Housing Policy Debate

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/rhpd20

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To cite this article: Chris Hess, Rebecca J. Walter, Ian Kennedy, Arthur Acolin, Alex Ramiller & Kyle Crowder (2022): Segmented Information, Segregated Outcomes: Housing Affordability and Neighborhood Representation on a Voucher-Focused Online Housing Platform and Three Mainstream Alternatives, Housing Policy Debate, DOI: 10.1080/10511482.2022.2133548

To link to this article: https://doi.org/10.1080/10511482.2022.2133548

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https://doi.org/10.1080/10511482.2022.2133548

Segmented Information, Segregated Outcomes: Housing Affordability and Neighborhood Representation on a Voucher-Focused Online Housing Platform and Three Mainstream Alternatives

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ABSTRACT

Online platforms have become an integral component of the housing search process in the United States and other developed contexts, but recent studies have demonstrated that these platforms offer uneven representation of different neighborhoods. In this study, we use listings covering the 50 largest U.S. metropolitan areas to assess how GoSection8, a platform uniquely focused on affordable housing and voucher-assisted households, compares with the "mainstream" alternatives of Craigslist, Apartments.com, and Zillow. Through descriptive and regression analyses of the housing and neighborhoods represented on these websites and a new way of measuring the distribution of rental housing opportunities, we advance a multisource perspective on the role of online information exchanges in housing search processes. Specifically, we find that GoSection8 and mainstream alternatives capture spatially segmented information about housing markets, with GoSection8 ads representing units that are more affordable but also more constrained to higher-poverty neighborhoods where assisted households are already concentrated. The findings suggest that disadvantaged households are potentially funneled toward high-poverty, isolated neighborhoods by the operation of stratified information systems available for online housing searches.

ARTICLE HISTORY
Received 28 March 2022
Accepted 4 October 2022

KEYWORDS
Housing platforms; residential segregation; neighborhood stratification; housing search; housing policy

Online housing platforms have a central role in the contemporary housing search process because they facilitate information exchange between tenants and landlords about possible rental opportunities. Identifying a suitable housing unit is an integral step prior to residential relocation, and online sites like Craigslist, Zillow, and Apartments.com all can reduce the cost of the housing search process by providing a freely accessible, always-on index of opportunities in a given area. Although these platforms do have an important potential to "democratize" information about the rental market, research has nonetheless demonstrated that there are inequalities in the neighborhoods, information, and discourse that appear online (Besbris et al., 2021; Boeing, 2020; Hess et al., 2021; Kennedy et al., 2021). Neighborhoods represented on most sites are

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Supplemental data for this article is available online at https://doi.org/10.1080/10511482.2022.2133548.

disproportionately higher-rent areas, with ads emphasizing amenities prioritized by higher-income, college-educated households, whereas listings outside of such areas tend to place greater emphasis on restrictions, and they separate housing developments from the neighborhood contexts they are situated within.

One platform, GoSection8, is somewhat unique in its singular focus on helping households "find affordable rentals," a mission blazoned prominently on the website's homepage.[1] As suggested by the platform's name, GoSection8 originally focused on providing rental information to households who have been provided a housing voucher (previously known as Section 8, now the Housing Choice Voucher, HCV) from a local public housing authority. Notably, GoSection8 is also distinct from other online housing platforms in how it treats paid "promoted" ads; all appear at the top of a given housing search, compared to piecemeal elevation of such ads (i.e., a handful per page) on competitors like Zillow or Apartments.com. Because of this potential relevance to housing policy in the U.S. as well as discussions about how the mechanics of online platforms can contribute to residential stratification, GoSection8 deserves a proper comparison with the "mainstream" platforms that have been the primary objects of research to date.

One important stipulation with so-called tenant-based assistance is that households must first navigate the housing search process and secure a rental unit in the private market with a qualifying rent lest the assistance be rescinded. Although this hypothetically affords greater choice among housing and neighborhood options, pressure to "lease up" with vouchers within a finite amount of time adds to the obstacles that households face when searching for their unit, particularly when the voucher itself can still be used by landlords as a legal disqualification criterion in many markets. Given the risk of losing one's voucher if searches take too long, households may lean on information that is considered relatively more reliable on some metrics (e.g., landlord accepts vouchers), even if it is relatively less optimal on others (e.g., high neighborhood poverty).

Given the broader housing affordability crisis across the U.S. markets and worsening rent burden among households (Fernald, 2021; Hess et al., 2020), finding affordable housing can have high search costs regardless of whether one has a voucher. For this reason, a platform centrally focused on facilitating information flow between voucher-friendly landlords and assisted tenants could be a boon to both parties. If a relatively complete set of affordable units appears on GoSection8, then this could help households efficiently identify units that meet public housing authority rent criteria and accept vouchers while still offering the greatest degree of neighborhood choice possible. In return, landlords participating in the HCV program are compensated on a reliable schedule and receive a fair rent.

However, to the extent that GoSection8 opportunities are concentrated in neighborhoods where neighborhood poverty is high, populations are segregated, and chances for upward mobility are weak, the moves based on using GoSection8 would fail to promote residential integration by socioeconomic status, race, and ethnicity. This tendency toward segregated outcomes would do little to rectify the well-documented concentration of HCV households in relatively disadvantaged neighborhoods and would additionally be problematic for achieving stated federal housing policy goals of Affirmatively Furthering Fair Housing (AFFH). The usage of this platform by housing counseling programs thereby creates a potential risk of restricting neighborhood outcomes among voucher-assisted households, even if the platform is useful for removing search costs related to voucher acceptability among landlords.

Housing searches do not occur in a vacuum, however. The housing and neighborhoods considered reflect a combination of one's prior experiences, social networks, and economic means (Krysan & Crowder, 2017). Prior research has already noted that the rental market is segmented to the extent that households may prefer particular platforms, whether for trust, usability, or other reasons. The existing research comparing online platforms is quite limited, but evidence from a handful of different metropolitan areas suggests that different platforms capture significantly different swaths of the broader rental stock (Costa et al., 2021). Importantly, the pernicious legacies of historical and contemporary discrimination in U.S. housing markets mean that such segmentation is not

simply between units, but also between neighborhoods. For this reason, the cycle of segregation may be increasingly driven by digital mechanisms like segmented information, with households disproportionately "seeing" particular neighborhoods based on the platform they use. Accordingly, more attention needs to be given to how existing residential segregation is being reproduced not just through different housing search strategies by individual actors but also through a segmented and stratified system of information about housing opportunities.

On one level, the present study uses the understudied online platform GoSection8 to assess the extent to which this information provider may be shaping housing search outcomes among assisted households by featuring affordable units in a relatively limited set of neighborhoods—albeit ones where the landlords may be more generally accepting of assistance vouchers. More broadly, the present study aims to examine how the divergent social worlds discussed in studies of residential segregation are translated into the digital world as disparate online spaces and a two-tier, segmented information environment about housing. The following research questions thus guide this investigation:

1. How do the housing and neighborhoods advertised on GoSection8, a rental housing information source targeting households with vouchers, differ from those on other online rental housing platforms such as Craigslist, Zillow, and Apartments.com?
2. To what extent does the information provided about neighborhoods on GoSection8 differ significantly in the presence of more racial or ethnic segregation?
3. To what extent do promoted ads on GoSection8 favor high-poverty contexts, and does this dynamic vary in the presence of more racial and ethnic segregation?

Using descriptive and regression analyses of a unique dataset covering scraped ads from four platforms across the 50 largest metropolitan areas, our study shows a new digital divide—with information focused on "affordable opportunities" highly compressed among neighborhoods with high poverty and segregated racial/ethnic compositions where other voucher holders reside. This dynamic is only intensified in metropolitan markets with greater residential segregation by race and ethnicity. In metropolitan regions with greater levels of segregation, GoSection8 describes increasingly separate spatial regions and neighborhood populations from those of the "mainstream" alternatives we study (Craigslist, Zillow, and Apartments.com). In many of the largest cities, the information provided among these four platforms suggests a two-tier information environment, with a primary segment covering the majority of space targeted at higher socioeconomic status (SES), and in many cases non-Latinx White, households and a secondary segment covering higher-poverty areas with greater non-White representation. The opportunities presented on GoSection8 focus disproportionately on higher-poverty neighborhoods. In addition, we find evidence suggesting that profit incentives embedded within the platform's page rank mechanism may exacerbate the likelihood that households see and consequently choose such opportunities. Finally, through this study we contribute a new methodology for calculating the expected distribution of rental ads across different neighborhoods and rent levels based on rental unit turnover, paving the way for more nuanced studies of neighborhood representation across housing platforms. Cumulatively, this research advances the literature on the housing search process, among both HCV households and the general public, by showing that online housing platforms may have relatively complete coverage when considered as a whole, but they provide substantially unequal, segmented information through platforms aimed at distinct populations.

Background

Representation, Discourse, and Segmentation on Online Rental Platforms

Online rental platforms offer a unique, if incomplete, picture of contemporary housing dynamics. Data from these platforms provide an opportunity for understanding the geography,

affordability, and marketing of housing opportunities in real time (Boeing & Waddell, 2017). However, these platforms also reflect stark inequalities in both information access and content in the rental market. Researchers have found both that listings are distributed unequally through space (Boeing, 2020; Boeing et al., 2021a; Hess et al., 2021) and that the content of listings changes with the socioeconomic status of the neighborhood that units are listed in (Besbris et al., 2021; Kennedy et al., 2021). Taken together, that research supports a view that online housing advertisements and their respective platforms are part of the broader social processes that sort people into different neighborhoods, providing choice sets that constrain the destinations of household moves (Bruch & Swait, 2019; Krysan & Crowder, 2017). For example, although households may theoretically search for housing anywhere, their actual search patterns even on digital platforms most often correspond closely with their current location (Steegmans & de Bruin, 2021). Given that households are likely to constrain their search to specific neighborhoods, the availability of listings within those neighborhoods may thus shape the outcome of the housing search process.

Much of the existing research on online rental platforms has focused on Craigslist alone, and only more recently has Craigslist been compared with other platforms (Besbris et al., 2021; Boeing, 2020; Costa et al., 2021; Hess et al., 2021; Kennedy et al., 2021). As a platform, Craigslist is skewed toward more advantaged spaces, with higher concentrations of listings relative to available units in neighborhoods with lower poverty and higher income, as well as those with greater non-Latinx White representation that might reflect historical (e.g., redlining, racially restrictive housing covenants) or contemporary (e.g., steering, blockbusting, upselling) forms of exclusion. Hess et al. (2021) notably found that racialized differences were more common in areas with greater racial/ethnic segregation, whereas dynamics in less racially segregated areas were dominated by disparities in listing density across socioeconomically differentiated areas. These findings suggest that although Craigslist is generally a useful window into the dynamics of the rental market, it has less information about higher-poverty, less-White neighborhoods, especially considering the number of available units in those areas (Hess et al., 2021).

Whereas Craigslist overrepresents more advantaged spaces, GoSection8, as a platform, might offer insight into the housing opportunities among neighborhoods characterized by greater racialized disadvantages that have been the object of historical and contemporary forms of discrimination in the housing search process (Besbris & Faber, 2017; Faber, 2020). In addition to potentially questioning the current findings that many segregated neighborhoods are simply not observed much online, incorporating GoSection8 within research on online housing platforms' role in modern housing search stands to balance an incomplete view of the online rental market provided by "mainstream" sources like Craigslist or Zillow. In a study of five metropolitan areas across the U.S., Costa et al. (2021) noted that all platforms target different segments of the rental market, although GoSection8 uniquely provides a larger share of lower-rent listings more likely to be rentable with a housing voucher. In contrast, Craigslist tended to include rents more toward the cross-platform median, whereas Zillow tended toward higher-rent opportunities.

Importantly, research on these platforms must also start to consider them as digital spaces governed by algorithms generally designed to maximize profit and user bases, with little or no consideration toward equity (McMillan Cottom, 2020; Srnicek, 2017). As with other forms of "platform real estate" (Shaw, 2020), rental listing platforms effectively reshape market relations by creating new digital environments that set the terms by which buyers and sellers interact. Although these platforms are often presented as value-neutral market environments, they also introduce the potential for algorithmic bias to alter housing market outcomes. Noble (2018) demonstrated that systems like Google web and image search would reproduce, or even exacerbate, offline racial ideology online. Although more economically inclined accounts of rental advertisements tend to treat them as objective marketing, Benjamin (2019) argues that targeted advertisements on housing platforms, algorithmically tuned for profit, might filter advertisements by ethnicity and reproduce segregation. Safransky (2020) examines how such algorithms

structure urban space by tracing city officials' use of digital tools to decide which areas merit investment and which do not. Overall, this existing research illustrates how uncritical use of algorithmic tools reproduces and exacerbates inequality, rather than reducing it (Eubanks, 2018). Platforms may increase aggregate access to rental listing information, but they also embed existing biases—particularly those of landlords—into the distribution of that information (Boeing et al., 2021b). Based on these prior studies, we accordingly operate from an expectation that digital rental platforms have incentives to prioritize certain landlords' interests, even when stated goals for a given platform may include making information accessible to all or "helping" households.

Housing Search Process and Outcomes Among HCV Households

Although the aforementioned literature underscores the broader implications of online platform segmentation for understanding the housing search process, GoSection8 has unique importance for research on stratification in assisted households' residential outcomes. In recent decades, the deconcentration of poverty has gained attention at the federal level, and the U.S. Department of Housing and Urban Development (HUD) amended the Public Housing Agency Plan in 2000 (65 FR 81213) to add it as an objective to AFFH as part of the implementation of the 1968 Fair Housing Act. As the dominant demand-side federal subsidy in the United States, the HCV program has become the central policy platform for attempting to achieve the poverty deconcentration objective—although that was not the original reason for the program's creation (Goetz, 2003). Intended to provide real choice for relocating households, the program allows voucher recipients to pursue rental housing at any location in the private market.

Although the program is designed to provide flexibility in locational choice, and HUD incentivizes public housing authorities to administer the program to meet poverty deconcentration goals for its residents (Khadduri, 2001), previous research demonstrates that the program is not universally effective at assisting low-income minority populations' mobility away from high-poverty neighborhoods. Voucher holders tend to remain in place, move to a housing unit within the same neighborhood, or move to neighborhoods with similar SES (Basolo & Nguyen, 2005; Feins & Patterson, 2005; Teater, 2008, 2009; Varady & Walker, 2000; Walter et al., 2015). In fact, the HCV program has been found to perform similarly to project-based programs in terms of locating recipients in high-poverty neighborhoods (McClure, 2008; Wyly & DeFilippis, 2010), and voucher holders have similar location outcomes to nonsubsidized poor renters (Devine et al., 2003; McClure, 2008; Pendall, 2000). From a spatial perspective, prior research finds HCV households tend to cluster in highly segregated, poor neighborhoods (Newman & Schnare, 1997; Oakley & Burchfield, 2009; Park, 2013; Wang & Varady, 2005; Wyly & DeFilippis, 2010).

As a market-driven program, this outcome is not surprising given that the alternative would require the private market to provide affordable housing options in low-poverty neighborhoods and make them available to voucher holders, and would place the onus on the voucher holder to locate these housing units (Basolo & Nguyen, 2005). Existing research has stressed the shortage of affordable housing options in neighborhoods with low poverty and strong amenities (Daniel, 2009; Ladd & Ludwig, 1997; McClure, 2010; Pendall, 2000; Walter et al., 2016). Furthermore, the inherent challenges that limit choice are abundant. To start with, the voucher recipient needs to be willing to relocate to a new unit and neighborhood. Voucher holders may struggle to explore and venture into new neighborhoods because of public transportation inaccessibility (Popkin & Cunningham, 2001; Varady et al., 2001), shifts in life events such as divorce or job loss (Comey et al., 2008), inadequate social support (Brooks et al., 2012), or reluctance to abandon local social ties (Briggs et al., 2010; Sobel, 2006; Varady et al., 2001; Varady & Walker, 2007), to name just a few reasons.

Even when a voucher holder is willing to relocate to a new area, they may face discrimination from landlords or neighbors given the stigma associated with vouchers (Basolo & Nguyen, 2005; Devine et al., 2003; Popkin & Cunningham, 2001). In response, landlords in the private rental market may subject voucher holders to unreasonable tenant screening requirements, preventing them from being able to lease the unit (Daniel, 2009; Devine et al., 2003; Pendall, 2000; Rosen et al., 2021). Furthermore, there are programmatic obstacles that restrict voucher holders from amenity-rich neighborhoods. For instance, Fair Market Rents (FMRs), which are used to determine the maximum rent a voucher holder can afford, are historically determined at the metropolitan level, restricting the units available to voucher recipients, particularly among high-rent neighborhoods (Pendall, 2000). Sparse relocation assistance due to housing authorities' limited resources is another example of programmatic challenges that limit choice (DeLuca et al., 2013). These and many other barriers contribute to the ineffectiveness of the HCV program in deconcentrating poverty.

Because there are limited rental units available in low-poverty neighborhoods and landlords are often reluctant to rent to households with vouchers (Garboden et al., 2018), access to information about such units during the housing search process is crucial to expand choice and improve outcomes. For example, information about opportunities where vouchers are accepted can be tremendously beneficial but difficult to identify on normal online rental platforms. For this reason in particular, GoSection8 is potentially advantageous. However, there may also be disadvantages to relying on GoSection8 during the housing search process, and the information available on that platform may differ in important ways (i.e., neighborhood context) compared to possible rental opportunities advertised on other platforms.

Although search time and effort expenditures on identifying HCV acceptance are likely reduced by GoSection8's emphasis on linking potential tenants to voucher-friendly landlords, especially in areas where there are no laws against source-of-income (SOI) discrimination,[2] households' capacity to identify housing in low-poverty neighborhoods still depends on such landlords' presence on GoSection8. Given the increasing use of screening services and the proliferation of different online platforms, some landlords with relatively affordable units may simply aim to exclude potential subsidized tenants from the start and avoid using platforms like GoSection8 as a result (Rosen et al., 2021). Related to this point, prior research also suggests that landlords with units in highly disadvantaged neighborhoods who otherwise struggle to rent their unit on the open market have a particular interest in marketing the vacancies to subsidized households, because these landlords may not be able to lease to market-rate tenants based on their housing units' location, while also facing difficulties in collecting rent on a reliable basis (Besbris et al., 2022; Garboden et al., 2018). Accordingly, if landlord postings on the GoSection8 platform overrepresent units in poor and racially isolated neighborhoods, the platform would help to perpetuate segregation and the concentration of poverty. Furthermore, if GoSection8's algorithm for ranking which ads households see first is biased toward particular areas, then such an interface dynamic would only exacerbate the likelihood of searches ending in neighborhoods where assisted households, and neighborhood poverty more broadly, are concentrated.

The Present Study

Our multisource framework for studying online housing platforms seeks to understand how those platforms play a role in the reproduction of residential inequalities by structuring housing search processes, even after accounting for general differences in the affordability of housing observed between different information sources. By incorporating multiple sources of information that households might use, we can test new theoretical expectations related to which neighborhoods are visible online as well as identify possible inequalities in neighborhood outcomes among households using these different sources. Crucially, our consideration of multiple

mainstream information sources in combination with GoSection8 provides our study with the capacity to assess these dynamics both in a specific policy context and among the broader population.

We address three key questions through this study. First, *how do the housing units and neighborhoods advertised on GoSection8 differ from those advertised on other online rental housing platforms like Craigslist, Zillow, and Apartments.com?* The underrepresentation of some neighborhoods on previously studied platforms like Craigslist may reflect spatial variations in housing search strategies; neighborhoods with greater shares of non-White and lower-income households may have relatively fewer online ads because of a greater reliance by local landlords and tenants on physical ads, social networks, and other offline tools to advertise and identify housing options. This leads to the first theoretical expectation that regardless of the platform that one studies—"affordable" or otherwise—some neighborhoods are simply not observed or are underrepresented online, reflecting a low reliance on online tools among landlords and tenants in this segment of the rental housing market.

On the other hand, the existing racialized geography of neighborhood disadvantage in many areas may interact with online platforms' interest in carving out a market niche—and in some cases, maximizing profit—even if this leads to segmentation among platforms that implicitly, and perhaps explicitly, structures segregated housing search outcomes. This leads to a competing theoretical expectation that considering representation across the various online housing platforms will reveal segmentation, rather than the absence, of online information in neighborhoods with greater racial/ethnic representation and presence of lower-income households. Such segmentation might serve to undermine confidence in the benefits of the internet for housing searches by voucher holders and other low-income households, even if its use has otherwise become ubiquitous among other households. Importantly, segmented information between online platforms also potentially worsens assisted households' search outcomes to the extent that a platform like GoSection8 constrains such households' searches to structurally disadvantaged neighborhoods where assisted households are already concentrated. Furthermore, underrepresentation of GoSection8 ads in relatively advantaged neighborhoods may potentially bias housing authorities' program definitions of "reasonable" rents.

Second, *to what extent does the information provided about neighborhoods and housing on GoSection8 differ significantly in the presence of more racial or ethnic segregation?* Here, expectations from prior literature suggest that greater racial and ethnic segregation in a metropolitan area will be associated with exacerbated biases in information about different neighborhoods (Hess et al., 2021). Specifically, we expect the tendency for housing opportunities advertised on GoSection8 to describe a separate information sphere to be most pronounced in metropolitan areas characterized by greater residential stratification by race and ethnicity. Although segmented information is likely to structure housing search outcomes among the broader public and assisted households alike, patterns of neighborhood representation interacting with patterns of residential segregation would further suggest that assisted households face heightened challenges in locating housing in integrated contexts when relying on GoSection8 over alternative platforms.

Third and finally, *to what extent do promoted ads on GoSection8 favor high-poverty contexts, and does this dynamic vary in the presence of more racial and ethnic segregation?* Greater differences in neighborhood representation provide one important mechanism through which racial and ethnic segregation theoretically interacts with online platforms, but the role of profit-seeking among online platforms constitutes another potentially salient pathway to the extent that this prerogative among platforms underpins decisions to order ads in a particular manner, selectively provide search filters, and highlight sponsored ads with additional description. For this reason, the availability of information on a for-profit platform like GoSection8 may also interact with prevailing patterns of racial and ethnic segregation through differences not only in the full set of opportunities that households *could* see, but also through the

interface households *must* use in order to observe the units that fit their search criteria. To the extent that households supported by HCVs generally have fewer resources to devote to housing search and face additional discrimination particular to their voucher, platforms may bias outcomes among assisted households toward particular units in segregated neighborhoods simply by presenting information in a particular manner. Overall, by testing the extent to which the interface of a platform like GoSection8 can constitute its own mechanism for structuring housing searches toward particular information, this study stands to advance a new theoretical perspective about how "platform capitalism" can interact with existing racialized residential inequalities in ways that reinforce residential stratification over time (McMillan Cottom, 2020; Srnicek, 2017).

Materials and Methods

Data

The following analyses draw on a unique database of approximately two million rental listings scraped on a daily basis from GoSection8, Craigslist, Zillow, and Apartments.com from late October 2020 through June 2021. We focus on the 50 largest core-based statistical areas by population size because many smaller metropolitan areas have too few (often fewer than 30) ads across one or more of our four platforms (typically GoSection8, if any) to sustain meaningful analysis. Building on methods contributed in prior studies of online housing platforms (e.g., Costa et al., 2021; Hess & Chasins, 2022; Kennedy et al., 2021), a combination of scrapers written within Python and Helena scraped these data by crawling through the indexes of ads on each site for all relevant geographic locations in the 50 metropolitan areas. This ensures that we have the capacity to observe the entire metropolitan market, even if a particular listing site divides a metropolitan area into multiple separate markets (something common among larger ones on Craigslist). For example, the Los Angeles–Long Beach–Anaheim, CA, metropolitan area includes multiple Craigslist locations (e.g., "Los Angeles," "Orange County") that must be scraped in order to provide complete coverage of the metropolitan market. For Craigslist, we scraped all possible subdomains for U.S. locations listed on craigslist.org, and then used spatial filtering to reduce our overall sample to the metropolitan areas of interest. For Apartments.com, Zillow, and GoSection8, we used Office of Management and Budget (OMB) data informing the counties within each metropolitan area to populate a list of URLs for each county where a scraper should collect data.

The locations of advertised units are drawn from addresses observed within metadata; for Craigslist listings, Google Maps coordinates and addresses observed within the descriptive text of the listing are used if no address was observed in other metadata fields. This geocoding process successfully appended precise locational information to at least 94% of ads with an address candidate to geocode across each source-specific sample. To ensure that aggressive reposting of the same advertisements by some landlords does not bias our data, we deduplicate to a sample of unique listings according to rent, bedroom size (i.e., number of bedrooms), and location (i.e., latitude and longitude) combinations. Summary statistics about our listing sample, as well as counts by metropolitan area and source, are available in sections A and B of our online supplement (Supplemental file). The listing totals for each platform are 76,618 for GoSection8, 736,044 for Craigslist, 122,787 for Apartments.com and 1,516,627 for Zillow.

The following analyses combine these listing data with American Community Survey (ACS) 5-year estimates for 2015–2019 to understand housing and demographic conditions in the neighborhoods where we observe user activity on different platforms. Although census tracts are administrative units subject to the modifiable areal unit problem (MAUP), these estimates nonetheless reflect the most recent and spatially granular data about neighborhood socioeconomic and demographic compositions available for use with our listing data.

Measures

Throughout the following analyses, our focus is primarily on differences related to the source of a listing—that is, whether the rental opportunity was observed on GoSection8 or one of our comparison platforms (Craigslist, Apartments.com, and Zillow). As described below, we sometimes use regression models to do so, setting GoSection8 as the reference source in order to test for differences in outcomes such as housing cost between this "affordable" platform and its competitors.

In the context of assessing the affordability of units advertised on different platforms, we draw on HUD spatial data indicating county-level FMRs for fiscal year 2021, spanning October 2020 through September 2021. We use these FMR values to assess the affordability of listings on different online platforms through the ratio of rent asked to FMR and a binary indicator of whether an ad's rent asked is below the relevant FMR level.

To address whether there are differences in online platform dynamics in the presence of SOI protections, we join the data compiled by housing researchers and the Urban Institute that identify the state and local jurisdictions with such protections for voucher-holding households (Greene et al., 2020). We filter these data to include only jurisdictions where the SOI protections were in effect for the entirety of our scraped listing data's temporal span. In our analyses of differences in online platform dynamics based on SOI protections, we use a dummy variable to flag whether there were any protections present in the jurisdiction where a given ad was located.

Finally, our measure of neighborhood representation builds on previous work that uses the ACS vacant housing unit for rent distribution as "ground truth" for estimating the expected distribution of rental opportunities across tracts in a metropolitan area (Boeing, 2020). In this paper, we contribute a new approach for identifying a reference distribution of rental housing opportunities with ACS data by drawing on the distribution of renter-occupied housing units that have householders who moved into the unit within the last year and information on the rent level for these units. This constitutes an advancement over prior literature in two ways: (a) it better reflects the number of units expected to have been available for rent; and (b) it allows us to create a distribution for units at different affordability levels.

The number of people who moved into rental units within a year is expected to closely match the number of rental units that were available for rent over that period in a given area. By contrast, the number of vacant units for rent reflects both unit availability and market tightness. In tight markets, vacancy numbers will be very low even while the expected number of listings over a one-year period would be substantially higher. Because our mobility-based measure reflects the extent of recent renter mobility into a given area over a full year, it is better positioned to capture the extent of advertisements that a neighborhood had beyond the specific point of time at which the ACS was administered (as in the case of the vacant for rent estimates). In addition, the vacant for rent estimates within the ACS have many zero values that reflect both the fact that units may not be vacant at the time of the survey and the difficulty of sampling the target population (i.e., vacant housing units for rent) at a single point in time as opposed to over a full year (i.e., with the recent renter mobility estimates).[3]

We use data from the ACS to estimate the overall distribution of recently rented housing units, but because the distribution of affordable units (i.e., below FMR) across neighborhoods differs in important ways from the overall distribution, we need an alternative distribution for defining how many ads one should expect on a given platform for a given neighborhood. We estimate the number of recently rented below-FMR units in a given tract using a combination of ACS census tract estimates for the share of renter-occupied housing units whose renters moved within the last year and the count of renter-occupied units where households paid cash rents less than the FMR.[4] This allows us to examine representation across platforms for units that recently rented at affordable levels based on the FMR definition. For each source the overall and below-FMR representation values are calculated separately in order to explore differences in

over- and underrepresented neighborhoods across GoSection8, Craigslist, Apartments.com, and Zillow.

These reference distributions are then used within a framework for analyzing neighborhood representation that was advanced in prior studies (Boeing, 2020; Hess et al., 2021) to assess which neighborhoods have more or fewer ads than what would be expected based on the distribution of recent movers who are renters. We first use each tract's contribution to the overall count of recently rented units (or recently rented below-FMR units) within the metropolitan area ($\frac{\tau_{tract}}{\tau_{metro}}$) to produce the expected number of advertisements we would have observed on a given source (ϕ_{tract}) if we proportionally allocated the total listings observed within the metropolitan area for that source (κ_{metro}) according to this reference distribution provided by the ACS.

$$\phi_{tract} = \frac{\kappa_{metro}\tau_{tract}}{\tau_{metro}} \tag{1}$$

We then compute lambda (λ), our representation measure, for each source as a ratio of the observed number of listings in the tract (κ_{tract}) to the expected number of listings (ϕ_{tract}) using the following equation:

$$\lambda = \frac{\kappa_{tract} + 1}{\phi_{tract} + 1} \tag{2}$$

When its lambda is greater than 1, a tract is relatively overrepresented in platform listings compared to the expected number of ads based on the ACS. Likewise, when its lambda is less than 1, a tract is relatively underrepresented in platform listings compared to the expected number of ads.

Analytic Framework

We use descriptive statistics and regression analyses as the primary methods within this study. Our descriptive analyses compare Cohen's *d* estimates and Gini coefficients between sources, with these used (respectively) to understand differences in the composition of neighborhoods based on their online representation and the degree to which affordable ads are disproportionately restricted to a small set of all neighborhoods within a given metropolitan area. Cohen's *d* is typically used to assess effect magnitudes and can be understood as the difference in means between two groups on the scale of the two groups' pooled standard deviation on the measure. The Gini coefficients are calculated based on the number of listings per tract, providing insight into the extent to which ads are unevenly distributed across neighborhoods and thus relatively compressed into a small set of locational choices. In this context, higher values for the Gini coefficient imply more uneven distribution of ads across all possible neighborhoods. These methods have been used in prior studies of neighborhood representation online (e.g., Boeing, 2020; Hess et al., 2021) and facilitate a high-level descriptive analysis of how over- and underrepresented neighborhoods differ between GoSection8, Craigslist, Apartments.com, and Zillow.

To address our first research question about platform differences in affordability and neighborhood representation, we couple Cohen's *d* and Gini data description with regression models showing associations between source of listing and housing affordability. These models assess whether ads on GoSection8 systematically differ in their housing cost and potential for meeting HCV program requirements. We use three ordinary least squares (OLS) model specifications for three dependent variables: (1) logged rent, (b) the ratio of rent to FMR, and (c) a binary indicator of whether an ad's rent falls below the relevant FMR. All models adjust for differences based on the listed number of bedrooms. Our first models are intended to provide a baseline description of platform differences in affordability, and then our second models incorporate census tract fixed effects to provide insight into platform differences in affordability net of neighborhood variation in housing cost. The third and final model specification interacts listing source with an

indicator for whether the ad is located in an area with SOI protections to understand whether there are differences in information segmentation in the presence of SOI antidiscrimination laws.

We address our second research question about differences in platform affordability and neighborhood representation based on residential segregation by race and ethnicity through additional data description with Cohen's *d* disaggregated by levels of metropolitan racial or ethnic segregation. For each metropolitan area, we use Black–White dissimilarity indices to measure racial segregation and ethnic Latinx–White segregation dissimilarity indices to capture ethnic segregation.[5] In the context of these disaggregated Cohen's *d* analyses, we take the terciles of each dissimilarity measure to categorize metropolitan areas as low, moderate, or high segregation.

For our third and final research question about whether "featured" ads systematically favor more disadvantaged contexts, we investigate models of whether a GoSection8 ad is located in a high-poverty neighborhood based on whether it is a paid-for Featured listing or a free Basic ad. These models use poverty rate thresholds of 20% and 30% to denote high and concentrated poverty, respectively, with these conventions from prior literature stemming from observations that social problems related to poverty concentration begin around this level (Galster, 2002; Wilson, 2012). Logistic regression models predict the binary neighborhood poverty outcomes based on whether an ad is a Featured or Basic post, with all model specifications adjusting for unit size in terms of number of bedrooms, rent asked, and whether the ad falls within a SOI-protected area. The first model is a baseline using the aforementioned terms, Model 2 tests for interaction in the Featured/Basic dynamic in the presence of SOI protection, Model 3 tests for interaction in the presence of greater Black-White racial segregation, and Model 4 tests for interaction in the presence of greater Latinx–White ethnic segregation. Across all models of these neighborhood poverty outcomes, we include metropolitan fixed effects to adjust for time-invariant differences between markets.

Results

Differences in Housing Cost and Affordability

To address our first research question, we start by analyzing whether the housing advertised on GoSection8 differs significantly from Craigslist, Zillow, and Apartments.com in typical cost and affordability. Table 1 provides regression coefficients from models of logged rent asked, the ratio of rent asked to county FMRs, and a binary indicator of whether the rent asked is below the area's FMR. GoSection8 is the reference category for the source measure in all of the following models.

Model 1 in Table 1 shows that each of the comparison platforms has listings with average rents asked at least 20% above the average for GoSection8, holding differences related to unit size constant. Even when looking at differences in rent asked between sources net of heterogeneity between tracts, Model 2 indicates that the average Craigslist ad's rent asked is about 2% greater than GoSection8, whereas ads on Apartments.com and Zillow have asking rents about 4% greater than GoSection8. Finally, although Model 3 has significant interactions for differences in average Apartments.com and Zillow rent asked in the presence of SOI laws, they are fairly small in effect size and not consistent in their direction across mainstream platforms.

Next, Models 4 and 5 suggest a similar dynamic for the affordability of different platforms based on county-level FMRs. Although studio, one-, and two-bedroom units on GoSection8 are predicted to have below-FMR rents, on average, the predicted ratio of rent to FMR for each comparison platform exceeds 1.0 regardless of unit size in bedrooms. These associations imply that the lower rent asked among GoSection8 ads typically also corresponds to greater affordability relative to local incomes. However, according to Model 6, Craigslist and Apartments.com ads are relatively less affordable than GoSection8 in places with SOI protections.

Table 1. Linear regressions of housing cost and affordability across GoSection8 and comparison platforms (Craigslist, Zillow, and Apartments.com).

	Log (rent asked)			Rent asked ÷ Fair Market Rent (FMR)			Rent asked below Fair Market Rent (FMR)?		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Source = Apartments.com	0.234***	0.041***	0.036***	0.327***	0.073***	0.059***	−0.280***	−0.039***	−0.051***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.005)	(0.002)	(0.003)	(0.005)
Source = Craigslist	0.223***	0.021***	0.019***	0.248***	0.039***	0.028***	−0.283***	−0.038***	−0.046***
	(0.001)	(0.002)	(0.004)	(0.002)	(0.003)	(0.005)	(0.002)	(0.004)	(0.006)
Source = Zillow	0.213***	0.038***	0.043***	0.292***	0.054***	0.054***	−0.300***	−0.044***	−0.069***
	(0.001)	(0.002)	(0.003)	(0.001)	(0.002)	(0.004)	(0.002)	(0.003)	(0.004)
Beds = 1	0.055***	0.183***	0.183***	0.031***	0.098***	0.098***	−0.060***	−0.097***	−0.097***
	(0.001)	(0.003)	(0.003)	(0.001)	(0.005)	(0.005)	(0.001)	(0.006)	(0.006)
Beds = 2	0.236***	0.426***	0.426***	0.078***	0.173***	0.173***	−0.097***	−0.153***	−0.153***
	(0.001)	(0.004)	(0.004)	(0.001)	(0.006)	(0.006)	(0.001)	(0.007)	(0.007)
Beds = 3	0.354***	0.682***	0.682***	0.358***	0.522***	0.522***	−0.359***	−0.448***	−0.447***
	(0.001)	(0.004)	(0.004)	(0.001)	(0.007)	(0.007)	(0.001)	(0.007)	(0.007)
Beds = 4+	0.564***	0.884***	0.884***	0.281***	0.433***	0.432***	−0.313***	−0.391***	−0.390***
Source = Apartments.com × Source of Income protected area	(0.001)	(0.004)	(0.004) 0.009*	(0.001)	(0.007)	(0.007) 0.025***	(0.002)	(0.007)	(0.007) 0.016*
	(0.004)		(0.006)			(0.006)			
Source = Craigslist × Source of Income protected area	0.003		0.017**			0.013†			
	(0.005)		(0.006)			(0.007)			
Source = Zillow × Source of Income protected area	−0.008*		0.0007			0.039***			
(Intercept)	(0.004) 7.01***	0.833***	(0.005)	0.728***		(0.006)			
	(0.002)	(0.002)		(0.002)					
Census tract fixed effects?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Observations	2,452,076	2,452,076	2,452,076	2,452,076	2,452,076	2,452,076	2,452,076	2,452,076	2,452,076
BIC	2,225,608.4	−491,546.9	−491,880.3	2,454,062.5	1,523,167.7	1,522,847.1	2,795,582.6	2,282,599.9	2,282,012.3

Significance codes: ***: 0.001, **: 0.01, *: 0.05, †: 0.1.

Finally, the generally lower rents of GoSection8 correspond to a significantly greater likelihood of ads being below a given area's FMR. Net of differences in probability related to unit size, GoSection8 ads are roughly 30 percentage points more likely to fall below FMR compared to Craigslist, Zillow, and Apartments.com. Even after adjusting for neighborhood differences in this outcome, GoSection8 ads are about 3 to 4 percentage points more likely to be below FMR. Notably, however, Model 9 indicates that ads located in an area with SOI protections have slightly less separation between GoSection8 and mainstream platforms in the likelihood of being below FMR. So although average rents on mainstream platforms skew toward high rent/FMR ratios in places with SOI protections, results from this last model show that platforms like Zillow and Craigslist nonetheless have a greater share of ads that fall below FMR in these contexts. Overall, this first set of models provides evidence of the expected affordability of GoSection8 compared to mainstream platforms, with this manifesting in a greater likelihood of observing ads that meet HCV program criteria regardless of whether there are SOI protections.

Differences in Neighborhood Representation

Although the models in Table 1 demonstrate how, all else being equal, GoSection8 includes a greater share of affordable ads than other rental platforms, these opportunities may not be distributed equally across neighborhoods. As such, other platforms may provide insight into a greater number of neighborhoods—even when only considering their affordable opportunities. Figure 1 uses Gini coefficients to summarize the spatial compression overall and among below-FMR ads across neighborhoods in each of the 50 largest metropolitan areas, with coefficients for GoSection8 denoted by red circles and comparison platforms by blue squares (Apartments.com), diamonds (Craigslist) and triangles (Zillow). The left-hand panel of this figure, focused on overall spatial compression, highlights how GoSection8 ads tend to be most restricted in terms of their spatial coverage of different neighborhoods (mean Gini = .82). Craigslist tends to have the second greatest average spatial compression (.79) when considering all listings in these metropolitan areas, with Zillow and Apartments.com being roughly comparable in terms of their typical rank as least compressed (mean Gini = .58 and .61, respectively).

Further, although below-FMR listings are most prevalent on GoSection8, the right panel of Figure 1 underscores how these ads are uniquely compressed into a small set of neighborhoods compared to alternative sources of rental information. In fact, in most of the metropolitan areas shown, affordable GoSection8 listings have the most uneven distribution across all possible neighborhoods (mean Gini = .87). The other platforms vary in their degree of spatial compression and relative rank across the metropolitan areas shown. Specifically, Craigslist and Apartments.com have roughly comparable spatial compression on average (.77), whereas Zillow tends to have the least compression of its affordable ads into particular neighborhoods (mean Gini = .67) and would afford the most even selection of possible neighborhoods when searching for lower-rent housing.

Given that GoSection8 ads tend to be more affordable but relatively skewed toward particular neighborhoods, our focus now turns to understanding the neighborhoods represented on GoSection8 and competing mainstream information sources. Figure 2 provides Cohen's *d* statistics (with 95% confidence intervals) for different neighborhood population and housing composition measures. Values for GoSection8 are again denoted by red circles, in contrast to blue squares (Apartments.com), diamonds (Craigslist) and triangles (Zillow) for the comparison platforms.

The markedly different levels of statistics between GoSection8 and the comparison platforms show that ads on GoSection8 represent a significantly different set of neighborhoods than Apartments.com, Craigslist, or Zillow—all of which are fairly comparable in their statistics' levels across demographic and housing measures. Although prior studies have noted the relative paucity of activity on Craigslist and Apartments.com within neighborhoods with lower SES and

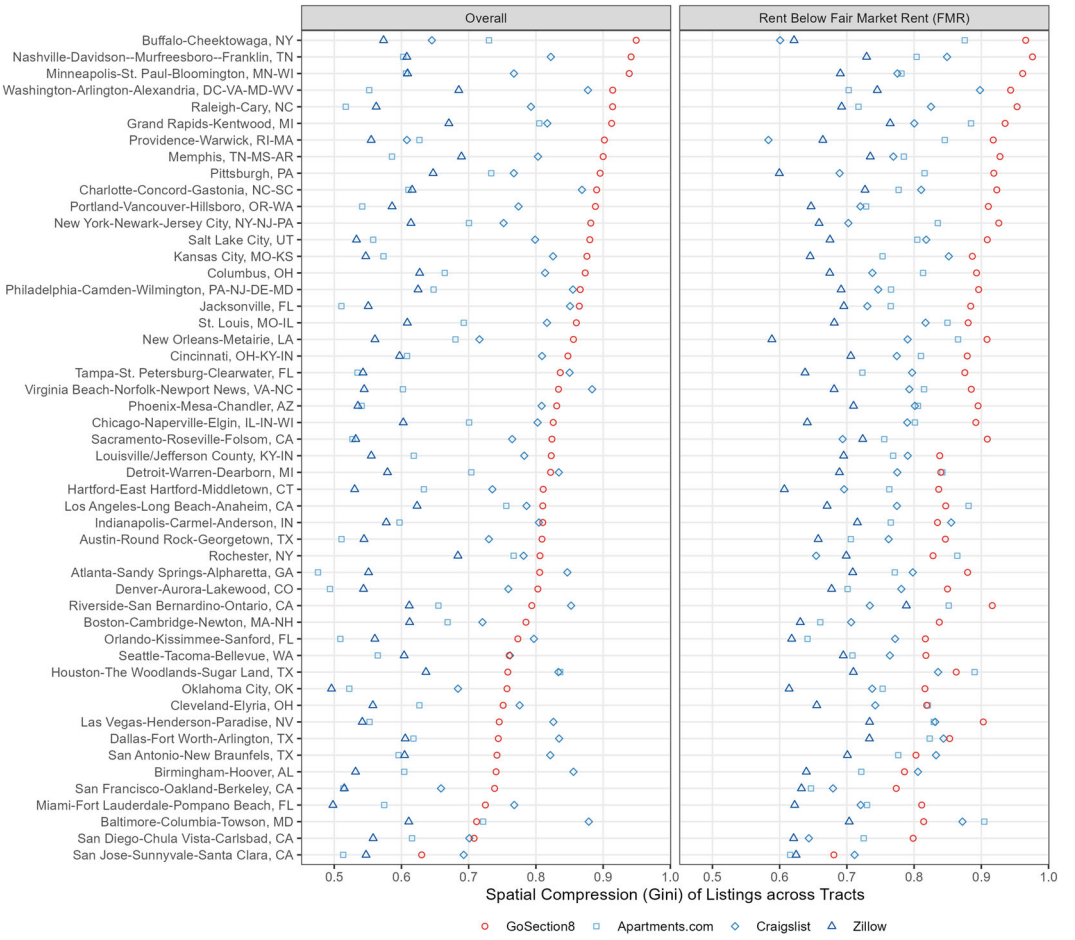

Figure 1. Spatial compression of all ads and below fair market rent (FMR) ads for GoSection8 and comparison platforms (Craigslist, Zillow, and Apartments.com) among the 50 largest metropolitan areas.

greater Black and Latinx representation (Boeing, 2020, Hess et al., 2021), it is not that these neighborhoods are not online *per se*. Rather, they are disproportionately represented in a different online space—GoSection8—rather than platforms aimed at more general populations of home searchers. Listings appearing in GoSection8 are highly concentrated in areas containing relatively large shares of Black, Latinx, and lower SES populations. Notably, the only variables whose Cohen's *d* statistics are strong (i.e., almost an entire standard deviation difference between over- and underrepresented neighborhoods) are (a) share non-Latinx White, (b) share non-Latinx Black and (c) the neighborhood poverty rate, with these values in sharp contrast to the comparison platforms' average difference on these measures between over- and underrepresented tracts. Beyond differences in the socioeconomic and ethnoracial composition of neighborhoods represented on GoSection8, the other nonnegligible (i.e., $|d| \geq .2$) statistics point to GoSection8 favoring neighborhoods that are closer to central business districts, that have an older housing stock and where internet access is generally less prevalent and more likely to be through a cell phone plan only.

These patterns of neighborhood representation are important for understanding how real-world residential inequalities are propagated online through information segmented across different platforms. GoSection8 and the comparison platforms are not wholly separate from each other, but they nonetheless present different sets of housing opportunities and neighborhood

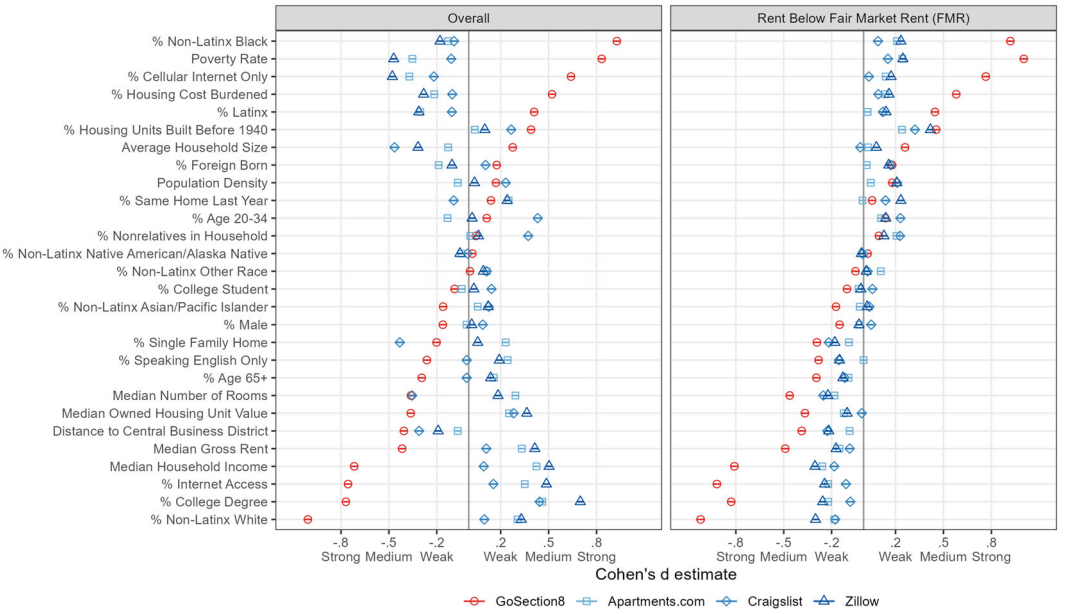

Figure 2. Standardized differences in means on housing and neighborhood measures between over- and underrepresented tracts for GoSection8 and comparison platforms (Craigslist, Zillow, and Apartments.com).

contexts to their users. Importantly, even when looking at affordable opportunities, the neighborhoods with affordable units overrepresented on Apartments.com, Craigslist, and Zillow have only negligible to weak differences from the relatively underrepresented ones on most measures. These are in stark contrast to the differences between over- and underrepresented tracts with affordable housing on GoSection8, with almost a full standard deviation separating the over- and underrepresented tracts' average values for Black and White population composition, the neighborhood poverty rate, and the share of households with internet access.

Next, Figure 3 extends the prior analysis by using a measure of existing HCV household concentration and indexes from HUD's AFFH data to compare the degree to which the ads represented on GoSection8 are facilitative of moves toward more socioeconomic opportunity and deconcentration of voucher-assisted households. First, overrepresented tracts on GoSection8 average a considerably greater number of HCV households than tracts that are relatively underrepresented on the platform, whereas the comparison platforms all have a relatively negligible value for this measure. Although there are modestly higher levels for the transit trip index among overrepresented neighborhoods on GoSection8, nonetheless such neighborhoods also have significantly lower levels for the job proximity, environmental health, school proficiency, low poverty and labor market engagement indices. Furthermore, the values for GoSection8 stand in contrast to Apartments.com, Craigslist, and Zillow, all of which have listings that are overrepresented in neighborhoods with greater school proficiency, lower poverty, and greater labor market engagement. Importantly, the differences between over- and underrepresented tracts for GoSection8 persist or are even exacerbated when we focus on units with advertised rents below FMR, all while the differences based on representation among Apartments.com, Craigslist, and Zillow are more muted among these affordable listings.

Differences in Neighborhood Representation Amid Racial/Ethnic Segregation

Whereas the prior analyses contribute important evidence about differences in the housing and neighborhoods represented on GoSection8 compared to comparison information sources, our

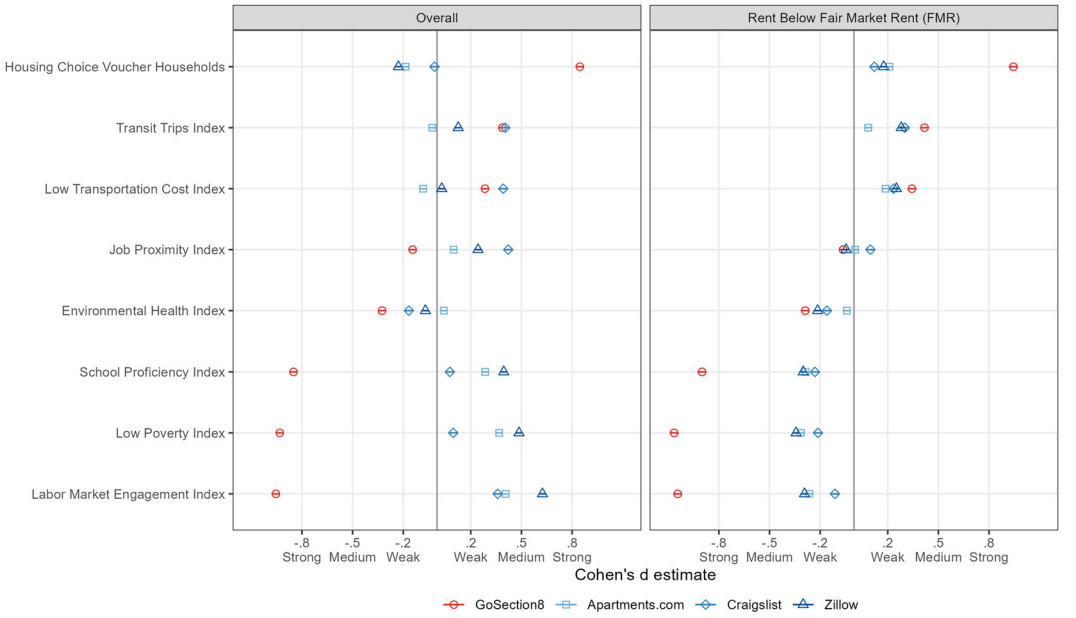

Figure 3. Standardized differences in means on Affirmatively Furthering Fair Housing (AFFH) measures and total Housing Choice Voucher households between over- and underrepresented tracts for GoSection8 and comparison platforms (Craigslist, Zillow, and Apartments.com).

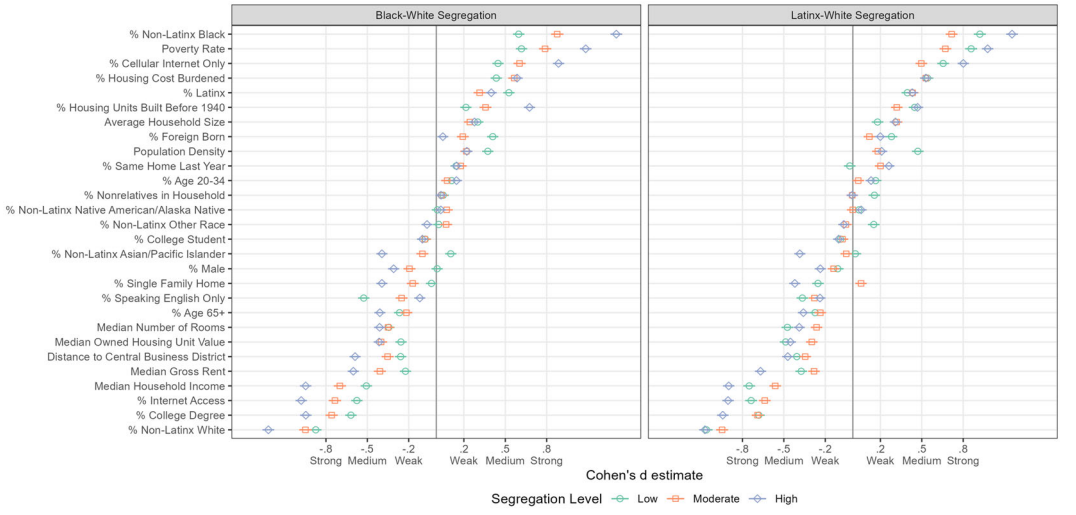

Figure 4. Standardized differences in means on housing and population measures between over- and underrepresented tracts for GoSection8 across high, medium, and low levels of metropolitan racial/ethnic segregation.

second research question focuses on whether and to what extent information segmentation varies across metropolitan areas characterized by different levels of residential segregation by race and ethnicity. Figure 4 accordingly provides two series of Cohen's *d* analyses, one for Black–White segregation and one for Latinx–White segregation, each with statistics for neighborhood representation among metropolitan areas where there are low, moderate, and high levels of racial or ethnic segregation.

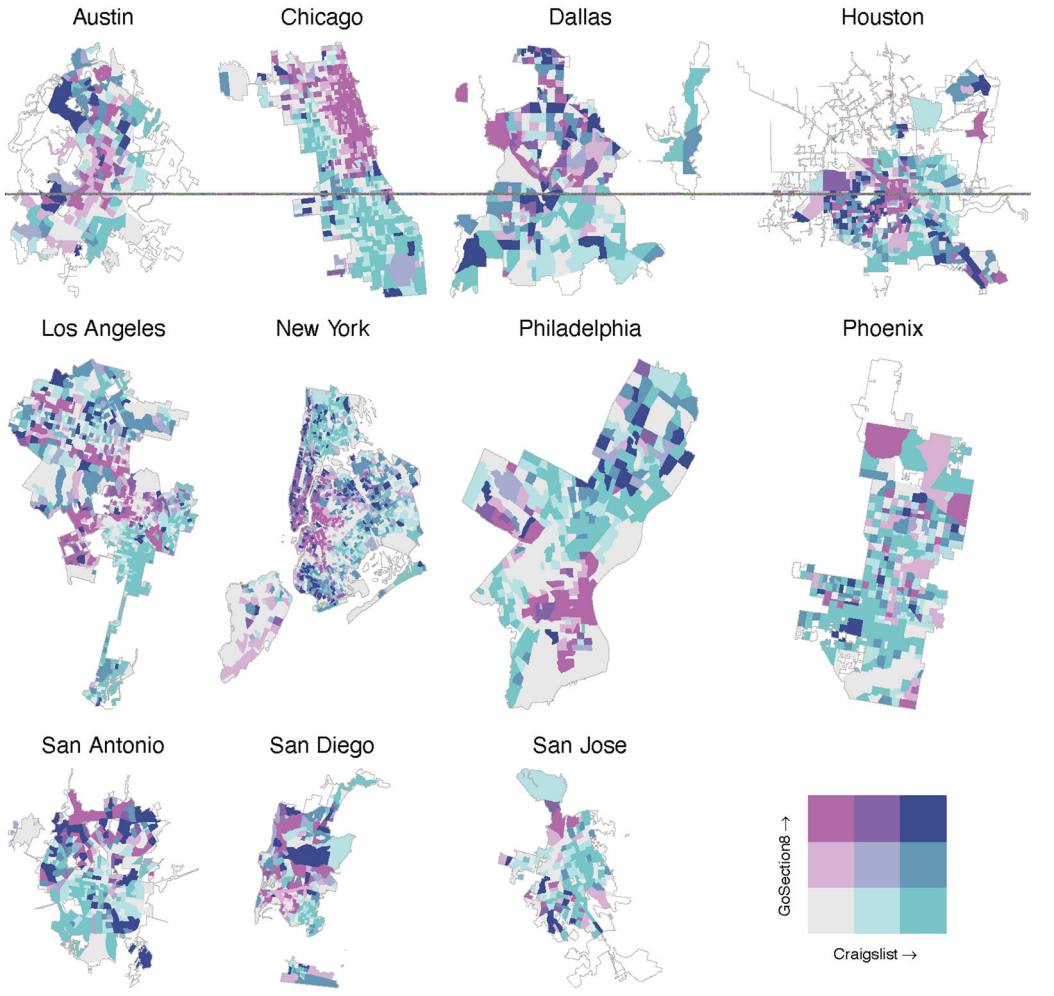

Figure 5. Underrepresented neighborhoods on Craigslist and GoSection8 within the largest 11 cities in the United States.

The results indicate that listings on GoSection8 in more segregated markets tend to be especially concentrated in relatively disadvantaged neighborhoods. Greater Latinx–White and Black–White segregation in the metropolitan area increases the likelihood that a household using GoSection8 will be exposed disproportionately to rental opportunities in neighborhoods that have greater neighborhood poverty rates, more cost burdened households, and more segregated racial/ethnic compositions. These findings for GoSection8's neighborhood coverage across levels of segregation stand in contrast to dynamics with comparison platforms in the existing literature, where greater segregation only tended to associate with less listing activity on Craigslist and Apartments.com in neighborhoods with greater Black and Latinx representation (Hess et al., 2021). The variations in neighborhood representation based on broader patterns of segregation are important for understanding how existing restrictions on housing search in places with high levels of racialized segmentation are only compounded by information that is slanted toward less advantaged areas.

Viewing these patterns spatially only serves to make the correspondence between segmented information and neighborhood segregation clearer. Figure 5 is a set of bivariate choropleth maps describing the spatial distribution of underrepresented neighborhoods across the 11 largest cities within the United States. Light blue values denote neighborhoods

underrepresented on Craigslist alone, pink neighborhoods denote neighborhoods underrepresented on GoSection8 alone, and dark blue values denote neighborhoods underrepresented across both of these information sources. If these platforms capture segmented information about these cities' rental markets, we would expect to see separated zones of light blue and pink describing each source's relative coverage gaps. In contrast, if these platforms have similar gaps in their coverage we would expect clusters of dark blue, with these areas perhaps mostly served by other platforms or areas where households use offline information, by and large.

In practice, segmentation of information is the rule, with Craigslist and GoSection8 describing substantially different information environments among most of the cities shown in Figure 5. In most cities, the platform one uses greatly structures the neighborhood set one potentially observes. In some historically segregated cities like Chicago and Philadelphia, the segmentation of information based on neighborhood segregation is essentially complete. Craigslist underrepresents Chicago's South Side and West Side neighborhoods where Black and Latinx shares are greatest, whereas GoSection8 underrepresents the Loop and North Side neighborhoods where White shares are greatest. Only in more integrated areas like San Jose is there general consistency between platforms to the point where the spatial distribution does not have obvious clustering of platform coverage. Comparable figures with Zillow and Apartments.com as the comparison platform are available in section D of our online supplement (Supplemental file). Despite using a different reference distribution to compare with GoSection8, these figures support the same conclusion: GoSection8 and the comparison platforms cover different segments of cities' respective rental markets, and this segmentation of online resources is especially pronounced in highly segregated metropolitan areas.

Given the history of social inequalities manifesting as spatial inequalities in the United States, online platform segmentation through GoSection8 and these comparison platforms means they cover different sections of the urban environment. The pernicious legacies of redlining and other historical forms of discrimination can even be observed in relation to these patterns of segmentation, with models available in section E of our online supplement (Supplemental file) demonstrating that, among metropolitan neighborhoods where the Home Owners Lending Corporation (HOLC) assigned a grade of D for hazardous, GoSection8 ads consistently are more likely to appear in such neighborhoods, regardless of whether one is looking at all ads across the four platforms or just those with affordable rents. Overall, the patterns of representation across these platforms suggest that broader patterns of segregation by race and ethnicity exacerbate the segmentation of information across different platforms. Further, in some of the most segregated contexts where information environments are most segmented, the strong differences in the neighborhoods one tends to see on GoSection8 versus mainstream sources correspond to the acute spatial inequalities wrought by historical discrimination and *de jure* residential segregation.

User Interface Mechanisms and Stratified Housing Search Outcomes

The findings so far suggest that households using GoSection8 in more segregated metropolitan areas are likely to face difficulties in locating rental opportunities outside of neighborhoods with higher poverty rates, and these dynamics are likely magnified by the way the platform determines ads' rank on a given location's listing index. Unlike competing sources of information where "Featured" ads may exist but tend to be mixed in throughout a set of search results, GoSection8 is unique in presenting such ads in their entirety to the user prior to showing any "Basic" ads posted by landlords without an expensive subscription to the platform. As a result, these featured listings are likely to be quite prominent among the information gathered by users of the platform. To the extent that landlords in higher poverty neighborhoods are more likely to

Table 2. Logistic regression models for high and concentrated neighborhood poverty levels among GoSection8 "Featured" and "Basic" ads.

	Tract poverty rate ≥ 20%?				Tract poverty rate ≥ 30%?			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Featured ad = True	0.267***	0.248**	−0.772*	−0.719†	0.206***	0.210**	−0.426	−0.366
	(0.074)	(0.082)	(0.379)	(0.395)	(0.058)	(0.068)	(0.324)	(0.356)
Rent asked (in $1000s)	−1.47***	−1.47***	−1.46***	−1.47***	−1.32***	−1.32***	−1.31***	−1.32***
	(0.273)	(0.274)	(0.274)	(0.275)	(0.230)	(0.231)	(0.231)	(0.232)
Beds = 1	0.151	0.152	0.153	0.156	0.171	0.171	0.171	0.174
	(0.123)	(0.122)	(0.123)	(0.122)	(0.141)	(0.140)	(0.141)	(0.139)
Beds = 2	0.658***	0.658***	0.654***	0.661***	0.644***	0.644***	0.641***	0.646***
	(0.162)	(0.162)	(0.163)	(0.163)	(0.152)	(0.151)	(0.152)	(0.150)
Beds = 3	1.18***	1.18***	1.17***	1.18***	1.08***	1.08***	1.08***	1.08***
	(0.221)	(0.222)	(0.223)	(0.224)	(0.209)	(0.209)	(0.209)	(0.209)
Beds = 4+	1.59***	1.59***	1.57***	1.58***	1.44***	1.44***	1.43***	1.44***
	(0.324)	(0.325)	(0.325)	(0.327)	(0.295)	(0.296)	(0.295)	(0.295)
SOI protected area	1.14**	1.13**	1.12**	1.13**	1.02*	1.02*	1.01*	1.02*
	(0.393)	(0.375)	(0.385)	(0.389)	(0.456)	(0.434)	(0.455)	(0.455)
Featured ad × Source of Income protected area		0.028				−0.005		
		(0.126)				(0.116)		
Featured ad × Black–White segregation			1.64*				0.975†	
			(0.645)				(0.509)	
Featured ad × Latinx–White segregation				1.92*				1.11
				(0.845)				(0.752)
Metro fixed effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	76,618	76,618	76,618	76,618	75,917	75,917	75,917	75,917
BIC	88,311.7	88,322.4	88,253.7	88,261.2	79,024.2	79,035.4	79,014.1	79,017.6

Note. Clustered standard errors are given in parentheses.
Significance codes: ***: 0.001, **: 0.01, *: 0.05, †: 0.1.

pay for such subscriptions to search priority and proprietary market data, this interface component may worsen the base likelihood of finding housing in lower-poverty contexts using GoSection8.

Although this dynamic may seem contrary to expectations at first, the reliable monthly rent payment ensured by the HCV program may motivate some landlords who otherwise struggle to consistently lease their units due to location in a high-poverty neighborhood context to see a relatively greater return on whatever fee is attached to promoted listings on GoSection8. Given greater prevalence of higher poverty neighborhoods in more segregated housing markets, landlords in those markets may be even more likely to rely on such marketing tactics in a way that further structures what housing opportunities households—particularly assisted ones—see when searching on a given platform.

Table 2 uses logistic regression models to understand the extent to which such "Featured" ads disproportionately favor high-poverty (20+%) and concentrated-poverty (30+%) contexts. These models adjust for the rent advertised in the listing and the size (in bedrooms) of the unit, and include metropolitan fixed effects to account for differences in characteristics such as neighborhood poverty prevalence across the markets covered within our GoSection8 data. Models 1 and 5 respectively show that, holding all else constant, a Featured ad on GoSection8 has 28% greater odds of being located in a high-poverty neighborhood, and 22% greater odds of being located in a concentrated-poverty neighborhood.

Models 2 and 6 then indicate, even after accounting for time-invariant differences across metropolitan areas, there are still comparable differences in the odds of Featured ads, as compared to Basic ads, favoring less-advantaged contexts. These models also show how ads in SOI-protected jurisdictions have relatively higher odds of being located in high- and concentrated-poverty neighborhoods, which we interpret as likely reflecting the uneven adoption of these laws within metropolitan areas (i.e., with urban jurisdictions more likely to adopt such protections than suburban ones). Despite this association between SOI location and the

neighborhood poverty outcomes, we do not find evidence of an interaction between SOI protections and the Featured/Basic differences and conclude that this page rank dynamic exists even in the presence of additional protections for voucher holders. Next, Models 3 and 7 show how there are differences in the odds of Featured ads being in high- and concentrated-poverty areas related to the degree of Black–White segregation in the metropolitan area, with more segregated metropolitan areas where Featured ads are disproportionately likely to be in relatively poorer tracts. Similarly, Models 4 and 8 show that these dynamics with Featured ads map onto patterns of Latinx-White segregation too, although only for high-poverty neighborhoods rather than concentrated-poverty neighborhoods as well.

The variation described in the models of Table 2 implies that Featured GoSection8 ads in relatively integrated metropolitan areas tend to have slightly lower levels of neighborhood poverty. However, as segregation rises to high levels (e.g., $\geq$.6), Featured ads start to disproportionately favor high-poverty and concentrated-poverty neighborhoods. This component of GoSection8's interface is not insurmountable, but the fact that landlords of units in higher poverty areas flood the first several pages with their vacancies likely increases search costs for households trying to secure affordable housing in a context with low neighborhood poverty. Notably, this interface dynamic is an aspect of online housing search that households using other platforms do not necessarily deal with, at least to the extent that these platforms may present such sponsored content gradually, and perhaps more importantly, that such promoted content tends to favor premium units in high-SES areas.

Discussion

Although we find that housing on GoSection8 is consistently more affordable when compared to alternatives like Craigslist, Apartments.com, and Zillow, the listings advertised on this platform nonetheless exhibit important differences beyond their cost. With respect to our first research question, we observed that the ads on GoSection8 are particularly compressed into a small number of neighborhoods, even when considering only those with affordable asking rents. Second, the neighborhoods observed among ads on GoSection8 are not only limited in terms of spatial coverage but are also systematically biased toward higher poverty, lower-SES neighborhoods where Black and Latinx populations have historically been most isolated from non-Latinx Whites. These observations cumulatively provide evidence for our first research question, with our novel multisource perspective illustrating how information gaps on platforms like Craigslist do not imply holes in online platforms' coverage altogether. Instead, we contribute evidence of a segmented online housing market, with GoSection8 providing information about affordable housing opportunities that heavily tilts housing searches toward the identification of housing in racially isolated, higher-poverty areas, all while Craigslist and other platforms tend to underrepresent such options.

Related to our second research question, our study also shows how the overrepresentation of higher poverty, more racially isolated neighborhoods is particularly pronounced in metropolitan areas characterized by greater residential segregation by race and ethnicity. Differences in online platforms' coverage in the presence of varying degrees of residential segregation suggest that the online segmentation of information is more complete in the markets characterized by existing residential stratification by race and ethnicity. Finally, related to our third research question, we also find evidence that the interface of a platform can itself become relevant to structuring what opportunities households are most likely to observe, with these dynamics being exacerbated based on broader conditions of segregation. Specifically, we observe associations between "Featured" listings and higher poverty locations that are conditional on levels of Black–White and Latinx–White residential segregation, with the unique interplay of landlords' interests and patterns of housing inequality leading to a potentially greater value of promoted content in

more segregated markets, even if this actively tilts the odds against assisted households finding "moves to opportunity."

For voucher mobility literature, our findings related to neighborhood representation demonstrate how the use of GoSection8 for housing search counseling and rent reasonableness data within the HCV program may constrain opportunities to locations inconsistent with upward mobility and AFFH goals. Even if there is utility in terms of the platform's greater proportion of landlords likely to accept vouchers, it is clear that GoSection8 does not provide information about the same set of rental opportunities as mainstream platforms, even within a given census tract. Recent quasi-experimental research showing that SOI protections enhance HCV mobility outcomes (Ellen et al., 2022), suggests a need for more adoption of such protections. Giving these policies more "teeth" could further help to ensure landlord compliance with any new protections HCV households have on the market. Although we find mixed evidence about how platform differences in affordability vary in the presence of SOI laws, we contend that reducing the significant onus placed on HCV households' to find voucher-friendly landlords could increase the success that voucher holders have when using mainstream platforms rather than GoSection8. Regardless, the differences in neighborhood representation and page-ranking dynamics on GoSection8 that we observed in the presence of metropolitan segregation suggest that efforts to counsel HCV households on online housing search strategies are likely to be beneficial regardless of whether a given household potentially has such protections while on the market.

For broader discussions about housing search in the online age, these results show how the underrepresentation of higher poverty and more racially/ethnically diverse neighborhoods on platforms like Craigslist and Apartments.com is not indicative of a lack of online coverage of these neighborhoods. Rather, these results point to a segmentation of online housing information that reflects, and likely reinforces, existing neighborhood inequalities. Our insights about the potential role of tilted user interfaces as a mechanism for structuring residential outcomes also shed light on an underappreciated way that "platform capitalism" intersects with racial inequalities within the context of the housing search process (McMillan Cottom, 2020; Srnicek, 2017). Larger landlords are more likely to have the resources to pay for Featured ads and may perceive aggressive advertising to HCV tenants as worth the cost given the difficulty that they otherwise face renting their units on the open market (Garboden et al., 2018; Rosen et al., 2021), creating theoretically important stratification in the amount and primacy of information about different types of landlords encountered by online housing searchers. Further, metros with high degrees of racial/ethnic residential segregation are where we find that Featured ads are most likely to be concentrated in higher poverty contexts, an empirical observation suggesting that there is a potentially larger search cost related to weeding through Featured ads before finding any potential "mom and pop" options on GoSection8. Overall, the interaction of GoSection8's business model with some landlords' interest in locking in subsidized tenants for units in otherwise disadvantaged areas potentially structures what GoSection8 users see in ways that users of other platforms do not deal with.

There are some important limitations to this study that are worth noting. First, we only consider ads' distribution across neighborhoods and rents in this analysis, and understanding how housing and neighborhoods are discussed on GoSection8 could reveal differences in neighborhood discourse with other platforms and unique HCV-related language like how landlords phrase conditions of voucher acceptance. A second limitation is that we do not have user data to see whether interface mechanisms are indeed detrimental and lead to search exhaustion in practice. Nonetheless, understanding how exhaustively households search through listings—as well as variations between households that lead to tighter search budgets—would provide insight into whether an interface mechanism like the one noted here with Featured ads is leading not just to a higher likelihood of seeing ads in high-poverty contexts, but also to mobility outcomes to such contexts. Finally, the COVID-19 pandemic has disrupted rental markets and housing conditions in important ways that our data cannot fully address. Our research relies on prepandemic data

about the distribution of recent movers to understand where we would expect listings to be distributed across neighborhoods, even though COVID-19 may have been associated with changes in the areas where such turnover occurs. We contend that our approach is best because no alternative data yet exist for use as a reference distribution, and supplementary analyses have shown similar representational dynamics even when omitting the ACS from such analyses altogether. Nevertheless, it is likely that COVID-19 has interacted with online platform dynamics in important ways that future research may yet uncover.

This research moves closer to mapping the coverage of different platforms in a manner that highlights the importance of looking beyond Craigslist in the effort to map the segmented online housing market. Our new methodology for calculating the expected number of rental ads across different neighborhoods and rent levels also crucially extends our capability to see where affordable housing—not just any housing—tends to be over- and underrepresented. Nevertheless, investigation of the patterning of information available to searchers utilizing Facebook, Nextdoor, and other platforms with more restricted access to information remains an important area of future research. Gated access to these resources makes scraping more difficult, but the advertising of opportunities through a more narrowly defined set of online users suggests a potential for this siloing of information to shape searches in a way that reinforces existing segregation. More research assessing who uses which platforms, among tenants and landlords alike, along with their motivations could shed light on important socially structured factors driving decisions to use—and, perhaps equally important, trust—particular platforms.

A second important direction for future research is to test whether and how the online dynamics observed in this study operate in contexts outside of the United States. Recent work highlights how real estate and property technologies have seen similarly rapid adoption in other developed contexts such as Australia, suggesting the same potential for online information segmentation as a mechanism for the reproduction of existing housing and neighborhood inequalities (Maalsen et al., 2021). By adopting a multisource perspective in contexts outside of the U.S., future research can test the extent to which information segmentation across platforms is fundamental to the "data broker" role that housing platforms aim to play within rental markets (Boulay et al., 2021).

Although the internet has already revolutionized how most households search for housing, these platforms operate within housing markets where stratification by race, ethnicity, and socioeconomic status remains acute. For this reason, the promises of wider information accessibility are held in check by the constraints of the existing landscape of place-based inequalities. Segmented information will only contribute to a continuing cycle of segregation, but by recognizing online platforms' relative biases and benefits, we can understand how long-standing residential stratification by race and ethnicity are reproduced online and reduce the link between social and digital inequalities.

Notes

1. As of September 2021, the website has rebranded itself as AffordableHousing.com.
2. Source-of-income protections require landlords to rent to qualified applicants regardless of where their income comes from, including vouchers, although there are many variations across jurisdictions in the scope of protections offered to renters. See Tighe et al. (2017) for a review of source-of-income discrimination laws.
3. Appendix C compares the characteristics of neighborhoods that are over/underrepresented on the four platforms using these two different reference distributions, and we detect limited substantive differences in our results related to patterns of neighborhood representation of GoSection8 and the comparison platforms.
4. The American Community Survey counts for renter-occupied housing units by monthly cash rent paid are binned, like many detailed American Community Survey counts (e.g., household income) published for small areas like census tracts. We use the lower bound of the American Community Survey bin to define whether the rents paid by households in the relevant bin were below Fair Market Rent. Because one could reasonably use the upper bound as an alternative, we tested our results under this specification using the upper bin value and found no substantive difference.

5. The dissimilarity index measures the share of a group's population that would need to move for each tract to have the same percentage of that group as the metropolitan region overall. It ranges from 0 (complete integration) to 1 (complete segregation).

Disclosure Statement

No potential conflict of interest was reported by the author(s).

Funding

Partial support for this research came from the Eunice Kennedy Shriver National Institute of Child Health and Human Development research infrastructure grant [P2C HD042828] and training grant [T32 HD101442-01] to the Center for Studies in Demography & Ecology at the University of Washington.

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