination varied substantially by gender, which serves as a call to future correspondence experiments to manipulate gender to estimate general measures of ethnic discrimination. The results undergird the notion that male ethnic minorities are particularly vulnerable to discrimination. Hence, this experiment is aligned with recent field experiments from other European countries that explore intersections between ethnicity and gender and find support for the outgroup-male-target hypothesis (Andriessen *et al.*, 2012; Arai, Bursell and Nekby, 2016; Liebkind, Larja and Brylka, 2016; Midtbøen, 2016). However, contrary to previous studies on gendered ethnic discrimination, the results indicate that such discrimination is not limited to specific occupational categories but is instead consistent across a broad spectrum of the labour market. Additional research is required to explore the conditions under which ethnic discrimination is gender-reliant.

Furthermore, this article examined whether the SES of names influences the chances of receiving a callback. By actively choosing control names, we were able to examine if the ethnic gap decreased when the majority name belonged to a group of low-SES names. The results do not suggest that the majority applicants' names confounded the effect of ethnicity, which bolsters the interpretation that the gap in callbacks can be attributed to ethnicity and not characteristics related to the use of distinct names.

Despite its innovations, the present study also has a number of limitations. First, this experiment proves discrimination against candidates with a given set of credentials in a non-representative sample of the Danish labour market. While we did apply for a broad array of jobs, it is impossible to draw a representative sample of job openings from the ever-changing job market. Hence, applicants applying for other types of jobs—and with different educational levels, experience or personal characteristics—might face different outcomes than found in the present study. It should also be noted that while we have studied discrimination in the first stage of the hiring process, discrimination could occur at the job interview or within a workplace in the wage-setting or promotion process (Pager and Western, 2012).

Second, despite the large difference in invitations for job interviews, it remains uncertain how discrimination affects the employment rate of the large group of Middle Eastern immigrants and descendants in Denmark more generally. Because the availability of jobs and the strategy of the individual applicant play a decisive role in getting a job, discrimination on average does not necessarily translate into gaps in employment rates (Heckman, 1998). Minorities might have prior knowledge about non-discriminating workplaces or find jobs outside of the formal hiring processes (Demireva, 2008), and thereby avoid discriminating employers. Nevertheless, the gap between majority and minority candidates found in this experiment is substantial and occurred across different occupational categories, from the largest Danish online job portal, and it therefore seems highly plausible that ethnic discrimination translates into overall employment disadvantages. Furthermore, the findings raise concerns about the presence of a meritocratic principle and suggest widespread violations of the law of equal treatment in the labour market.

Third, a concern in correspondence experiments is that names are imprecise proxies of the groups they represent. In this case, the names used to signify gender and ethnic differences are distinct, and there is little reason to doubt that employers understand the traits. However, it could be argued that the names used to signify SES do not match employers' perceptions of low-SES names. The names were selected based on three socio-economic factors (average crime, income, and unemployment), and even though the names match a common notion of low-

status names, we cannot be completely sure that these names were perceived as such. It should be mentioned, however, that the manipulation of SES served to bolster the validity of the ethnic trait—we were not interested in studying the effects of variations in SES in itself, in which case we would have manipulated more than just the name (Jackson, 2009). In addition, it should be mentioned that while we examined the importance of having a low-SES majority name, the application templates included information that signalled a middleclass lifestyle, which might crowd out the effect of low-SES names. Hence, we cannot ignore the possibility that SES might be important if the applications were less informative.

Finally, our findings leave open the important question of *why* we see these results. This experiment was primarily designed to examine if, and against whom, employers discriminated, and we cannot definitively establish the causal mechanisms underpinning the results. On the one hand, the fact that ethnic discrimination is gender-reliant supports the notion of Social Dominance theory, which can be understood as a type of taste-based discrimination mechanism. On the other hand, this finding is seemingly consistent with the expectations of statistical discrimination models as well. If minority males perform, on average, worse than minority females do on some outcome-relevant characteristics, we might expect employers to treat the two groups differently. Female descendants with a Middle Eastern background outperform male descendants in a number of statistics (education, grades, wages, etc.) which employers might utilize in their evaluation of applicants (Statistics Denmark, 2017). In addition, employers' perceptions of cultural distance might vary by the gender of the minority applicant. Cultural or value differences, for example views on gender equality, could be perceived as larger or more problematic when the minority candidate is male (Lancee *et al.*, 2017). While the importance of hard skills (e.g. increased experience or reference letters) has been examined in previous studies (Kaas and Manger, 2012; Arai, Bursell and Nekby, 2016), little is known about the ways in which perceptions of cultural differences moderate ethnic discrimination. This could be examined in future research by manipulating cultural information, for example by signifying support for gender equality, democratic participation, or religious affiliation.

Thus, an important task in future research is to increase the understanding of why ethnic minorities—especially males—are penalized. As this article demonstrates, it is possible within the framework of correspondence experiments to study how different components affect behaviour among employers. We urge researchers on ethnic discrimination to replicate and extend work in this area by disentangling the effects of other components alone and in combination to contribute towards measuring and understanding ethnic discrimination.

Notes

1 The method has also been applied in a number of domains outside the labour market, measuring differential treatment in housing markets (Fang, Guess and Humphreys, forthcoming), the market place (Ayres and Siegelman, 1995), the sharing economy (Edelman, Luca and Svirsky, 2017), or state legislators' responsiveness to requests from voters (Butler & Broockman, 2011).

2 One way of assessing the implications of theories of discrimination has been to examine heterogeneous treatment effects—e.g. varying effect sizes across firm size or customer contact. While such treatment-by-covariates effects can be interesting, they are not solid answers to causal questions. Jobs with certain characteristics might differ systematically on a number of unobserved variables that alter the explanation.

3 One argument for doing so is to avoid evoking suspicion among employers in gender-stratified occupations where two applications from similar qualified applicants of the under-represented gender will seem odd (Arai, Bursell and Nekby, 2016). Another argument relates to the real-life consequences of discrimination: if very few female candidates work in construction, the need to examine and address discrimination against female candidates is arguably smaller.

4 Butler and Homola (2017) perform an *ex post* analysis of an audit study on political responsiveness using public records to assess the importance of SES and political resources reflected in names. They find no evidence that these signals predict the probability of legislators' likelihood of responding.

5 To circumvent the risk of ascertaining SES of racially distinct first names, Darolia *et al.* (2016) only signify race through distinct surnames, which might not be a clear signal of race.

6 We initially assumed that the large majority of employers would belong to the majority group. From the names of employers or HR managers that we contacted, we only identified one with a minority name.

7 See details at Supplementary Appendix H.

8 We used data on the most common Danish names from Statistics Denmark (2015). See a list of names in Supplementary Appendix A.

9 The data set included register data on more than 3.8 million Danes.
10 The applicants' CVs mentioned real educational institutions in the section on educational background and real workplaces in the section on experience to maximize realism. We did not receive any comments indicating that employers had been in contact with institutions or workplaces.
11 We created four individual email addresses and set up four phone numbers with voice mails. Thus, we were able to send out applications and receive answers for all four combinations of gender and ethnicity. All invitations were either recorded from the answering machines or saved as screenshots from emails.
12 Covariates include Size (number of employees); Sector (public/private); Education (if education after high school was needed); Language required; and Customer contact.
13 By reproducing the randomization procedure a large number of times, the distribution of the test statistic under the sharp null hypothesis can be approximated with a high degree of precision (Gerber and Green, 2012).
14 The measure of net discrimination treats cases with no callbacks as non-observations and is obtained by dividing the difference between observations where only the majority was invited and observations where only the minority was invited with the number of observations where at least one candidate was invited.
15 The fact that ethnicity is randomly assigned within occupations and gender between occupations implies that the effect of ethnicity is measured with more precision than the effect of gender. We account for this by using randomization inference with the same randomization procedure. Gender is clustered on the job level and ethnicity is block randomized on the job level. We impute constant additive effects and run 100,000 iterations. Alternative specifications using ordinary least squares regression with clustered standard err generate similar results (Supplementary Appendix F1).
16 We also examine the intersection between ethnicity and gender across sector and find the same pattern within both public sector jobs and private sector jobs (Supplementary Appendix G).

Supplementary Data

Supplementary data are available at *ESR* online.

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