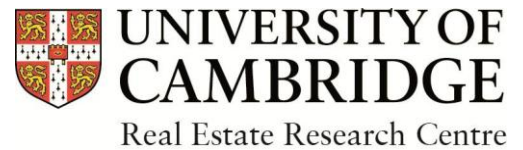


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Title: Is hiding my first name enough? Using behavioural interventions to mitigate racial and gender discrimination in the rental housing market

Authors: Helen X. H. Bao

Affiliation: ¹University of Cambridge, Department of Land Economy

Contact corresponding author: Helen Bao: hxb20@cam.ac.uk

Is hiding my first name enough? Using behavioural interventions to mitigate racial and gender discrimination in the rental housing market

Helen X. H. Bao¹

Department of Land Economy, University of Cambridge, CB39EP, UK

Abstract:

This study investigates whether behavioural interventions can reduce racial and gender discrimination in the rental housing market. Our correspondence tests include two behavioural interventions based on the taste-based discrimination theory and the statistical discrimination theory. Specifically, we provided employment information to help letting agents to overcome statistical discrimination and included anti-discrimination messages to nudge letting agents to adhere to the “Equality, Diversity and Inclusion” social norm. Empirical evidence from London shows that behavioural interventions worked. Both employment information and anti-discrimination messages changed the racial and gender gap in response rate significantly. However, anti-discrimination messages helped Polish and Nigeran renters by increasing their chance of getting a response from letting agents, but hurts Chinese applicants greatly. Also, the employment information intervention widened the gender gap. Racial and gender discrimination in housing markets is a complex issue and the landscape is constantly changing. Hiding one’s first name is far from enough to solve the problem. We conclude by calling for more empirical studies from housing markets in other parts of the world.

JEL Classifications: D90, J15, J16, R30

Keywords: nudge; boost; labour mobility; housing decisions; behavioural policy interventions

¹ Corresponding author (hxb20@cam.ac.uk).

Is hiding my first name enough? Using behavioural interventions to mitigate racial and gender discrimination in housing markets

1. Introduction

Implicit racial and gender biases can shape our behaviours and decisions significantly (Greenwald and Banaji, 1995). For example, health care providers have implicit bias in terms of positive attitudes toward Whites and negative attitudes toward people of colour (Hall et al., 2015); implicit gender stereotypes towards drivers are common (Tosi et al., 2021); university professors are more responsive to White males who were seeking mentoring in the future (Milkman et al., 2015); and black/male taxi riders have higher rates of trip cancellation and longer wait times compared with white/female riders (Brown, 2022).

Racial and gender biases are also prevalent in housing markets, with males and ethnic minorities being discriminated against in rental housing markets in many places around the world (Flage, 2018). The issue has been so serious that it makes national and international headlines regularly (Airbnb, 2020; BR Data and SPIEGEL ONLINE, 2017; Mohdin, 2019; Siddique and Duncan, 2018). In response to a lawsuit against racial discrimination, Airbnb had to hide guests' first name from rental hosts in Oregon, USA from January 2022 (Olson, 2022). However, there is little evidence that such measurement is sufficient to combat racial and gender discrimination in housing markets.

Despite of some well-established theoretical models developed more than half a century ago (Arrow, 1973; Becker, 1957) and the large body of empirical evidence accumulated in the last two decades, there is a lack of studies on the effectiveness of solutions to tackle discrimination (Llorens et al., 2021; Metinyurt et al., 2021). This is particularly true in housing markets. Given the complexity of the products and services involved and the relatively low frequency of transactions, nuanced studies are needed to understand how implicit racial and gender biases manifest themselves in letting decisions, and more importantly, what interventions are effective to ameliorate or even eliminate such biases. This research sets out to help fill this gap in the literature.

The objective of this study is to investigate whether behavioural interventions can effectively reduce racial and gender discrimination in the rental housing market. We designed two behavioural interventions based on the taste-based discrimination theory (Becker, 1957) and the statistical discrimination theory (Arrow, 1973). Specifically, we provided employment information to help letting agents to overcome statistical discrimination, and included anti-discrimination messages to nudge letting agents to adhere to social norms (and hence overcome their implicit/subconscious racial and gender biases). We conduct correspondence tests in one of online real estate portals in the UK. London is chosen as the study area because of the size of the market and the diverse background of its residents, both of which are important to ensure the internal and external validity of the study. Four ethnic minority groups are considered, i.e., Indian, Nigerian, Polish, and Chinese renters. A randomised design was used to allocate respondents into control and treatment groups. 1800 observations were collected from December 2021 to March 2022.

Our findings are three-folded. First, racial and gender discrimination is prevalent in London's rental market. Female and White British applicants were treated more favourably by letting agents in terms getting initial responses to their inquiries and being offered a chance to view

the properties. Second, behavioural interventions worked. Both employment information and hashtag messages changed the racial and gender discrimination gap. Finally, and most importantly, racial and gender discrimination is complex and there is no 'one-size-fits-all' behavioural interventions. We found that hashtag messages helped Polish and Nigerian applicants by increasing their chance of getting a response from letting agents, but did the opposite to Chinese applicants; also, the employment information intervention actually widened the gender gap. Racial and gender discrimination in the rental housing market is a complex issue and the landscape is constantly changing. Hiding one's first name is far from enough to solve the problem. Behavioural interventions are powerful tools, but more empirical evidence is needed to help apply these instruments correctly.

2. Literature Review

2.1 Racial and gender discrimination in the rental housing market

There is persistent racial discrimination against ethnic minorities across the world. For example, the 17 studies reviewed in Guscute et al. (2021) cover 12 countries from the North America and the EU. The ethnic majority considered in these studies is White Caucasian from the study areas, such as Swedish (Ahmed et al., 2010; Carlsson and Eriksson, 2014), White American (Carpusor and Loges, 2006; Hanson and Hawley, 2011; Hanson and Santas, 2014), German (Auspurg et al., 2017; Mazziotta et al., 2015), and Finnish (Oblom and Antfolk, 2017). The ethnic minority groups in these studies include Arabic/Muslim (Baldini and Federici, 2011; Hogan and Berry, 2011), Black (Acolin et al., 2016; Hogan and Berry, 2011), East Europeans (Bjornsson et al., 2018; Carlsson and Eriksson, 2015), Turkish (Auspurg et al., 2017; Heylen and Van den Broeck, 2016), among others. These studies found that landlord and real estate agents are 4.5% to 35% less likely to respond to inquiries from ethnic minority groups. The racial discrimination is particularly strong for people with Arabic or Muslim origins, to the extent that Flage (2018) focuses on Arabs/Muslims exclusively in a meta-analysis of 25 separate studies on discrimination against ethnic minorities in the rental housing market. The average odds ratio for Arabs/Muslims to receive responses from landlords and real estate agents is 0.48 with a 95% confidence interval of [0.40, 0.56]. It is worth noting that these statistics are based on 12 papers published between 2006 and 2017, of which six were published between 2015 and 2017. There is no sign of improvement in racial discrimination in recent years, as the gap is as wide as in studies from earlier years. This is consistent with findings of racial discrimination in the labour market, where a meta-analysis of 28 studies reveals that the level of discrimination (24% to 36%) remains largely unchanged in the last three decades (Quillian et al., 2017).

Few studies focus exclusively on gender discrimination in the housing market. However, most of the racial discrimination studies reviewed by Flage (2018) and Guscute et al. (2021) included gender discrimination in their research designs. Empirical evidence supports such a strategy, because not only gender discrimination against males is identified consistently but also gender and racial discrimination interact. For example, 14 out of the 29 studies reviewed in Flage (2018) reported an average odds ratio of 1.18 for females, with a 95% confidence interval of [1.07, 1.30]. In other words, female applicants could be 30% more likely than male applicants to receive positive responses from landlord and real estate agents. Moreover, Arab/Muslim women are 50% more likely than Arab/Muslim men to be favoured; while this gender gap drops to 20% for majority groups (e.g., White American). Therefore, it is important to include both gender and racial discrimination in one overarching analytical framework to reliably isolate the main effects and the interaction effects of these two factors.

Although these racial and gender discrimination studies cover a wide range of geographic regions and ethnic origins, the research methods adopted in these studies are fairly consistent and homogeneous. Field experiment in the form of correspondence test (Jowell and Prescottclarke, 1970) is the prevalent method in this stream of research. To implement correspondence test, researchers create fictitious names indicating the gender and ethnic origin of a fake applicant. Inquiries with these names are sent to landlords and real estate agents by emails, and the proportion of positive responses is recorded as a measurement of discrimination. If racial and gender discrimination is absent, the response rate should be roughly the same between females and males, as well as between the ethnic majority and minority groups. The experiment typically terminates as soon as a response is received.

The correspondence test method has better control over confounding factors, such as the appearance of testers in in-person audits, and the ascent of experimenters in telephone interviews. After being introduced in housing studies by Carpusor and Loges (2006), this method has been widely used in studies of racial and gender discrimination in the housing market. Of course, the correspondence test method also has limitations. Specifically, racial and gender profile are established exclusively based on fictitious names, which might not be interpreted as correctly as expected by the researchers; it is also not designed to study discrimination beyond the initial response stage. Nevertheless, despite of these limitations the method has been proven to be one of the most efficient and effective tools for empirical studies of racial and gender discrimination in the housing market. In fact, Flage (2018)'s meta-analysis of studies on this topic includes papers using correspondence test only. We will follow this practice and use correspondence test in this study.

2.2 Behavioural interventions in urban studies

In recent years behavioural interventions – interventions that are neither monetarily incentivizing nor legally/regulatorily coercive – have been applied extensively in urban studies. For example, two recent literature reviews by Khanna et al. (2021) and Buckley (2020) contrasted the effect of both behavioural interventions and monetary incentives in reducing energy consumption and CO₂ emissions in residential buildings. These findings not only confirmed the positive effect of both monetary and non-monetary interventions on reducing the energy consumption of households, but also highlighted the potential benefits of deploying the right combinations of behavioural interventions.

To better understand and choose among the wide range of behavioural interventions, it is helpful to classify these tools into two broad categories: nudges and boosts. Nudges (Thaler and Sunstein, 2008) leverage behavioural heuristics in the design of choice architecture to induce desirable actions for both the individual and the society, such as using green electricity defaults to increase the uptake of renewable energy (Kaiser et al., 2020). Boosts (Grune-Yanoff and Hertwig, 2016), on the other hand, focus on changing existing behavioural heuristics or establishing new ones to support environmentally friendly actions, such as providing home energy report with personalised energy use feedback and energy conservation information to encourage energy savings (Allcott and Rogers, 2014). In other words, nudges are manipulating tools, while boosts empower people. Nudges are easy and quick to implement, but the effects tend to be short-lived; boosts require more time and resources to change behaviours, but tend to remain effective for a longer term because ‘they have become routinised and have instilled a lasting competence in the user’ (Lorenz-Spreen et al., 2020, page 1106).

Existing evidence indicates that both nudges and boosts are effective in encouraging positive actions, especially for environmental conservation and sustainable urban development. These findings from related fields suggest that nudges could be helpful to combat taste-based discrimination, while boosts might be able to alleviate statistical discrimination. However, the application of these behavioural tools in racial and gender discrimination studies does not seem to be straightforward. The effects of these behavioural interventions vary significantly among studies. For example, boosts are effective only when combined with nudges in energy saving experiments in Monaco (Lazaric and Toumi, 2022), while video information boosts outperform nudges in promoting the acceptance of recycled water in the US (Tanner and Feltz, 2022). Therefore, the effectiveness of behavioural interventions is context specific, and needs to be tested with empirical evidence from the housing market.

Unfortunately, there has been little empirical evidence on the applications of behavioural interventions in studies of discrimination in general, and in the housing market in particular. There are limited number of behavioural studies in the labour market, with promising results (O'Meara et al., 2020; Tilcsik, 2021). This paper aims to push the research frontier of this under-studied area.

3. Experiment Design and Implementations

3.1 Racial and gender profiles

We create ten fictitious renters for five ethnic groups: White British, Chinese, Indian, Nigerian, and Polish. There are one female and one male renter in each group. The White British group is the ethnic majority in the UK and serves as the base group for comparison. According to the Office of National Statistics, India is the most common non-UK country of birth in 2021, Polish has been the most common non-British nationality in the UK since 2007, and Nigerian is the largest African-born population in the UK in 2021 (ONS, 2022). Although Chinese is the 10th largest overseas-born population in the UK in 2021, it is included in the study because of the stigma against Asians in general and Chinese in particular during the COVID-19 pandemic (Grahame Allen and Zayed, 2021; LANG, 2021).

We use the first name to identify gender, and both the first and the second name to signal ethnic background. The names used in the experiments are given in Table A1 in the Appendix. The names were tested at an online panel data platform in the UK (www.prolific.co). We used filters to select respondents from London only, and a stratified sampling scheme to ensure a 50-50 gender split among the respondents. We then asked respondents to identify the gender and nationality based on the fictitious names. Only names with a minimum of 85% of correct identification rate for both gender and nationality are used in the experiment. A total of 400 respondents were recruited to complete the name checks between 1 and 11 December 2021.

3.2 Behavioural interventions

There are two behavioural interventions included in the experiment. The first is a social norm nudge that applied to three ethnic groups only, that is, the Chinese, Nigerian, and Polish groups. We did not include White British and Indian renters in the nudge design because there are no clear social norms that apply to these two ethnic groups.

For respondents in the nudge treatment group, their email messages will end with a social media hashtag, placed right below their names. The nudges are designed to remind letting agents to adhere to three social trends: “Stop Asian Hate Crimes” for Chinese renters, “Black Lives Matter” for Nigerians, and “Immigrants Lives Matter” for Polish applicants. The hashtags for these three social norms are #stopasianhate, #blacklivesmatter, and #immigrantslivesmatter, respectively. We will use responses from this treatment group to verify whether reminding people to treat Asian, Blacks, and immigrants fairly could reduce gender and/or racial discrimination in the rental housing market.

The second behavioural intervention is an information boost that applied to all five ethnic groups. Messages sent by renters in this treatment group will contain positive information about employment to hint that the applicant has a stable or well-paid job. Examples of email messages from this group are “I am a secondary school teacher and answering phone calls during office hours is difficult. Emails would be much better” and “I am running a medical practice, and won't be able to answer personal phone calls at work. An email response will be much appreciated.” We will use responses from this treatment group to verify the effect of information boosts on gender and racial discrimination in the rental housing market.

Respondents are randomly allocated to a control group, a boost treatment group, a nudge treatment group, and a treatment group with both the boost and nudge intervention. Examples of emails in each group can be found in Figure A1 in the Appendix.

3.3 Experiment implementations

We carried out the experiment at the UK's largest online real estate portal and property website, www.rightmove.co.uk. In 2021, Rightmove had 208 million visits per month and a total of 692,000 properties listed at their website. Therefore, the platform gives us access to the largest available database of rental property listings in the country. We searched rental properties in Greater London Area that are advertised between December 2021 and April 2022. Only houses, flats and apartments are included. All listings are handled by letting agents. No private landlords are involved.

Once a property was identified as eligible for the experiment, we sent a total of five applications to the letting agent, asking for a viewing appointment. The five applicants will be from different ethnic groups (i.e., one from each of the five groups) but of the same gender. The five emails were sent with at least 12 hours in between so that no suspicious of spamming might be raised.

A total of 360 properties were selected, which gives a sample size of 1,800. The sample is evenly divided between the two gender groups and the five ethnic groups. Specifically, there are 360 observations in each ethnic group and 900 observations in each gender group.

Half of the sample are randomly selected to receive an information boost behavioural intervention. In other words, the sample is evenly divided between the boost treatment group and a control group. Within each of these two groups, one-third of the Chinese, Nigerian and Polish renters are randomly selected to include the social norm nudge in their email messages. This gives us a nudge treatment group, which consists of 360 observations in total, or 180 observations in each of the three ethnic groups involved.

Each email inquiry ended when either the letting agent replied or did not respond within two weeks. When letting agents invited applicants for a viewing, we turned down the offer within 24 hours. Except for the initial application with a request for a viewing and the notification to withdraw the application, no other attempts were made to communicate with letting agents, such as replying to emails, messages, or phone calls. This is to minimize the impacts of this project on letting agents' normal business. We obtained ethical approval from the Research Committee at the author's institution.

4. Empirical Findings and Discussions

4.1 Classification and coding of responses

We classify responses to viewing applications in three categories. If an email enquiry received an automatic response from the agent without follow-up emails, or no replies in two weeks, it is classified as "no responses". If the applicant was invited for a viewing of the property, the response is labelled as 'viewing invitations'. All other responses, such as asking for more information about the applicant's background, are classified as 'inquiries'. We define two respondent variables based on these three categories: *Favresp* equals one for the 'viewing invitations' category and zero otherwise; *Resp* equals one for the 'inquiries' category and zero otherwise. The 'no responses' category is omitted as the base category for comparison. The proportion of applications with either type of responses for the control group (i.e., without behavioural interventions, N = 900) is given in Figure 1 and Figure 2.

An average of 13% of the renters received an invitation to view the property (see the first row in panel A of Table 1). British renters are about 3% more likely to be invited for a viewing than Indian and Polish renters; the differences between British, Chinese and Nigerian renters are negligible. Overall, the racial difference is not statistically significant at the 10% level (see the last column in panel A of Table 1).

On average, female renters (i.e., the orange dots in Figure 1) received 8% more viewing invitations than their male counterparts (i.e., the blue circles in Figure 1). Upon close examination, this pattern is driven by British, Chinese, and Indian renters. In particular, Chinese renters' gender gap (i.e., 18%) is twice of the other two groups (i.e., 9%). The gender discrimination against male renters is statistically significant for these groups of renters as well (see column 7 in panel A of Table 1). Female and male renters are treated much more equally if their ethnic background is Nigerian or Polish, with female renters' being about 2% more likely to be invited for a viewing and the difference is statistically insignificant.

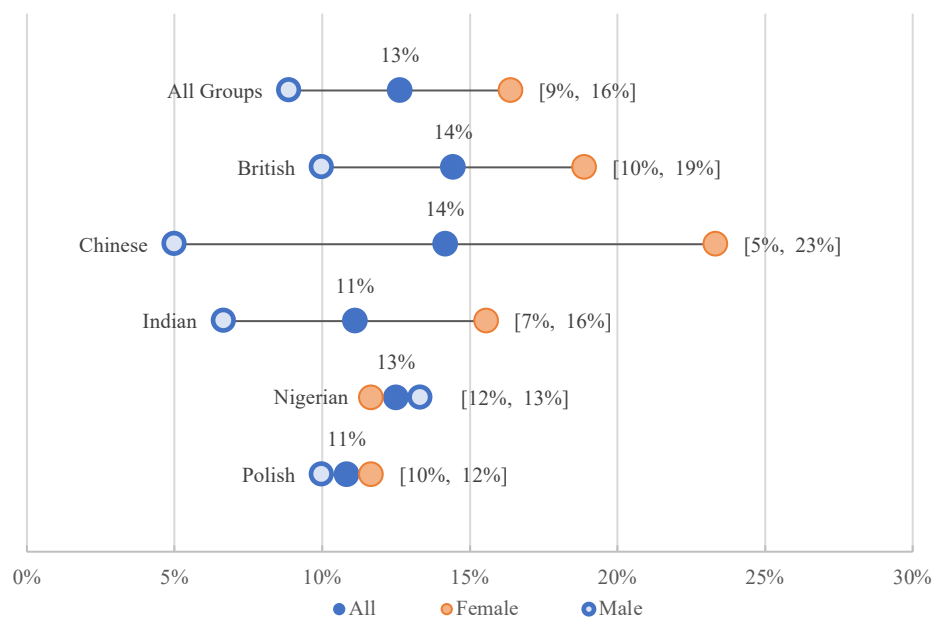
The pattern is somehow reversed in Figure 2, where inquiries are recorded as responses. First, there seems to be a gender discrimination against female renters, who received fewer inquires for further information. This is evident from the negative figures in column 7 in panel B of Table 1. Second, the gender gap is narrower for inquires response rate, especially for Chinese, Indian and Nigerian renters. However, even for British and Polish renters, where the gender gap is 7%, the difference is not statistically significant at the 1% level. We note the statistical

significance of the gender gap for all ethnic group combined (i.e., 5%). Although this seems to be counter-intuitive given the fact that the gender gap is insignificant in all sub-groups, this is likely due to the much larger sample size involved in the t test for the whole sample. Overall, gender discrimination presents in inquiry response rate, with a smaller effect size and are less statistically significant.

When it comes to racial discrimination, although on average 34% of the renters received inquiries for further information, all ethnic minority groups had a lower than average chance to have further discussions with letting agents. Specifically, British renters are nearly 10% more likely to receive inquires than ethnic minority renters. This racial difference is statistically significant at the 1% level (see the last column in panel B of Table 1).

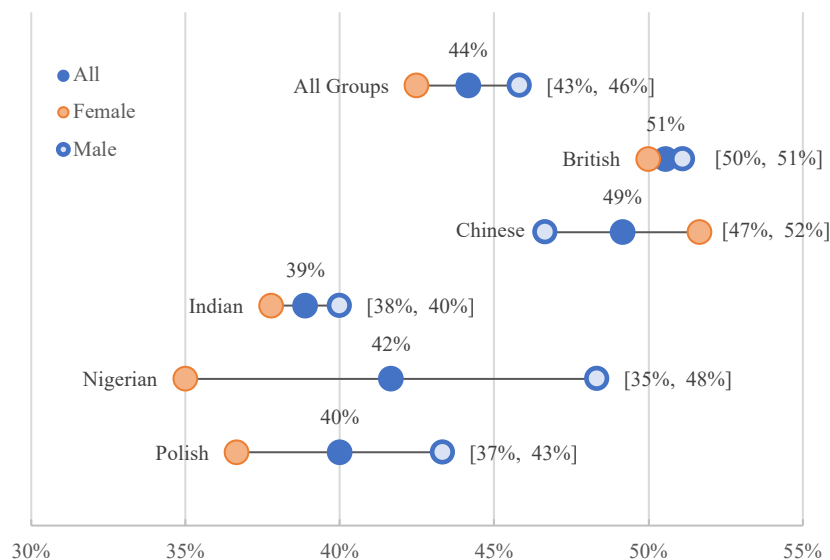
In summary, we found evidence for both racial and gender discrimination in the rental market in London. However, they affected letting agents' behaviours differently when deciding whether to offer a viewing appointment straightaway or to further evaluate the potential tenants. On average, letting agents discriminated against male renters when offering a viewing appointment upon first email inquiry from the applicant; and they do not treat ethnic minority groups significantly differently from British renters. However, when choosing renters to ask for further information, letting agents favoured British applicants, with a preference for male renters across all ethnic groups. The gender preference, albeit larger than 5% on average, is not as statistically significant as that when choosing applicants for viewing appointments.

Figure 1: Proportions of applications with 'viewing invitations' responses



Note: Only the control group (n = 720) is included in this figure. The average figure of both genders combined is shown on top of the solid blue dots. The gendered figures are shown in the brackets.

Figure 2: Proportions of applications with ‘inquiries’ responses



Note: Only the control group ($n = 720$) is included in this figure. The average figure of both genders combined is shown on top of the solid blue dots. The gendered figures are shown in the brackets.

Table 1: Response rates by gender and ethnic groups with t test results

	All		Female		Male		Gender difference (Female - Male)	Racial difference (Relative to British)
	%	N	%	N	%	N		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>A: Viewing Invitations</i>								
Overall	13%	91	16%	59	9%	32	8% ***	--
British	14%	26	19%	17	10%	9	9% **	--
Chinese	14%	17	23%	14	5%	3	18% ***	-0.3%
Indian	11%	20	16%	14	7%	6	9% **	-3%
Nigerian	13%	15	12%	7	13%	8	-2%	-2%
Polish	11%	13	12%	7	10%	6	2%	-4%
<i>B: Inquiries</i>								
Overall	44%	318	43%	153	46%	165	-3%	--
British	51%	91	50%	45	51%	46	-1%	--
Chinese	49%	59	52%	31	47%	28	5%	-1%
Indian	39%	70	38%	34	40%	36	-2%	-12% **
Nigerian	42%	50	35%	21	48%	29	-13% *	-9% *
Polish	40%	48	37%	22	43%	26	-7%	-11% **

Note: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$. The null hypothesis of the one-tailed t test is based on the sign of the mean differences in column 7.

4.2 The effects of behavioural interventions on response rate

Table 2 reports the difference in response rate between the treatment groups and the control group. Positive figures indicate an increase in response rate as a result of the corresponding treatment, and vice versa. There are three treatment groups: boost only, nudge only, and nudge and boost combined. Because the social norm nudge is applied to Chinese, Nigerian, and Polish renters only, statistics are not available for the White British and Indian sub-samples in the analysis of the ‘nudge only’ and ‘nudge & boost combined’ treatment groups.

Overall, the information boost increased response rate by 6% and 10% for viewing invitation and inquiries, respectively. This positive effect is consistently observed across all ethnic groups, ranging from 3% (Polish renters, viewing invitations) to 13% (Indian renters, inquiries).

Interestingly, this behavioural intervention worked much more effectively for female renters, as indicated by the large and statistically significant improvements in column 2. On average, the boost effect is nearly 10% to 20% stronger for female renters than their male counterparts. For example, when employment information was included in email messages, the response rate for female renters is 11% higher than that in the control group; while the response rate for male renters is only 2% higher (see the first row corresponding to the ‘Boost only’ group in panel A of Table 2). This gender difference is the largest for Polish renters regarding inquiries. Our information boost increased female Polish renters’ chance of receiving inquiries by 25% but reduced that of male Polish renters by 12%. The only exception of this ‘female advantage’ in boost effect is Chinese renters, where male renters have a small (2%) advantage over their female counterparts.

There is a positive effect of including employment information across the board, which suggests that providing relevant information is helpful for letting agents to overcome implicit biases. Nevertheless, we also observed the intertwining of gender stereotyping and behavioural interventions, where boosts worked primarily in favour of female renters. The negative or nil effects for male renters in the Indian and Polish group are also interesting. This is most likely due to the racial stereotyping of Black and Eastern European migrants, who typically work in blue collar jobs such as construction workers or janitors. As our employment information are all white-collar jobs, the information boost is likely to be interpreted as a lie and hence treated with caution.

In comparison, the effect of social norm nudge is less clear and weaker. On average, the chance of getting a viewing invitation dropped by about 3% overall and is not statistically significant. When we break down the sample by gender and ethnic groups, the complexity of racial and gender discrimination manifests itself. First, by including ‘#stopasianhate’ in email signatures, female Chinese renters’ chance of getting a viewing invitation dropped by 20%, while their male counterparts saw an increase by as much as 12%. Both changes are statistically significant at the 10% level. On the other hand, when “#blacklivesmatter” are included in Nigerian applicants’ emails, letting agents were 13% less likely to invite them for a viewing, but 8% more likely to extend the invitation to a female Nigerian renter. These patterns can only be visible when samples are broken down by gender and ethnic groups. These social nudges worked in different directions among gender and ethnic groups and can easily cancel each other out at the aggregate level, as suggested by the small and statistically insignificant results reported in column 4 in panel A of Table 2.

The same patterns are observed in panel B of Table 2, where response rates for inquiries are reported. However, the effect size is much larger and significant. For example, respondents in the treatment group are 10% less likely to receive inquiries from letting agents. This is true for both female and male applicants. Chinese renters saw a nearly one-quarter drop of chance to receive inquiries, and female Chinese renters were hit much harder than their male counterparts (i.e., a 35% vs 13% drop). Although letting agents’ responses to the social nudge by Polish renters changed in terms of gender preference (see the last row in each of the two panels in Table 3), the difference is small and statistically significant. We conclude that the overall effect of social norm nudges is negative. Letting agents in London avoid Chinese female and Nigerian male renters when they include social norm nudges in their emails; on the other hand, Chinese males and Nigerian females increased the response rate to their email applications by around 10%. Our experiments do not provide an explanation for these phenomena. Nevertheless, this is strong evidence that social norm nudges should be applied with great caution. They are

powerful tools that could affect behaviours significantly, but the size and the direction of the effects are context-specific and idiosyncratic.

Because the information boost and the social norm nudge worked in opposite direction on response rate, it is not surprising to find that the results for the ‘nudge & boost combined’ group is mixed (see column 7 – 9 in Table 2). There is clear indication of the interaction effects between the two behavioural interventions. For example, boost or nudge alone increased Chinese male renters’ chance of receiving a viewing invitation by 10% and 12%, respectively. However, if Chinese male renters included both employment information and the ‘#stopasianhate’ hashtag in their emails, the chance of receiving a viewing invitation dropped by 12% instead. The opposite was observed for Polish male renters, whose response rate improved notably by using both behavioural interventions in their email messages. Overall, using the two behaviour interventions together helped male renters, because the combined effect is larger than the sum of the effects from using each tool alone. The opposite is true for female renters. The conclusion is that female renters should avoid social norm nudge, while male renters should use both. This finding highlights the challenge of applying behavioural interventions in real life problems, which is one more layer of complexity facing policymakers and practitioners on top of the interworking between gender and racial biases as observed in the ‘boost only’ results.

Table 2: Behavioural intervention effects on response rates

	Boost effects (N = 720)			Nudge effects (N = 180)			Nudge & Boost combined effects (N = 180)		
	All (1)	Female (2)	Male (3)	All (4)	Female (5)	Male (6)	All (7)	Female (8)	Male (9)
A: Viewing Invitations									
Overall	6% ***	11% ***	2%	-3%	-3%	-2%	0.28%	3%	-2%
British	6% *	9% *	3%	--	--	--	--	--	--
Chinese	9% **	8%	10% **	-4%	-20% ***	12% *	-10% **	-8%	-12% **
Indian	6% **	10% **	2%	--	--	--	--	--	--
Nigerian	6%	15% **	-3%	-3%	8%	-13% ***	2%	7%	-3%
Polish	3%	12% **	-5%	-1%	2%	-3%	9% *	10%	8%
B: Inquiries									
Overall	10% ***	18% ***	1%	-10% **	-9% *	-11% **	3%	8% *	-2%
British	11% **	16% **	6%	--	--	--	--	--	--
Chinese	6%	7%	5%	-24% ***	-35% ***	-13%	-12% *	2%	-25% ***
Indian	13% ***	21% ***	4%	--	--	--	--	--	--
Nigerian	10% *	20% **	0%	-5%	12%	-22% **	7%	25% ***	-12%
Polish	7%	25% ***	-12% *	0%	-3%	3%	15% **	-2%	32% ***

*Note: Figures are the difference in response rate between treatment groups and the control group (treatment – control), where the response rates of the control group can be found in Table 1. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$. The null hypothesis of the one-tailed t test is based on the sign of the mean difference between each experiment group and the control group. British and Indian groups are not included in the Nudge and the Nudge & Boost treatment groups because no social norm nudges were applied to those two ethnic groups. The proportion and frequency of responses for each group can be found in tables A2 to A4 in the Appendix.*

4.3 The effects of behavioural interventions on gender differences

The differences of response rate between the two genders (female – male) are reported in Table 3 for each of the three treatment groups. The same statistics from the control group are also included in the table for comparisons.

The effects of the boost behavioural intervention are overwhelmingly in favour of female renters. As can be seen in the third column in Table 3, the response rate for female renters increased much more than their male counterparts in all groups, with the only exception being the viewing invitation response rate for Chinese renters. As we discussed in Section 4.1, there

is a general preference for female renters in sending viewing invitations, while letting agents send a slightly higher proportion of inquiries to male renters (i.e., the Control Group column in Table 3). Therefore, using information boost alone widened the gender gap.

The effects of ‘nudge only’ treatment is less clear, as can be seen in the “Nudge only” column in Table 3. The use of social norm nudge reversed the gender preference for female renters for the Chinese group completely, but worked in favour of Nigerian female renters. The overall effect is negligible (i.e., a 4% reduction of gender gap for viewing invitations, and no changes for inquiries).

When the two behavioural tools were used together, the information boost seems dominant. The numbers in the last column are all larger than their counterparts in the second column (i.e., the control group), which means the combined intervention increased female renters’ response rate much more than it did to male renters. This is additional evidence that the behavioural interventions adopted in this study widened the gender gap.

Table 3: Effects of behavioural interventions on gender differences

	Control (N = 720)	Boost only (N = 720)	Nudge only (N = 180)	Nudge & Boost combined (N = 180)
A: Viewing Invitations				
Overall	8% ***	16% ***	4%	22% ***
British	9% **	14% ***	--	--
Chinese	18% ***	17% **	-13% **	20% **
Indian	9% **	17% ***	--	--
Nigerian	-2%	17% ***	20% ***	27% ***
Polish	2%	18% ***	7%	20% **
B: Inquiries				
Overall	-3%	13% ***	-3%	24% ***
British	-1%	9%	--	--
Chinese	5%	7%	-17% *	33% ***
Indian	-2%	14% **	--	--
Nigerian	-13% *	7%	20% *	43% ***
Polish	-7%	30% ***	-13%	-3%

*Note: Figures are the difference in response rate between two genders in each group (female – male). *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$. The null hypothesis of the one-tailed t test is based on the sign of the mean differences between the two genders. British and Indian groups are not included in the Nudge and the Nudge & Boost treatment groups because no social norm nudges were applied to those two ethnic groups.*

4.3 The effects of behavioural interventions on racial differences

We investigate the effects of behavioural interventions on racial differences by calculating the difference in response rate between the White British and the four ethnic minority groups. The results are given in Table 4. The same statistics from the control group is also include in the table for comparison.

Because the differences in Table 4 are calculated by subtracting the response rate of ethnic minority group from that of the White British group, negative figures are interpreted as racial discrimination. Without behavioural interventions, this statistic is negative across the board (see the Control column in Table 4). This racial discrimination is particularly strong for non-Chinese groups in receiving inquiry responses.

The ‘boost only’ intervention made little difference on racial discrimination. The statistics in the third column of Table 4 are about the same as those from the control group, except for the

Chinese group. However, the change from -0.3% to 3% is rather small when compared to the large changes in Table 3, and neither is statistically significant.

The impacts from the ‘nudge only’ treatment is negative across the board, with the largest drop of response rate observed from the Chinese group. Our social norm nudge worked against some ethnic minority groups, reducing their chance of receiving responses relative to the White British group. This effect is particularly strong for Chinese renters.

However, when the two interventions are used together, an intriguing pattern emerged. The overall effect is much larger and more positive than the sum of its parts, especially for the Nigerian and the Polish groups. Specifically, the Nigerian and Polish renters were 6% to 11% more likely to get a reply from letting agents than the White British group in this treatment group. This is a significant improvement over the control group, where these two ethnic minority groups are about 10% less likely to get responses. Unfortunately, the opposite is observed for the Chinese group, as they were treated less favourably than their counterparts in the control group. Again, this is evidence of the complexity of both the application of behavioural tools and the nature of racial and gender discrimination in housing markets.

Table 4: Effects of behavioural interventions on racial differences

	Control (N = 720)	Boost only (N = 720)	Nudge only (N = 180)	Nudge & Boost combined (N = 180)
A: Viewing Invitations				
Chinese	-0.3%	3%	-4%	-1%
Indian	-3%	-3%	--	--
Nigerian	-2%	-2%	-4%	6%
Polish	-4%	-6% *	-4%	9% *
B: Inquiries				
Chinese	-1%	-6%	-26% ***	-7%
Indian	-12% **	-9% **	--	--
Nigerian	-9% *	-9% *	-14% **	8%
Polish	-11% **	-14% ***	-11% *	11% *

*Note: Figures are the difference in response rate between the White British and the corresponding ethnic group (ethnic minority group – White British). *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$. The null hypothesis of the one-tailed t test is based on sign of the mean difference. British and Indian groups are not included in the Nudge and the Nudge & Boost treatment groups because no social norm nudges were applied to those two ethnic groups.*

5. Conclusions

This study investigates the effectiveness of behavioural interventions on alleviating racial and gender discriminations in the rental housing market. We conduct a field experiment in the largest online property portal in the UK. Four ethnic minority groups are included in the correspondence test, with White British as the ethnic majority group.

We draw three conclusions from the field experiment, each of which has significant policy implications. First, there is a general preference for female and White British renters by letting agents in London. This is consistent with existing empirical evidence from other parts of the world. Our study provides further support to the notion that racial and gender discrimination are persistent in the housing market. To move forward, the focus of this research stream should be on the questions of ‘how’ and ‘what if’. Specifically, a better understanding of the roots of discrimination is needed to decide what could be done to reduce racial and gender discrimination in the housing market.

Second, behavioural interventions are powerful tools. On average, the nudge and boost adopted in this study introduced changes up to 56% in gender gaps and 22% in racial differences in ethnic minority groups' response rate. This finding highlights the potential of using behavioural interventions in combating racial and gender discrimination in the housing market. These tools are proven to be efficient and effective in other related fields, such as environment protection and sustainable urban development. Our research made an initial attempt to test the applicability of these tools in the rental housing market in the UK. Empirical evidence from other parts of the world is needed to verify our findings.

Finally, and most importantly, behavioural interventions are challenging tools to implement, partly because of the context-specific nature of the instruments, and partly due to the interaction between gender and racial discrimination. The effects from using each intervention in isolation are significantly different from those when the two tools are combined. These behavioural interventions are double-edged swords that could do substantial damages if not implemented correctly. What worked well in Finland might backfire in Australia, and vice versa. There are indeed no 'one-size-fits-all' solutions when using behavioural tools to address complex social problems such as racial and gender discrimination. The way forward is to collect more field evidence from a wide range of social, cultural, and economic settings, so that policymakers could make informed decisions when implementing behavioural tools.

References:

- Acolin, A., Bostic, R., Painter, G., 2016. A field study of rental market discrimination across origins in France. *Journal of Urban Economics* 95, 49-63.
- Ahmed, A.M., Andersson, L., Hammarstedt, M., 2010. Can Discrimination in the Housing Market Be Reduced by Increasing the Information about the Applicants? *Land Economics* 86, 79-90.
- Airbnb, 2020. Measuring Discrimination on the Airbnb Platform. Airbnb.
- Allcott, H., Rogers, T., 2014. The Short-Run and Long-Run Effects of Behavioral Interventions: Experimental Evidence from Energy Conservation. *American Economic Review* 104, 3003-3037.
- Arrow, K., 1973. The Theory of Discrimination, in: Ashenfelter, O., Rees, A. (Eds.), *Discrimination in labor markets*. Princeton University Press, Princeton, N.J., USA, pp. 3-33.
- Auspurg, K., Hinz, T., Schmid, L., 2017. Contexts and conditions of ethnic discrimination: Evidence from a field experiment in a German housing market. *Journal of Housing Economics* 35, 26-36.
- Baldini, M., Federici, M., 2011. Ethnic discrimination in the Italian rental housing market. *Journal of Housing Economics* 20, 1-14.
- Becker, G.S., 1957. *The economics of discrimination*. University of Chicago Press, Chicago.
- Bjornsson, D.F., Kopsch, F., Zoega, G., 2018. Discrimination in the Housing Market as an Impediment to European Labour Force Integration: the Case of Iceland. *Journal of International Migration and Integration* 19, 829-847.
- BR Data and SPIEGEL ONLINE, 2017. No Place for Foreigners. Why Hanna is invited to view the apartment and Ismail is not. <https://interaktiv.br.de/hanna-und-ismail/english/index.html>.
- Brown, A.E., 2022. Prevalence and Mechanisms of Discrimination: Evidence from the Ride-Hail and Taxi Industries. *Journal of Planning Education and Research*.
- Buckley, P., 2020. Prices, information and nudges for residential electricity conservation: A meta-analysis. *Ecological Economics* 172.

- Carlsson, M., Eriksson, S., 2014. Discrimination in the rental market for apartments. *Journal of Housing Economics* 23, 41-54.
- Carlsson, M., Eriksson, S., 2015. Ethnic Discrimination in the London Market for Shared Housing. *Journal of Ethnic and Migration Studies* 41, 1276-1301.
- Carpusor, A.G., Loges, W.E., 2006. Rental discrimination and ethnicity in names. *Journal of Applied Social Psychology* 36, 934-952.
- Flage, A., 2018. Ethnic and gender discrimination in the rental housing market: Evidence from a meta-analysis of correspondence tests, 2006-2017. *Journal of Housing Economics* 41, 251-273.
- Grahame Allen, Zayed, Y., 2021. Hate Crime Statistics, Commons Library Research Briefing, 26 November 2021 The House of Commons Library, London.
- Greenwald, A.G., Banaji, M.R., 1995. Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review* 102, 4-27.
- Grune-Yanoff, T., Hertwig, R., 2016. Nudge Versus Boost: How Coherent are Policy and Theory? *Minds and Machines* 26, 149-183.
- Gusciute, E., Muhlau, P., Layte, R., 2021. Discrimination in the rental housing market: a field experiment in Ireland. *Journal of Ethnic and Migration Studies*.
- Hall, W.J., Chapman, M.V., Lee, K.M., Merino, Y.M., Thomas, T.W., Payne, B.K., Eng, E., Day, S.H., Coyne-Beasley, T., 2015. Implicit Racial/Ethnic Bias Among Health Care Professionals and Its Influence on Health Care Outcomes: A Systematic Review. *American Journal of Public Health* 105, E60-E76.
- Hanson, A., Hawley, Z., 2011. Do landlords discriminate in the rental housing market? Evidence from an internet field experiment in US cities. *Journal of Urban Economics* 70, 99-114.
- Hanson, A., Santas, M., 2014. Field Experiment Tests for Discrimination against Hispanics in the U.S. Rental Housing Market. *Southern Economic Journal* 81, 135-167.
- Heylen, K., Van den Broeck, K., 2016. Discrimination and selection in the Belgian private rental market. *Housing Studies* 31, 223-236.
- Hogan, B., Berry, B., 2011. Racial and Ethnic Biases in Rental Housing: An Audit Study of Online Apartment Listings. *City & Community* 10, 351-372.
- Jowell, R., Prescottclarke, P., 1970. Racial Discrimination and White-collar Workers in Britain. *Race* 11, 397-417.
- Kaiser, M., Bernauer, M., Sunstein, C.R., Reisch, L.A., 2020. The power of green defaults: the impact of regional variation of opt-out tariffs on green energy demand in Germany. *Ecological Economics* 174.
- Khanna, T.M., Baiocchi, G., Callaghan, M., Creutzig, F., Guias, H., Haddaway, N.R., Hirth, L., Javaid, A., Koch, N., Laukemper, S., Loschel, A., Dominguez, M.D.Z., Minx, J.C., 2021. A multi-country meta-analysis on the role of behavioural change in reducing energy consumption and CO2 emissions in residential buildings. *Nature Energy* 6, 925-932.
- LANG, C., 2021. Hate Crimes Against Asian Americans Are on the Rise. Many Say More Policing Isn't the Answer, TIME.
- Lazarc, N., Toumi, M., 2022. Reducing consumption of electricity: A field experiment in Monaco with boosts and goal setting. *Ecological Economics* 191.
- Llorens, A., Tzovara, A., Bellier, L., Bhaya-Grossman, I., Bidet-Caulet, A., Chang, W.K., Cross, Z.R., Dominguez-Faus, R., Flinker, A., Fonken, Y., Gorenstein, M.A., Holdgraf, C., Hoy, C.W., Ivanova, M.V., Jimenez, R.T., Jun, S., Kam, J.W.Y., Kidd, C., Marcelle, E., Marciano, D., Martin, S., Myers, N.E., Ojala, K., Perry, A., Pinheiro-Chagas, P., Ries, S.K., Saez, I., Skelin, I., Slama, K., Staveland, B., Bassett, D.S., Buffalo, E.A., Fairhall, A.L., Kopell, N.J., Kray, L.J., Lin, J.J., Nobre, A.C., Riley, D., Solbakk, A.K., Wallis, J.D., Wang,

- X.J., Yuval-Greenberg, S., Kastner, S., Knight, R.T., Dronkers, N.F., 2021. Gender bias in academia: A lifetime problem that needs solutions. *Neuron* 109, 2047-2074.
- Lorenz-Spreen, P., Lewandowsky, S., Sunstein, C.R., Hertwig, R., 2020. How behavioural sciences can promote truth, autonomy and democratic discourse online. *Nature Human Behaviour* 4, 1102-1109.
- Mazziotta, A., Zerr, M., Rohmann, A., 2015. The Effects of Multiple Stigmas on Discrimination in the German Housing Market. *Social Psychology* 46, 325-334.
- Metinyurt, T., Haynes-Baratz, M.C., Bond, M.A., 2021. A systematic review of interventions to address workplace bias: What we know, what we don't, and lessons learned. *New Ideas in Psychology* 63.
- Milkman, K.L., Akinola, M., Chugh, D., 2015. What Happens Before? A Field Experiment Exploring How Pay and Representation Differentially Shape Bias on the Pathway Into Organizations. *Journal of Applied Psychology* 100, 1678-1712.
- Mohdin, A., 2019. Racism in Britain: how we revealed the shocking impact of unconscious bias, *The Guardian*.
- O'Meara, K., Culpepper, D., Templeton, L.L., 2020. Nudging Toward Diversity: Applying Behavioral Design to Faculty Hiring. *Review of Educational Research* 90, 311-348.
- Oblom, A., Antfolk, J., 2017. Ethnic and gender discrimination in the private rental housing market in Finland: A field experiment. *Plos One* 12.
- Olson, C., 2022. Airbnb blocks Oregon hosts from seeing guests' names in push against racial bias, *The Guardian*.
- ONS, 2022. Population of the UK by country of birth and nationality: year ending June 2021. Office of National Statistics.
- Quillian, L., Pager, D., Hexel, O., Midtbøen, A.H., 2017. Meta-analysis of field experiments shows no change in racial discrimination in hiring over time. *Proceedings of the National Academy of Sciences* 114, 10870-10875.
- Siddique, H., Duncan, P., 2018. Flatshare bias: room-seekers with Muslim name get fewer replies, *The Guardian*.
- Tanner, B., Feltz, A., 2022. Comparing Effects of Default Nudges and Informing on Recycled Water Decisions. *Journal of Experimental Psychology-Applied*.
- Thaler, R.H., Sunstein, C.R., 2008. *Nudge : improving decisions about health, wealth, and happiness*. Yale University Press, New Haven.
- Tilcsik, A., 2021. Statistical Discrimination and the Rationalization of Stereotypes. *American Sociological Review* 86, 93-122.
- Tosi, J.D., Haworth, N., Diaz-Lazaro, C.M., Poo, F.M., Ledesma, R.D., 2021. Implicit and explicit attitudes in transportation research: A literature review. *Transportation Research Part F-Traffic Psychology and Behaviour* 77, 87-101.