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Original Article

Rental housing discrimination against Chinese minorities in Spain: a new instant messaging correspondence test

Javier San Millán [1], Javier Polavieja [2,*], Toni Gamundí [2]

[1]Department of Urbanism, TU Delft, Julianalaan 134, 2628 BL Delft, Netherlands
[2]Institute for Public Goods & Policies, Spanish National Research Council, CSIC, C/Albasanz, 26-28, Madrid 28037, Spain

*Corresponding author: Institute for Public Goods & Policies, Spanish National Research Council, CSIC, C/Albasanz, 26-28 Madrid 28037, Spain. Email: javier.polavieja@csic.es.

Research on rental housing discrimination (RHD) against migrant minorities has overwhelmingly focused on the first generation, paying special attention to the most sizeable immigrant groups. As a result, we still know little about the housing-market experiences of immigrants' children and the less sizeable—but often fast-growing—ethnic minorities. RHD research has also lagged behind the spectacular growth of online apps for conducting private rental transactions. We present a novel instant messaging correspondence test to study (real) private landlords' responses to (fictitious) flat seekers of native and Chinese background in Madrid, Spain. Drawing on instant messaging allows us to introduce innovative treatments for phenotype and cultural assimilation. We find moderate levels of RHD against visibly Chinese-background applicants with a fully Chinese name and who use full Chinese characters in their *WhatsApp* status profile (low assimilation condition) but very low levels of discrimination against visibly identical applicants who combine a Spanish first name with a Chinese last name (typical of the second generation) and who use the word "Madrid" in Latin alphabet in their app status profile (high assimilation condition). Finally, we find adding signals of flat-seekers' income reliability (diagnostic treatment) does not reduce discrimination propensity. Results are robust to stringent controls for ethnic composition and COVID-19 incidence rate at the district level. These findings highlight the primacy of perceived cultural assimilation over racial appearance and information deficits in shaping RHD against Chinese minorities in Spain and illustrate the analytical pay-offs of using instant messaging correspondence tests in discrimination research.

Key words: rental housing discrimination; correspondence test; phenotype; cultural assimilation; Spain; WhatsApp.

Introduction

Housing discrimination against ethnic minorities constitutes an important barrier for immigrants' structural incorporation in receiving societies (Auspurg, Schneck, and Hinz 2019; Flage 2018) and

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hence a key source of social inequality (Thomas, Gray, and McGinty 2012). Housing discrimination raises housing search costs, hinders homeownership, and reinforces ethnic urban segregation (Bosch, Carnero, and Farré 2015). Moreover, it can reduce access to labor markets, public services, and social capital and thus have a negative impact on both the economic opportunities (Bethoui 2004) and the health outcomes (Borrell et al. 2015) of minorities in increasingly diverse contemporary societies.

As in other areas of discrimination research, the literature on housing discrimination has disproportionately focused on the US experience (see reviews in e.g., Pager and Shepherd 2008; Quillian, Lee, and Honoré 2020). In contrast, housing discrimination research in Europe is considerably scanter and has mainly focused on the most sizeable ethnic minorities (for a review, see Flage 2018 and below). As a result, we know little about the experiences of smaller immigrant-origin ethnic minorities in Europe. Moreover, existing research has primarily examined discrimination against first-generation immigrants, often operationalized using foreign-sounding names and national origin signals. Less attention has been paid to how cultural assimilation cues—such as mixed names, language use, or profile presentation—affect landlords' treatment of applicants. This limits our understanding of how different dimensions of perceived "foreignness" interact to shape discriminatory behavior as well as our ability to design policies that ensure equitable access to housing.

Particularly notable is the limited body of research on housing discrimination against Chinese immigrants in Europe, even in the countries that host the largest Chinese communities (i.e., France, United Kingdom, Italy, Spain, and Germany). This is an important gap in the literature, not only because Chinese migrants are among the top 10 fastest-growing minorities in the European Union (Latham and Wu 2013) and inflows from China are expected to increase further in the near future (European Commission, 2021); but also because established Chinese communities in Europe could be at special risk of suffering housing discrimination for the following three reasons:

First, while existing research on ethnic stereotyping suggests Asian minorities in general are typically construed as competent and hardworking in Western societies (Wong et al. 1998)—which could potentially favor their labor market prospects—they are also consistently stereotyped as lacking interpersonal skills and warmth, which could potentially hinder their access to rental housing (see Cuddy et al. 2009; Fiske, Cuddy, and Glick 2016). According to classic group-threat theories of prejudice and discrimination, fast growing and culturally distant minorities are especially likely to be perceived as a threat to the ingroup (Blalock 1967; Piontkowski, Rohmann, and Florack 2002).

Second, Chinese-origin populations in Europe are "visible" minorities, which could further trigger racial prejudice and discrimination. While there has been a historic dearth of research on appearance-based racial discrimination in Europe, recent field experimental research on hiring discrimination has shown people of immigrant background with "visible" (i.e., non-European) phenotypes are significantly more likely to experience employment discrimination in Germany, the Netherlands, and Spain—although net phenotypic discrimination seems significantly lower in the latter country (Polavieja et al. 2023). Testing for phenotypic discrimination in rental housing using correspondence tests has not been possible to date, given researchers' reliance on standard phone and e-mail communication with landlords.

Third, we suspect negative stereotyping (and probably also racialization processes) may have been heightened in the context of the COVID-19 pandemic, as radical-right political actors used the Chinese origin of the disease to steer anti-Chinese sentiments in many Western countries (He and Yu, 2022), including Spain (Ng 2021) .

This study investigates rental housing discrimination (RHD) against Chinese-background flat-seekers in Madrid, a large and diverse European capital with over 3 million residents, which is home to ~30 percent of all Chinese migrants in Spain (Zhong and Antolín 2020). Because the majority of rental housing transactions nowadays take place via online apps, we investigate the behavior of private homeowners searching for potential tenants in the largest real estate web portal in Spain and we focus on communication exchanges that take place via instant

messaging apps (*WhatsApp*). To the best of our knowledge, this is the first study to employ instant messaging apps to conduct field experiments on RHD. We analyze the responses of 1,600 real homeowners to (fictitious) rental inquiries from both Spanish native and Chinese-background flat-seekers.

Using instant messaging to communicate with actual homeowners contributes to previous field-experimental methods in three main ways: (1) by adapting correspondence testing to digital home-search tools that are widely used at present in rental housing markets; (2) by allowing for more realistic minority signals, including photos for racial appearance; and (3) by focusing on ordinary landlords rather than professional agents (who are those typically contacted when researchers use the most traditional channels). We believe these three methodological contributions are likely to increase the external validity of correspondence testing in the field of RHD.

More specifically, a key contribution of our instant messaging experimental design is that it allows us to effectively study the role of perceived cultural assimilation and phenotypic visibility as potential drivers of RHD. We signal cultural assimilation using two types of ethnic-sounding names, one fully Chinese (first and last name) and one partially assimilated (Spanish first name, Chinese last name). We make the—we believe reasonable—assumption that homeowners will interpret the mixed-name condition as a sign of assimilation—most likely as belonging to second-generation Chinese renters, since the use of Spanish first names is common for this group (Giménez 2019). This assimilation signal is further reinforced by a short text introduced in the *WhatsApp* status profile, featuring solely Chinese characters under the fully Chinese condition and a combination of Chinese characters and the word "Madrid," in Latin alphabet, under the assimilated condition. While treatments of this kind, distinguishing between first- and second-generation immigrants, have been used in the employment discrimination literature (see Silberman, Alba, and Fournier 2007; Carlsson 2010; Fossati, Liechti, and Auer 2020), they have very rarely been used in RHD research (for an exception, see Hanson and Santas 2014). Evaluating the extent to which landlords' reactions change with clues about cultural assimilation is particularly relevant for integration research, where integration is typically conceived in terms of intergenerational gains (Gordon 1964; Alba and Nee 2003).

A further contribution of this study is the use of key contextual controls measured at the district level. In the last three decades, Madrid experienced a very sharp—but spatially uneven—increase in the number of foreign-born residents. This has led to significant variation in immigrant presence across districts. While some central and southern areas—such as *Centro* or *Usera*—have foreign-born shares exceeding 25 percent, others like *Fuencarral-El Pardo*, in the north, remain below 10 percent. This uneven distribution of immigrant presence shapes the local visibility of ethnic minorities, which may condition how landlords interpret ethnic signals in different city districts. Moreover, it is possible that differences in the intensity of the COVID-19 pandemic across districts may also influence rental market behavior. We address these potential contextual influences empirically by using district-level data on average immigrant shares and pandemic incidence (see below).

Finally, we inquire about the *nature* of discriminatory behavior by introducing within-pair randomized signals of applicants' potential ability to pay the rent. We use this additional treatment as a *diagnostic test* to check whether observed discriminatory behavior is driven by home-owners information deficits regarding flat-seekers potential "quality" or else by irrational discriminatory tastes and biases.

Our findings reveal that Chinese minorities face significant but—contrary to our expectations—comparatively modest barriers in Madrid's rental housing market. Phenotypically visible home-seekers with fully Chinese names have roughly an 11 percent lower probability of receiving a positive reply from landlords than equivalent natives (call-back ratio [CBR] of 1.1). Crucially, the discrimination faced by visibly Chinese-origin tenants with Spanish first names—indicative of cultural assimilation—is approximately half of that experienced by those identical in appearance but with fully Chinese names. These estimates are robust to landlord and flat characteristics,

as well as district-level controls. Finally, we find that landlords' adverse treatment of visible Chinese-background flat-seekers is not reduced when they are signaled as high-quality tenants. This evidence strongly suggests that (1) appearance-based racial discrimination plays a minor role in natives' treatment of Chinese minorities in Madrid; (2) that the route to socio-economic integration via access to flat rental is not blocked across generations for Chinese minorities; and (3) that RHD against Chinese minorities in Madrid is not primarily driven by informational deficits but likely by taste or implicit bias, as we explain below.

Previous studies

RHD is a pervasive phenomenon across virtually all Western societies. A large body of field experiments has documented discriminatory practices against diverse groups and countries (Auspurg, Schneck, and Hinz, 2019; Flage 2018; Quillian, Lee, and Honoré 2020; Rich 2014), including, among others: African-Americans (Hanson and Hawley 2011; Hanson and Santas 2014; Page, 1995) and Hispanics (Hanson and Santas 2014; Page, 1995) in the United States (see further Quillian, Lee, and Honoré 2020; Pager and Shepherd 2008); Muslim/Arabs in Canada (Hogan and Berry 2011), Sweden (Ahmed and Hammarstedt 2008), Norway (Andersson, Jakobsson, and Kotsadam 2012), the Netherlands (Art.1/Radar 2021), and Spain (Bosch, Carnero, and Farré 2010, 2015); Polish-background flat-seekers in the Netherlands (*Art.1/Radar* 2021) and Iceland (Björnsson, Kopsch, and Zoega 2018); Jewish flat-seekers in Canada (Hogan and Berry 2011); Roma flat-seekers in the Czech Republic (Bartoš et al. 2016), Turkish flat-seekers in Germany (Auspurg, Hinz, and Schmid 2017); Albanians in Greece (Drydakis 2011); Kanaks in New Caledonia (Bunel et al. 2019); and North African-, Sub-Saharan African-, and Iberian-background flat-seekers in France (Acolin, Bostic, and Painter 2016).

Research on RHD against Asian minorities is comparatively much scarcer. Turner and Ross (2003), Hogan and Berry (2011), and Bartoš et al. (2016) have examined landlords' differential treatment to Asians in the United States, Canada, and the Czech Republic, respectively, while, to our knowledge, only Sugasawa and Harano (2023) and Bao (2024) have investigated specifically discrimination against Chinese-origin rental applicants in Tokyo and London, respectively. Discrimination estimates against Asian/Chinese minorities in this literature seem comparatively less severe than those found for other ethnic groups, especially African-Americans in the United States or Muslim/Arabs in Europe. Indeed, we note Bao's correspondence test finds no evidence of discrimination against Chinese minorities in London—although her experiment focuses only on professional letting agents, whose behaviors could differ from that of private landlords. To our knowledge, there is virtually no research on RHD against Chinese-origin second-generation immigrants, and, as noted above, generally very few about any other second-generation ethnic groups (but see Hanson and Santas 2014 for a notable exception).

Discrimination mechanisms: information deficits or taste?

A crucial question in the discrimination literature concerns the mechanisms behind discriminatory behavior. A classic distinction is made between discrimination *by taste* (Becker 1971) and *statistical discrimination* (Arrow 1974; Phelps 1972). Discrimination by taste was originally considered to be driven by different forms of prejudice (see Becker, 1971: 13). More recently, however, it has also been understood to include implicit cognitive biases (Devine 1989; Faigman et al. 2007; Fiske 1998; Rooth 2010). As Becker (1971) stressed, the defining feature of taste-based discrimination is its irrationality: discriminators are (or behave as if they were) willing to incur a cost in order to act on their prejudicial beliefs or biases. Empirical research shows attitudinal prejudice correlates with discriminatory behavior at the individual level (Rooth 2010), while evidence on aggregate-level correlations is mixed—compare for example, Carlsson and Eriksson (2017) for Sweden with Verhaeghe and De Coninck (2022) for Belgium.

In contrast to taste-based approaches, statistical discrimination theories stress the rational foundations of discriminatory behavior in contexts of incomplete information (Arrow 1974;

Phelps 1972). In such situations, agents might rationally draw on (real or perceived) group-level characteristics to make inferences about unobserved individual-level traits. Applied to housing markets, these theories contend that, lacking comprehensive information about prospective tenants' "quality"—especially their ability to pay rent—rational agents may use ethnicity as a heuristic for assessing contractual risks. As a result, applicants belonging to minority groups that have lower average incomes will be more likely to be rejected by risk-averse landlords. While statistical discrimination models have become increasingly sophisticated (see Bertrand and Duflo 2017), they share the core assumption that discrimination is information-dependent and therefore at least partially reversible. This means providing individualized signals about minority applicants' ability to pay the rent should reduce discriminatory behavior. This expectation provides a crucial window to empirically test statistical against taste-based mechanisms of discrimination.

Generally, studies find that adding positive information on applicants' ability to pay the rent improves minority access to rental properties but does not fully eliminate differential treatment (see e.g., Ahmed and Hammarstedt 2008; Bosch, Carnero, and Farré 2010, 2015; Rich 2014). This finding seems consistent with either a market where both statistical and taste-based discriminators co-exist and/or a market with imperfect (non-Bayesian) information updaters (see Campos-Mercade and Mengel 2024).

Hypotheses

In Spain, there are ~230,000 Chinese residents (INE 2021a). Often perceived as aloof, inward-looking, and "unwilling to integrate" by the native Spanish population (Nieto 2003), Chinese immigrants form a distinctive community characterized by close contacts with co-ethnics, a distinctive cultural identity, and significant linguistic barriers with the native population (Li 2017). Asian/Chinese background minorities are also "visible" minorities in Spain and hence could be at risk of racialization (Okura 2021).

We hypothesize existing negative stereotypes about low levels of warmth and low willingness to integrate (see Enesco et al. 2005), racist attitudes and/or implicit biases, could lead Spanish landlords to discriminate against prospective tenants of Chinese background. Crucially, if beliefs about Chinese minorities' unwillingness to assimilate were the main trigger of RHD, we should expect a significant reduction in discrimination propensity against candidates who signal cultural assimilation, as compared to identical candidates who do not (H1).

Similarly, if statistical discrimination mechanisms played a role, we should expect landlords' invitation rate to be higher for those rental applicants who signal financial stability than for those who do not (H2). Conversely, lack of effect of the diagnostic treatment would suggest taste-based and/or implicit bias mechanisms are at work.

Finally, we note if landlords' responses to Chinese minority flat-seekers were entirely driven by appearance-based racial discrimination, we should expect no reduction in discrimination propensity, regardless of whether we introduce assimilation cues or diagnostic treatments (H3).

Data and methods

We use a matched-paired correspondence testing method, designed in line with previous studies in RHD (e.g., Ahmed and Hammarstedt 2008; Bosch, Carnero, and Farré 2010, 2015) to estimate the response rates (RRs) of real homeowners to fictitious candidates of native and Chinese background. Matched pairs of almost-identical expressions of interest in rental vacant apartments were sent out to 1,600 private landlords in Madrid, Spain, between January and April 2021.

Madrid is Spain's largest city—with over 3.2 million residents—and hosts the country's largest immigrant population, counting 511,067 individuals, as of December 15, 2021. Importantly for the current research, the Chinese community is the third largest single foreign nationally in the city of Madrid, with 38,164 residents (Ayuntamiento de Madrid 2021a), a figure that significantly exceeds that of any other city in Spain. Madrid offers a unique experimental setting as it combines

the highest volume of rental transactions in the country with the largest presence of Chinese minorities.

We focus on private landlords for three main reasons: First, over 90 percent of rental properties in Spain are owned by private landlords and most rental transactions in the housing market are private (Organización de Consumidores y Usuarios 2023). Second, focusing on private landlords allows us to unambiguously identify their own individual behavior—which would not be the case if we analyzed realtors' responses, as such responses can reflect both their own preferences or those of their clients (see Bosch, Carnero, and Farré 2015). Thirdly, this methodological choice allows us to use *WhatsApp* as the basis of our experiment, increasing external validity and allowing us to introduce innovative signals for racial appearance (photographs) and cultural assimilation (*WhatsApp* status profile text). In so doing, this study follows in the footsteps of pioneering research on homophily, discrimination and minority disadvantage in social media (Wimmer and Lewis 2010) and online social markets (see Ayres, Banaji, and Jolls, 2015; Doleac and Stein, 2013). As in these studies, we exploit the possibilities of new digital technologies to improve causal identification and increase external validity in discrimination research.

Sample and accounts design

To create the analytical sample, we downloaded all advertisements newly posted by private landlords on *Idealista*—the most popular Spanish rental housing website—between 10 a.m. and 3 p.m. in the city of Madrid (e.g., of ads in this website see Supplementary figs A2 and A3 in the Online Appendix). This procedure was consistently applied throughout the weekdays (Monday to Friday) from January to April 2021. The experimental inquiries were sent out later that same day, between 4 p.m. and 7 p.m. This approach minimized the possibility that inquiries were sent too late or for apartments that had already been rented, as none of the listings had been online for more than a few hours by the time our experiment was conducted. We sent the second inquiry to each landlord at least 30 min and at most 1 h after the first inquiry, randomizing the order in which applicants of different ethnic backgrounds were sent.

If landlords invited applicants for a viewing or replied with other clear expression of interest (e.g., inquiring for additional information to set up a visit), we cordially turned down the offer within 24 h at most.[1] Approval for this experiment was obtained from the Permanent Commission of the Department of Social Sciences at Carlos III University of Madrid. Landlords' consent was not required as harm produced by the experiment was minimized following the guidelines of Riach and Rich (2004).

Two fictitious *WhatsApp* accounts, one belonging to a young male Spanish native applicant (account A) and one belonging to a young male Chinese-background applicant (account B), were created. These accounts were used to contact landlords. Three different experimental treatments were applied: (1) ethnicity (Native/Chinese), (2) a signal of cultural assimilation (applied only within account B), and (3) a signal of high-quality tenant. The combination of these three treatments resulted in four different pairs of candidate profiles, which contacted 400 landlords each (see Table 1).

Additional information, including the gender and nationality of advertisers, price/m^2, and the location of the apartment, was collected. In the case of gender and nationality of homeowners, these data were inferred from the information available on *Idealista* following Bosch, Carnero, and Farré's (2015) method (see Supplementary Table A5 in the Online Appendix for descriptives).[2]

Treatments

The three experimental treatments (ethnicity, cultural assimilation, and information on tenant's quality) were inserted within accounts A and B through a set of signals which appeared in different parts of the *WhatsApp* account.

First, we used the *WhatsApp* profile picture to introduce a first signal of ethnicity. Our profile pictures were produced using open-source Generative Adversarial Networks, a machine deep learning technique for image generation (see e.g., Guan 2018). The use of AI-generated images

Table 1. Sets of matched-pairs of rental inquiries by treatment conditions.

Account A	Account B	N
Native Spanish	Culturally not assimilated Chinese	400
Native Spanish	Culturally assimilated Chinese	400
Native Spanish + high-quality tenant info	Culturally not assimilated Chinese + high-quality tenant info	400
Native Spanish + high-quality tenant info	Culturally assimilated Chinese + high-quality tenant info	400

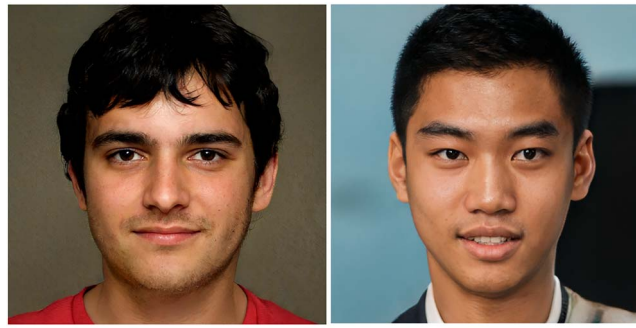

Figure 1. Photographs used in the experiment (AI generated). Profile photo of account A. Profile photo of account B.

allows for a higher degree of comparability across treatment conditions and eliminates the need for consent from real individuals, whose facial features would be otherwise publicly exposed. This greatly reduces ethical liability.

One crucial concern when using photographs to signal ethnicity/race is the possibility that the chosen images differ subtly in other "non-ethnic" dimensions—such as facial symmetry, width-to-height ratio, or facial expressions—that may potentially influence landlords' responses. To address this concern, we conducted two online validity surveys developed by snowball methods. In the first survey, we asked 167 participants to rank 9 pre-selected photos on a 1–5 scale on two important confounders: physical attractiveness and sympathy. The differences among the mean scores of each photo on these two dimensions were subjected to independent *t*-tests, grouping pictures by all possible pairs (one picture showing a Caucasian-looking man and another portraying an Asian-looking man). Out of the pairs that were matched in these dimensions, the pair that was finally selected was the one that recorded the least divergence in estimated age, another potentially important confounder, which was tested in a subsequent online survey involving 100 additional participants (see Table A1 in the Online Appendix).[3] The two final selected photographs are presented in figure 1. To ensure this treatment was visible, *WhatsApp*'s profile settings were explicitly set to display the photographs to any viewer regardless of whether the viewer is on the contacts list of the user (actual displays used are shown in Supplementary figs A4–A6 in the Online Appendix).

Second, we used the message appearing in the *WhatsApp* status feature to provide an additional signal of cultural assimilation within account B. While account A displayed a typically Spanish saying written in the Latin alphabet ("*No hay mal que por bien no venga*"), Chinese-background applicants showed either a saying written in Chinese characters ("不到黄河心不死"), in the fully Chinese condition (account B1), or an expression mixing Chinese and the word "Madrid" in Latin alphabet ("去Madrid把!"), in the assimilated condition (account B2).

Ethnicity and cultural assimilation signals were further reinforced in the content of the message to the landlords. Whereas account A invariably introduced himself as "Antonio García,"

signaling its native ethnicity, Chinese-background applicants identified themselves as either "Wei Chen," in the fully Chinese condition (B1) or "Manuel Chen," in the assimilated condition (B2). We make the—we believe reasonable—assumption that landlords likely interpret the latter name as belonging to individuals likely born and raised in Spain to Chinese parents, as the use of Spanish names is common in the second generation (Giménez 2019). Note the ethnicity information provided by the prototypical East Asian image portrayed in the photograph—which is fixed across cultural assimilation conditions—makes this interpretation of the mixed name more likely for landlords. Names were chosen to be the most popular native and Chinese names in Spain using the data published by Spanish National Statistics Office (INE 2021b).[4]

Lastly, to test for statistical discrimination, we randomized information on tenants' "quality" by using two concurrent signals. First, we signaled income potential using two alternative indicators in the message text: (1) having a permanent contract or (2) the possibility of providing a certified bank guarantee.[5] Matched candidates never use the same income-potential signal to minimize detection risks. This signal was reinforced by additionally indicating that the flat-seeker sought the apartments for just himself (the actual wording used for this signal differed across matched pairs to reduce detection risks). We note this latter signal not only implies tenants can cover the full rent by themselves but might also mitigate landlords' potential fears of overcrowding in their apartment. Tenant quality is thus one single treatment signaled with two concurrent pieces of information (see Supplementary Table A2 in the Online Appendix for the exact wording). This provides a high-quality condition that can be tested against a no-information condition (where tenants provide no signals of quality) for our diagnostic test.

District-level controls

To better contextualize the study's findings within the pandemic environment, we gathered bi-weekly official records on the average COVID-19 incidence rate for each district from December 2020 until May 2021, thus covering the study period. While official data show virtually identical time trends in the evolution of the pandemic across districts (see Supplementary figure A1 in the Online Appendix), there is significant variation in the period-averaged incidence rate across districts (see Supplementary Table A3 in the Online Appendix). We use this latter source of district-level variation as a control in our regression models and test for an interaction between period-averaged pandemic incidence and our experimental treatments—to check whether flat owners are less likely to rent out to Chinese home-seekers in the districts most hardly hit by the pandemic.

Additionally, we gathered two types of data on the ethnic composition of districts: (1) average proportion of foreign-born residents and (2) average proportion of Chinese-born residents (see Supplementary Table A4 in the Online Appendix). Both ethnic composition rates were subsequently incorporated into our statistical models to assess their potential influence on landlords' discriminatory behaviors, as explained below.[6]

Analytical approach

A set of standard statistical analyses were performed. First, we carried out a standard means-comparison test of landlords' RRs across ethnic groups—as in e.g., Ahmed and Hammarstedt (2008) and Bosch, Carnero, and Farré (2010). RR is simply the number of landlords who reply with a positive response (invitation to see the flat) to our messages divided by the total number of landlords contacted. To express the different average "callback" probabilities by the different treatment conditions, we calculated the messaging-back ratio (MBR), which is simply the ratio between the average RRs estimated for each account (A/B1; A/B2; where A is native; B1 is culturally less-assimilated Chinese and B2 is culturally more-assimilated Chinese). The MBR is the equivalent to the CBR used in labor market discrimination research and, as the latter, provides a valid estimate of ethnic discrimination against ethnic minorities. Following Neumark (2012), we also calculate measures of uncertainty around these MBRs.

Table 2. Distribution of landlord responses by treatment conditions.

	Natives vs. culturally not assimilated Chinese-background applicants				Natives vs. culturally assimilated Chinese-background applicants			
	NO (or no response) to both	YES to both	YES to native/NO to Chinese	NO to native/YES to Chinese	NO (or no response) to both	YES to both	YES to native/NO to Chinese	NO to native/YES to Chinese
No info *N*	37	326	34	3	31	343	21	5
%	9.25	81.50	8.50	0.75	7.75	85.75	5.25	1.25
Info *N*	47	315	33	5	28	344	21	7
%	11.75	78.75	8.25	1.25	7.00	86.00	5.25	1.75
All *N*	84	641	67	8	59	687	42	12
%	10.50	80.13	8.38	1.00	7.38	85.88	5.25	1.50

In addition to these bivariate analyses, three logistic regression models including controls for relevant district, property, and landlord characteristics, were fitted to the data. To test for potential interactions between landlord-, property- and district-level characteristics and candidates' treatments, we used both logistic and linear probability specifications—the latter often considered more fitting when testing for interactions. No significant interactions were found in either specification (see Supplementary Table A9). The most extensive (main-effects) model is described in the following equation:

$$\text{Log}(Y) = \beta_0 + \beta_{ij}\text{ETH}_j + \beta_3\text{Info} + \varphi_{1k}\text{MIG}_k + \varphi_{2k}\text{CH}_k + \varphi_{3k}\text{COVID}_k + \lambda_1\text{Price} + \lambda_{2j}\text{LANDLORD}_l \quad (1)$$

where *Y* is landlord's response to applicant, which takes a value of 1 if a positive reply (i.e., invitation for a viewing, asking for further information, or calling) and 0 otherwise. ETH is applicants' ethnicity, which includes three values: 0 (native candidate); 1 (fully Chinese-background candidate); and 2 (culturally assimilated Chinese-background candidate). Native applicant is the reference category so this variable implies two equation parameters, one for each Chinese-background treatment. Info is indicator of the presence of signals of a high-quality tenant, which takes a value of 0 if the applicant does not provide such signals and 1 if he does. MIG is a continuous variable capturing the proportion of immigrants in the district of Madrid where the flat is located. CH represents the share of Chinese-born among foreign-born residents by district. COVID stands for the average bi-weekly incidence rate by district calculated over the December 2020–May 2021 period, as explained above. Price is the price of the apartment advertised by the landlord divided by the number of square meters. LANDLORD is a vector of landlords' characteristics, which includes two dummy variables: gender (0 = female, 1 = male) and nationality (0 = foreigner, 1 = native).

Empirical results

The rollout of the experiment effectively produced a valid sample of 1,600 landlords in Madrid, with 400 landlords adequately contacted in each of the four treatment groups (see Table 1). 93.69 percent of these landlords replied to at least one of the two messages they received, and 91.06 percent messaged back with a positive response. The raw data of these responses are summarized in Table 2.

Importantly, we conducted randomization checks to verify that observable characteristics are comparable across treatment groups. Pearson's chi-squared tests reveal no statistically significant differences in landlord gender ($\chi^2 = 2.69$, $P = 0.44$) or ethnic origin ($\chi^2 = 0.78$, $P = 0.85$) across

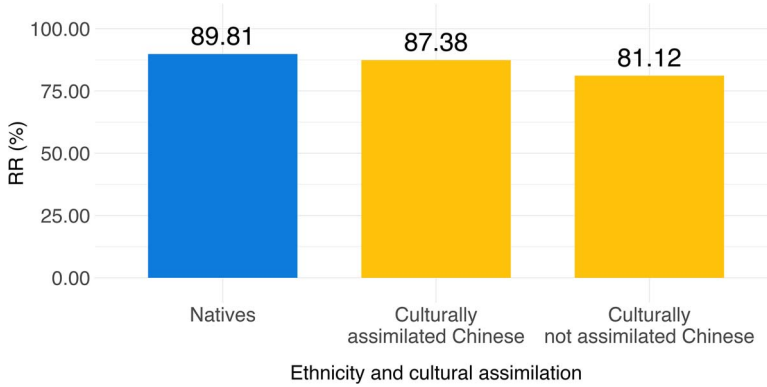

Figure 2. Average response rates by ethnicity and cultural assimilation.

conditions. For continuous district-level covariates, pairwise t-tests (with Bonferroni correction) indicate no systematic imbalance (see Supplementary Tables A6–A8, Online Appendix).

Significant differences in the RRs to natives and Chinese-origin individuals were found in the experiment, as can be seen in figure 2. Out of the 129 landlords that showed any kind of discriminatory behavior (replying differently to accounts A and B), 109 (6.81 percent of all landlords) preferred the native applicant over the Chinese-background applicant, whereas only 20 landlords (1.25 percent of all landlords) preferred the Chinese-background applicant over the native. This yields a figure of net adverse treatment against Chinese minorities of 5.56 percent of landlords.

A first means-comparison test (see fig. 2 for a graphic display) accordingly shows that both culturally assimilated and culturally non-assimilated Chinese-background applicants receive fewer responses from landlords when compared to natives, yet discrimination estimates are considerably lower for the latter group. Specifically, native flat-seekers are contacted back by landlords 1.11 times more than fully Chinese-background flat-seekers ($P < 0.001$) but only 1.04 times more ($P < 0.10$) than culturally assimilated flat-seekers. Chinese-background flat-seekers discrimination risks are thus 44 percent lower in the culturally more assimilated condition than in the less assimilated condition despite sharing the same visible phenotype/photograph. The average native-/Chinese-background MBR across cultural assimilation conditions is 1.09 ($P < 0.001$). These are all comparatively low discrimination estimates (see Discussion below).

The significant reduction in discrimination propensity observed for second-generation immigrants suggests that perceived lack of cultural assimilation is the main driver of RHD against Chinese minorities in Madrid. The very low discrimination estimate for this "visible" group suggests, in turn, phenotypic discrimination plays a very minor role. Together, these findings could be interpreted as indicating a positive process of incorporation across immigrant generations (at least as revealed by the very early stages of the renting process).

Interestingly, and contrary to our expectations, the inclusion of diagnostic signals for high-quality tenants did not decrease flat owners' propensity to discriminate. As shown in Table 3, differences in RRs between the non-treated condition (where information about flat-seekers quality is not provided) and treated condition (when such information is provided) are negligible in all groups of paired messages and never reach statistical significance. This evidence seems thus inconsistent with statistical discrimination mechanisms (for a graphical display, see fig. 3).

Table 4 shows the results of fitting different logistic regression models to our field-experimental data, which allows us to introduce owner, flat, and district-level characteristics as controls. Model 4 confirms that landlords' responses to both the fully Chinese and the culturally assimilated Chinese-background accounts remain significantly lower than those obtained by native applicants after introducing the above-mentioned controls (see fig. 4 for net marginal

Table 3. Messaging-back ratios by experimental treatments with confidence intervals calculated using the delta method.

	Ratio native/culturally not assimilated Chinese	Ratio native/culturally assimilated Chinese	Ratio native/all Chinese-background applicants
No signal of high-quality tenant (no info)	1.09	1.05	1.07
[*Confidence interval below*]	[1.03–1.16]	[1.00–1.10]	[1.03–1.11]
Signal of high-quality tenant (extra info)	1.09	1.04	1.06
[*Confidence interval below*]	[1.02–1.16]	[0.99–1.09]	[1.02–1.10]
All conditions	1.09	1.04	1.07
[*Confidence interval below*]	[1.05–1.14]	[1.01–1.08]	[1.04–1.10]

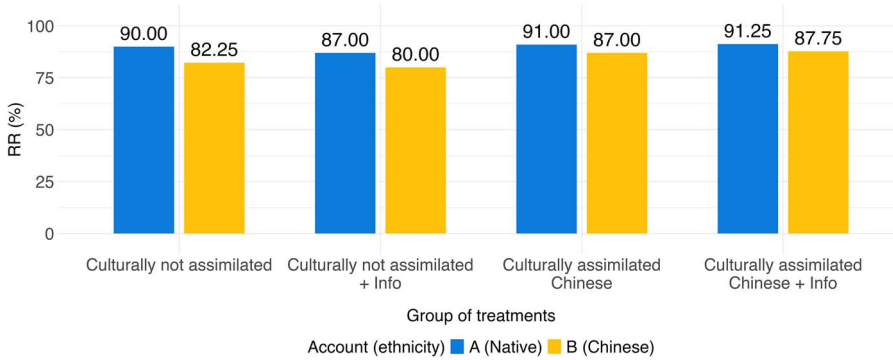

Figure 3. Average response rates for all experimental treatments.

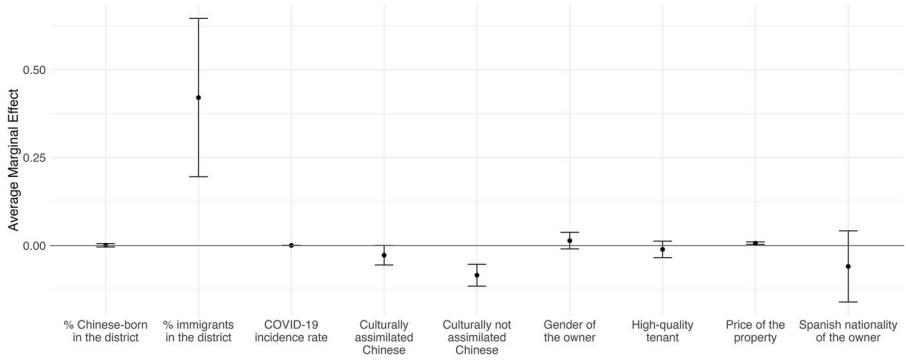

Figure 4. Average marginal effects for variables in model 4 (from Table 4).

probabilities). To test the expectation that information on candidates' quality could be more consequential for fully Chinese candidates than for assimilated ones, we tested an assimilation-quality interaction, which turned non-significant—either using logistic (available upon request) or linear probability specifications (see Supplementary Table A9 in the Online Appendix). Crucially, our stepwise models on Supplementary Table A9 confirm that no specific interactional term between the treatment variable and contextual factors is statistically significant, reinforcing the robustness of our main results. Hence, the best specification is provided by model 4 in Table 4, which includes all the control variables described above in addition to our parameters of interest.

Table 4. Logistic (logit) regression models on the messaging-back ratio.

	Model 1 (base model)	Model 2 (with district effects)	Model 3 (with COVID effects)	Model 4 (all variables)
Ethnic background of flat-seeker Ref. → *Native*				
Culturally not assimilated Chinese	**−0.719***** (0.122)	**−0.714***** (0.123)	**−0.714***** (0.123)	**−0.719***** (0.127)
Culturally assimilated Chinese	**−0.242**‡ (0.135)	**−0.253**‡ (0.135)	**−0.256**‡ (0.135)	**−0.276*** (0.138)
Signal of high-quality tenant	−0.095 (0.106)	−0.099 (0.106)	−0.107 (0.107)	−0.100 (0.109)
Share immigrants in district		**4.137***** (0.999)	**3.941***** (1.009)	**3.848***** (1.052)
Share Chinese-born residents		**−0.037*** (0.017)	−0.002 (0.021)	0.007 (0.023)
COVID-19 incidence rate			**0.006***** (0.002)	**0.004*** (0.002)
Price/m^2 of the rental offer				**0.061***** (0.017)
Gender of the flat owner				0.129 (0.110)
Nationality of the flat owner				−0.544 (0.473)
Constant	**2.225***** (0.099)	**1.810***** (0.193)	−0.777 (0.789)	−0.354 (0.949)
N	3200	3200	3200	3070
AIC	2442.3	2425.6	2416	2299
BIC	2466.6	2462	2458.5	2359.3
Log likelihood	−1217.2	−1206.8	−1201	−1139.5
F	11.895	10.938	10.841	8.561
RMSE	0.33	0.33	0.33	0.33

‡$P < 0.1$, *$P < 0.05$, **$P < 0.01$, ***$P < 0.001$. *Source*: Data on immigrant-born and Chinese-born proportions are retrieved from the Madrid City Council (Ayuntamiento de Madrid 2021b). Data on COVID-19 incidence rates are sourced from the Spanish Government (Gobierno de España 2025).

Introducing control variables (see models 2 through 4 in Table 4) allows us to explore the role of flat characteristics, as well as ethnic composition and COVID-19 incidence rates at the district level on landlords' responses. Interestingly, we find that the price of the flat, the proportion of immigrants in the district, and COVID-19 incidence rates are positively and significantly associated with higher average RRs. The positive coefficient of the price of the flat, as reported on model 4, may suggest that landlords of higher-priced flats are more motivated to secure a tenant quickly and are thus less selective, increasing their likelihood of messaging back to potential renters regardless of background. In contrast, higher concentrations of Chinese-born residents in a given district has no significant effect on RRs net of flat and landlord characteristics and COVID-19 incidence at the district level.

Regarding the COVID-19 incidence rate specifically, models 3 and 4 show a small but statistically significant positive association with RRs (coefficient of 0.004, $P < 0.05$ in model 4). This suggests that in districts with higher COVID-19 incidence rates, landlords were slightly more likely to respond to applicants. We note this could be due to increased economic pressures, higher perceived uncertainty during the pandemic, or unobserved district-level heterogeneity spuriously correlated with pandemic rates. No causal claims are thus made. To answer the question of whether COVID-19 incidence rates increase discrimination propensity, we fitted an interaction term between flat-seekers' ethnicity and pandemic incidence at the district-level. This interaction is not statistically significant in either logistic (available upon request) or linear probability model

(LPM) specification (see model 4 in Supplementary Table A9 in the Online Appendix). Similar interactions were tested between ethnic composition and flat-seeker's ethnicity/assimilation. No significant effects were found regardless of the model specification used (see models 2 and 3 in Supplementary Table A9 in the Online Appendix).

Discussion

We studied RHD against flat-seekers of Chinese background in Madrid, a large and ethnically diverse European capital. Using a novel correspondence testing method based on instant messaging apps, we tested discrimination in access to rental housing for "visible" applicants of Chinese background but with different levels of cultural assimilation. We signaled this dimension using two concurrent signals: applicants' first name and type of alphabet used in his *WhatsApp* profile. We found modest but statistically significant levels of discrimination against visibly Chinese-origin applicants overall (MBR = 1.09, $P < 0.001$). Yet discrimination is considerably lower and only marginally significant (MBR = 1.04; $P < 0.1$) for those with a Spanish first name (and who use the word "Madrid," in Latin alphabet, in their profiles) than for those who are identical in physical appearance but have two full Chinese names (and use full Chinese alphabet in their app profiles) (MBR = 1.11, $P < 0.001$). These results strongly suggest that discrimination is primarily driven by perceived cultural dissimilation rather than phenotype: if racial appearance were the main driver, culturally assimilated but phenotypically visible applicants should have experienced similar levels of discrimination as their less-assimilated counterparts.

We note our estimates are small when compared to some previous literature on discrimination against Asians. Specifically, those found by Bartoš et al. (2016) for Asians in the Czech Republic (where only 39 percent of Asian minority applicants received flat viewing invitations compared to 78 percent of Czech majority applicants), and by Sugasawa and Harano's (2023) in Tokyo (where flat-seekers with Chinese names have an estimated averaged reduction in positive RRs of 14 percentage points when compared to native Japanese).[7] Yet our estimates seem in line with those reported by Hogan and Berry (2011) in Toronto (75 percent RRs for Caucasian men, 71 percent for Asians; CBR = 1.06) and are actually larger than those found by Bao (2024) for Chinese-background tenants—compared to British native tenants—in London (with a reported invitation rate of 14 percent for both ethnic groups, hence CBR = 1, no evidence of discrimination).[8] We note Toronto, London, and Madrid are significantly more diverse cities than Prague (where most of Bartoš's experiment took place) and Tokyo. Interestingly, our discrimination estimates for the culturally less-assimilated Chinese-background flat-seekers fall well below those found by Bosch, Carnero, and Farré (2015) for Moroccan-background flat-seekers in Madrid and Barcelona (72.8 percent RR for male natives, 46.7 RR for Moroccan-background men, CBR = 1.56). Although changing housing market conditions across the two experiments could play a role in explaining differences in discrimination estimates, a point we elaborate on below, the existence of marked differences in discrimination propensity across ethnic groups is well documented in the literature, also for the Spanish case (see e.g., Polavieja et al. 2023). It is well-known Muslim-background populations are particularly at risk of suffering prejudice and discrimination in Europe (Stasio et al. 2021; Polavieja et al. 2023; Strabac and Listhaug 2007). Our reported discrimination estimates for Chinese minorities hence provide a new benchmark with which to gauge the intensity of discrimination against other ethnic minorities that have traditionally received greater attention in the literature.

In contrast to, for example, the results of Bosch, Carnero, and Farré (2015) for Moroccan minorities in Madrid, and Bao (2024) for Chinese minorities in London, Chinese-background flat-seekers who provided additional information signaling them as potentially high-quality tenants seem to be equally at risk of discrimination as those who did not. This finding suggests information asymmetry is not the driving force of RHD against Chinese-background individuals in our experiment, which indirectly points at the role of entrenched negative cultural stereotypes and biases (even if only present in a small minority of private flat-owners).[9] The possibility

that different ethnic groups not only experience different average levels of discrimination but actually trigger different discrimination mechanisms has been recently suggested by Polavieja and Fischer-Souan (2022), who show adding information on potential productivity reduces hiring discrimination against Southern European descendants in the Dutch labor market (consistent with statistical discrimination mechanism) but has no effect on the discrimination estimates for Sub-Saharan descendants (consistent with taste-based and implicit bias mechanisms).

The findings reported in this study thus strongly suggest that discrimination against Chinese-background flat-seekers in Madrid is primarily driven by taste-based mechanisms (Becker 1971) or else rooted in implicit bias (Rooth 2010). While we acknowledge the importance of taste-based prejudice (vis-à-vis information deficits) as a driver of discrimination could have been intensified by the unique context of the COVID-19 pandemic—during a period when virus-related anxieties might have trumped "cold" considerations about prospective tenants' ability to pay the rent—we note variation in district-level COVID-19 incidence rates does not appear to interact with our ethnicity treatments as one would expect from a "pandemic effect" on discrimination propensity. In other words, we have not found discrimination propensity against Chinese background flat-seekers to be any higher (lower) in the districts most (less) affected by COVID-19. Of course, disease-related stereotypes and anxieties associated with the racialization of the virus (Ng 2021) might have played a role in earlier stages of the pandemic spread (when the virus was mainly confined to China), but whether this was the case the present study cannot tell due to our limited observation window.

In interpreting our results, it is crucial to consider the broader context of Chinese immigrant segregation in Madrid. Our data show that Chinese-born residents represent a relatively small proportion of the total population across most districts, rarely surpassing 2 percent, except in the case of the *Usera* district, where the figure reaches 7.2 percent (see Supplementary Table A4 in the Online Appendix). This low visibility likely contributes to landlords' limited direct experience with Chinese-background tenants, which may heighten their reliance on stereotypes. Therefore, while Chinese immigrants are the third-largest immigrant group in Madrid, their relative invisibility in most city districts may have played a significant role in shaping landlords' responses, which—we must emphasize once again—were generally positive.

Particular scope conditions of Madrid city may be a relevant factor in explaining the comparatively low levels of discrimination found in this study, which could be specific to a very dynamic and globalized housing market (Rodríguez and Sosvilla-Rivero 2017; Canepa, Chini, and Alqaralleh 2020). Such degree of dynamism and globalization can only be found in a handful of European cities, including London (Guirguis, Giannikos, and García 2007), where no discrimination against Chinese minorities has been found, as mentioned above (see Bao 2024). While these specific conditions would seem to reduce the generalizability of our findings, it must be noted, first, that it is precisely the most dynamic cities that attract the largest number of international migrants, including Chinese migrants; and, second, that housing market dynamism has not precluded Madrilenian landlords from discriminating against flat-seekers with Arab-sounding names, as discussed above (see Bosch, Carnero, and Farré 2015).

This study is not without limitations and we would like to conclude by noting the following three. First, as Flage (2018) points out, responding to applicants' messages or calls is not equivalent to finally accepting them as tenants. As a consequence, experimental correspondence testing, be it based on telephone calls, emails, or instant messaging apps, only discloses the first stage of potentially discriminatory behaviors, which may amplify in subsequent phases of rental transactions—such as during property viewings or lease negotiations—when decisions become more subjective and difficult to monitor. In addition, while home-search engines, as the one used here, have become the main method for flat-hunters, particularly in cities like Madrid, rental market transactions can also operate through personal networks, the effects of which we cannot observe. Taken together, these limitations suggest that our findings might underestimate the full extent of discrimination. Our estimates should therefore be interpreted as conservative,

likely capturing a lower bound of the obstacles faced by minority applicants in the private rental market.

Second, as with any other experiment, reported findings in this study depend heavily on the operationalization of the treatments and we note, in our experiment, the *WhatsApp* messages of our fictitious Chinese-background flat-seekers were written in fluent Spanish (i.e., Spanish fluency was fixed across cultural assimilation conditions). Had we chosen to use language proficiency as a further signal of cultural assimilation, we might have found larger discrimination estimates. What our experiment shows, therefore, is that the chosen assimilation cues (likely perceived as signs of second-generation status) can travel a long way in reducing landlords' discriminatory behavior.

Lastly, and as mentioned above, we believe it is also important to note that this experiment took place in the last phase of the COVID-19 pandemic. While finding low discrimination against Chinese-background flat-seekers in this context might seem at first sight surprising, since the pandemic has been shown to increase anti-Chinese xenophobia in other countries (Chung and Li 2020; Reny and Barreto 2020; Zhanga, Bow, and Bow 2020), the pandemic also had a strong (albeit short term) impact on the rental housing market in Madrid (Moreno-Izquierdo et al. 2023). The lockdown curbed the demand while increasing supply—as many flats previously targeting tourists were redirected to permanent residents. In such tightening market conditions, the opportunity costs of discrimination increase and landlords might be "ecologically" inclined to accept tenants they would not accept otherwise. Only replication experiments will be able to assess the extent to which the post-pandemic context influenced our findings.

These limitations notwithstanding, this study has proposed a new instant messaging correspondence test method that expands the possibilities of RHD research. Just as e-mail-based correspondence testing innovated over traditional telephone-based audit studies (Carpusor and Loges 2006), we believe the evidence presented here illustrates well the methodological potential of using instant messaging apps in discrimination research. Differences in landlords' responses according to treatments signaled through the *WhatsApp* profile photo, its status, and the content of the message suggest that housing agents do indeed pay attention to the desired experimental features. Given the increasing reliance on social media apps for housing market transactions, studies on this area should take advantage of adapting experiments to these new instant messaging technologies, as other fields of research on social media and social markets have already done (see e.g., Ayres, Banaji, and Jolls 2015; Doleac and Stein 2013; Tjaden et al. 2018; Wimmer and Lewis 2010).

About the authors

Javier San Millán is a researcher at Delft University of Technology. He studies how economic inequality materializes spatially as residential segregation, using spatial analysis and register microdata. His work spans the Netherlands and Spain and engages with debates on housing and the right to the city. His latest article in *Tijdschrift voor Economische en Sociale Geografie* analyzes income inequality and segregation across Dutch cities (2011–2022), revealing more varied patterns than commonly assumed.

Javier Polavieja (PhD Sociology, Oxford, 2001) is research professor and Director of the D-Lab at the Institute for Public Goods and Policies, Spanish National Research Council (CSIC). His main fields of research are social stratification, immigrant incorporation, and ethno-racial discrimination. He is the leading author of the first large-scale European comparative study on racial discrimination in employment, recently published in *Socio-Economic Review*, as well as co-editor of the forthcoming *Oxford Handbook of Social Stratification*.

Toni Gamundí is a researcher at the Spanish National Research Council (CSIC). His work bridges computational social science with experimental methods to examine online hate speech, ethno-racial discrimination in labor and housing markets, and public attitudes toward immigration and the welfare state.

Endnotes

1. We note that the vast majority of rejections in our experiment (over 98 percent) occurred via non-response rather than explicit rejection of candidates. Non-response is actually the most typical form of rejection found in housing discrimination research (see e.g., Flage 2018; Hanson and Hawley 2011).
2. Landlords' nationality (as well as their gender) were inferred from their names, following the Spanish National Statistics Institute, which highlights the distinctiveness of names across nationalities. In cases where multiple names appeared in the add or characteristics could not be inferred, data on nationality and gender were coded as missing. Overall, landlord nationality and gender were successfully coded for 95.94 percent of cases, with missing values excluded from the regression models. Our robustness checks, which included these missing values, confirmed no significant changes in the results.
3. We left out of our validity tests other dimensions such as "competence" or "work ethics," which we believe are themselves likely endogenous to ethnic stereotypes and cannot be reasonably expected to be inferred from facial features alone (e.g., see Taylor, Landreth and Bang 2005; Wong 1998).
4. "Antonio" is the most common male name in Spain and "García" is the most common surname. "Wei Chen" is the most common name and surname among the male Chinese population in Spain. Additionally, "Manuel" is the second most common male native name in Spain and hence was used in the culturally assimilated condition.
5. Proof of stable employment and/or a bank guarantee are widely required by landlords in the Spanish rental market.
6. For descriptive purposes, we also calculated the average rental prices, the proportion of female landlords, and the proportion of native landlords by district. Results are presented in Table A5 in the Online Appendix.
7. Sugasawa and Harano (2023) do not report the invitation/response rates for any of the ethnic group treatments included in their study but only the reduction in percentage points (majority RR–minority RR). Such reduction (14.1 ppts) is larger than the largest reduction we obtain in our experiment, by subtracting the average RR of culturally distant Chinese-background flat-seekers from the RR of their native-background counterparts (89.8–81.1 = 8.7 pts.).
8. It must be noted, however, Bao's experiment was targeted to professional realtors and not to private landlords, and this alone could drive differences in discrimination propensity across her experiment and ours, as it has been suggested in the literature (see e.g., Bosch, Carnero and Farré 2015).
9. We note Auspurg, Hinz, and Schmid (2017) also found private flat-owners (but not professional agents) were unaffected by quality signals in Munich, Germany.

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Supplementary material

Supplementary material is available at *Social Forces* online.

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Conflicts of interest

None declared.

Data availability

The data underlying this article are available in the *Zenodo* repository at https://doi.org/10.5281/zenodo.16366441 (San Millán and Gamundí 2025).

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