# Race, Self-Selection, and the Job Search Process[1]

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While existing research has documented persistent barriers facing African-American job seekers, far less research has questioned how job seekers respond to this reality. Do minorities self-select into particular segments of the labor market to avoid discrimination? Such questions have remained unanswered due to the lack of data available on the positions to which job seekers apply. Drawing on two original data sets with application-specific information, we find little evidence that blacks target or avoid particular job types. Rather, blacks cast a wider net in their search than similarly situated whites, including a greater range of occupational categories and characteristics in their pool of job applications. Additionally, we show that perceptions of discrimination are associated with increased search breadth, suggesting that broad search among African-Americans represents an adaptation to labor market discrimination. Together these findings provide novel evidence on the role of race and self-selection in the job search process.

## JOB SEARCH PROCESSES

The matching of individuals to jobs is a two-sided process, with job seekers selecting into openings and employers selecting from among those who apply (Logan 1996). While both forms of selection are critical to the ultimate dis-

tribution of labor market outcomes, we know relatively little about how job seekers decide where to search for work. This striking asymmetry in our knowledge about the job-matching process becomes particularly relevant in considering how race affects labor market placement. The majority of recent social scientific research has focused on the demand side of the labor market, investigating the degree to which employer preferences shape the distribution of opportunities available to minority workers (Kirschenman and Neckerman 1991; Moss and Tilly 2001; Bertrand and Mullainathan 2004; Pager et al. 2009). Where existing research has documented persistent barriers facing African-American job seekers, far less research has questioned how job seekers respond to this reality. Do minority job seekers self-select into particular segments of the labor market in ways that allow them to avoid discrimination? Do minorities tailor their job search strategies in response to perceived discrimination? Unfortunately existing labor force surveys are poorly suited to answer these questions because they lack information on the pool of jobs to which job seekers apply before finding and accepting a position. Existing patterns of labor market placement may reflect supply-side differences in search strategy, demand-side influences on selection, or some combination of the two. The ability to distinguish between these two sides of the matching process, and to identify patterns of self-selection at work, represents an important and much-overlooked aspect of the employment process.

In this study we employ original data from a statewide panel survey of unemployment insurance recipients in New Jersey to investigate job search patterns by race. Respondents were followed for up to 12 weeks, with weekly questions about their job search activity. Each week respondents were asked to list up to three job titles for which they had submitted an application, allowing us to examine racial differences in the targeting or breadth of their job search. In addition, we supplement the New Jersey data with a nationally representative cross-sectional data set that enables us to replicate our key findings in a national context and to better identify the mechanisms driving racial differences in search behavior. To our knowledge, these represent the first surveys to ask job seekers about the pool of jobs applied to in the course of searching for work. The results of this investigation hold important implications for theories of job search and the supply-side processes that contribute to labor market inequality.

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Theories of Job Search

There are extensive literatures on job search in both economics and sociology. The economics literature on job search focuses almost exclusively on wages as the key outcome of interest. Reservation wages are thought to guide behavior as job seekers evaluate opportunities among a "random draw" of wage offers (Lippman and McCall 1976). And yet the emphasis on wage offers in job search ignores the large fraction of search activity that does not result in a job offer.[2] Decisions by job seekers about where to search—based on some combination of preferences and perceived opportunity—represent an important constraint on the subsequent distribution of offers and, ultimately, an individual's placement in the labor market.

The sociological literature has also contributed to the study of job search, with its major contribution centered around search *methods*. The relevance of networks versus formal methods of job search has been well documented in the research literature (Granovetter 1974), with important implications for the distribution of opportunity. Half or more of all jobs are found based on leads from friends or family (Corcoran, Datcher, and Duncan 1980; Green, Tigges, and Browne 1995; Green, Tigges, and Diaz 1999; Falcon and Melendez 2001). Search methods have been shown to affect both the likelihood of employment and the quality of match between employee and job, with personal networks appearing to better direct job seekers to openings that suit their skills and preferences (Lin, Ensel, and Vaughn 1981; Fernandez and Weinberg 1997; Royster 2003; but see Mouw 2003). While research on search methods does attend to the strategies of job seekers that precede finding a job, we know little about the actual pool of jobs under consideration. Equally important to how people find out about job opportunities is which opportunities they consider. This aspect of the sorting process has largely been overlooked by scholarly investigation.

Race and Job Search

Questions about job search are particularly relevant to understanding the processes that generate racial inequality in the labor market. Where a large body of research documents employers' racial preferences and decision making (e.g., Kirschenman and Neckerman 1991; Bertrand and Mullainathan 2004; Pager et al. 2009) and the consequences of job placement for racial disparities in wages (e.g., Tomaskovic-Devey 1993; Huffman and

[2] Lippman and McCall's (1976) theoretical model allows for the possibility that some search results in no offer by allowing some employers to generate a wage offer of zero. Empirical research studying wage offers as the outcome of job search, by contrast, captures only that search activity that results in positive wage offers (Wolpin 1992). This truncated distribution provides a skewed perspective on job search, allowing us to observe only those select applications that result in offers (see Heckman 1979).

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Cohen 2004), we know far less about the decisions and strategies of job seekers that may influence patterns of racial inequality. The limited information that does exist on racial differences in job search strategies primarily relates to search intensity, geographic scope, and search methods. For example, black and white job seekers in the Multi-City Study of Urban Inequality (MCSUI) reported having contacted a similar number of employers in the previous 30 days of job search (9.3 vs. 9.4, respectively), though blacks reported spending slightly more hours per month on job search (28.01 vs. 25.8 hours for blacks vs. whites, respectively).[3] There is also some evidence that low-skilled blacks engage in job search that is more constrained geographically, although this constraint is mainly the result of lack of access to transportation as opposed to preferences or perceived constraints (Stoll 2005). Less than 2% of black respondents in the MCSUI data report that they avoided job search in particular neighborhoods for "racial reasons."[4] Finally, though some research argues that blacks are substantially disadvantaged by a lack of access to job networks (e.g., Royster 2003; Smith 2007), recent empirical investigations suggest that blacks and whites are equally likely to rely on friends and relatives in their job search (BLS 2010) and that the use of networks has few consequences for racial differences in reemployment (Mouw 2002; Fernandez and Fernandez-Mateo 2006). The existing literature thus points to some important components of job search that may affect patterns of racial inequality; but this literature also leaves much unanswered as to whether or how these various processes affect the ultimate distribution of jobs to which black and white job seekers apply.

Where empirical work on how race affects job search remains limited, the theoretical work on this question offers some clear predictions. Specifically, one branch of economic theory predicts that job seekers facing discrimination will tailor their searches in ways that minimize encounters with discriminatory employers. Information about the sectors, firms, or job types

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[3] Based on the authors' calculations. The MCSUI respondents were asked, "How many employers did you contact in (the last 30 days/the last month) of your job search?" and "In total, about how many hours did you spend looking for work in (the last 30 days/the last month) of your job search?" These tabulations are weighted averages for those respondents who indicated that they had looked for work during the past 30 days.

[4] Based on the authors' calculations. MCSUI respondents were asked whether or not they had ever looked for work in one of seven areas in their city. If they had not, they were asked the primary reason they had not looked for work in that area. Among coded responses was the category "racial reasons." The percentage reported above sums the percentage of respondents citing this explanation for each of the seven areas. The most common explanation for not having looked for work in an area was problems related to travel distance or transportation. Note that while conscious search strategies do not appear driven by racial concerns, perceived encounters with discrimination are nevertheless common. Among MCSUI respondents 46% of blacks report having faced racial discrimination during job search, and 16% report having experienced discrimination at work (Goldsmith et al. 2004).

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in which discrimination is likely to occur—derived from news reports, family and friends, or personal experience—can help to guide search strategies in ways that concentrate search time among employers most likely to hire individuals of a given group. In a critique of audit studies of discrimination, for example, James Heckman (1998) argues that the extent of discrimination encountered by real job seekers is reduced by targeted searches that match racial minorities to the kinds of employers willing to hire them:[5] "The impact of market discrimination is not determined by the most discriminatory practices in the market, or even by the average level of discrimination among firms, but rather by the level of discrimination at the firms where ethnic minorities or women actually end up buying, working and borrowing. It is at the margin that economic values are set. . . . Purposive sorting within markets eliminates the worst forms of discrimination" (Heckman 1998, pp. 102–3). Self-selection into labor market opportunities is thus proposed as an important strategy for avoiding discrimination.[6] The key assumption in this literature is that blacks can identify and avoid discrimination by self-selecting into the firms or jobs that are least likely to discriminate against members of their group.

Lundberg and Startz (2007) also emphasize the role of self-selection as a strategy for preempting discrimination: "In a two-sided search model, segregation can arise not only because members of a minority group are excluded by uninformed agents, but also through self-segregation of the minority in response to the adverse selection that may result from discrimination" (p. 460). The supply-side decisions of job seekers are thus viewed as a critical motor of the labor market sorting process. These perspectives argue for the importance of job seekers' decisions about how and where to search for work as key factors in determining the extent of discrimination and segregation experienced by labor market actors. Narrowed or targeted search strategies by racial minorities are viewed as an adaptation to discrimination that ultimately reinforces segmented labor market placement.[7]

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[5] Field experiments rely on a random sample of employers to generate their estimates; job seekers, by contrast, do not apply to a random sample of job openings but rather, according to Heckman, self-select into sectors of the labor market where their characteristics will be better rewarded.

[6] This perspective does not address the possible secondary consequences of self-selection: occupational crowding by race increases competition among minority job seekers for a narrower range of positions. Further, to the extent that jobs open to African-Americans are likely to be of lower skill, compensation, or other desirable characteristics, any strategic sorting to avoid discrimination may have the consequence of reducing the occupational returns for minority workers (Collins 1983; Parcel and Mueller 1983; Tomaskovic-Devey 1993).

[7] For similar arguments about self-selection and discrimination in other contexts, see Borjas and Bronars (1989) (self-employment) and Longhofer and Peters (2005) (credit markets).

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Theories of self-selection assume that minority job seekers can identify when and where discrimination will take place, thus informing a more tailored search strategy. We might refer to this model as "adaptation to discrimination with full information." In actual labor markets, however, discrimination is often difficult to identify or anticipate. In the absence of reliable information about the occurrence of discrimination, we might expect a very different adaptation process to emerge. Indeed, Goldsmith et al. (2004) conceptualize a more diffuse response to discrimination, with minority job seekers adapting to a generalized reality rather than localized knowledge about discrimination among specific firms or job types. In this model, rather than attempting to identify where discrimination will or will not take place, minorities instead experience a generalized detachment from specific occupational targets. "How does a job searcher facing discrimination attain harmony of their search related cognitions? . . . This person would discard their primary goal of obtaining a 'good job' and replace it with a less ambitious target of acquiring the 'best job available' under the circumstances" (Goldsmith et al. 2004, p. 22).[8] The authors here conceive of a "good job" primarily according to its wages. One might also conceive of a good job as one that is consistent with an individual's skills, prior experiences, or desired line of work. In this framework, targeting the "best job available under the circumstances" may imply making oneself available for any realistic opening rather than constraining one's search to a more narrowly defined preferred occupation. In this case the anticipation of discrimination would distort search in ways not reflected in a narrowing or targeting of job search, but rather through a broadening of search and consideration of a wider range of possible opportunities. Awareness of discrimination without specific information of its whereabouts (what we might call "adaptation to discrimination under conditions of asymmetric information") may lead job seekers to cast a wider net in their search with the goal of reaching at least some fraction of nondiscriminatory employers.[9]

The theoretical literature on job search thus offers competing predictions about possible racial differences in search strategy. One branch of economic theory anticipates a narrowing of job search among racial mi-

[8] Goldsmith et al. (2004) find that blacks who perceive having experienced discrimination in job search or at work do not differ in labor supply (measured as hours worked) from those who have not. Their empirical analysis does not consider potential effects on job search behavior.

[9] An alternate adaptation to the perception of diffuse discrimination is retreat. Indeed, a great deal of scholarly attention has focused on the growing numbers of young African-American men who have exited the formal labor market altogether ("discouraged workers") (Wilson 1996; Holzer and Offner 2005). While the proportion of young, noncollege men not in the labor force has been increasing, this group represents only a small fraction of African Americans overall. It is the strategy of those job seekers who choose to continue active search with which this investigation concerns itself.

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norities as a strategy for avoiding discrimination. Other perspectives, by contrast, predict less targeted search among blacks due to uncertainty about when and where discrimination is likely to occur. A third possibility, of course, is that blacks and whites share similar search strategies, applying to a comparable range of jobs given an equivalent set of qualifications and work histories.

Unfortunately, the empirical research testing theories of self-selection by race remains extremely limited.[10] In one of the few studies to consider racial differences among applicant pools, Holzer and Reaser (2000) analyze data from a study of employers in four metropolitan areas, comparing the racial composition of the applicant pool to the racial composition of new hires across firms. The authors find evidence that blacks are better represented in the applicant pools for jobs in unionized firms and large establishments (which pay relatively higher wages to African-Americans) and for jobs located near public transportation, near black populations, and in jobs where the fraction of black customers is high. The authors conclude that "black applicants apply for work where their chances of being hired are greater, indicating rationality in the self-selection process" (Holzer and Reaser 2000, p. 377). On the other hand, blacks were less represented among the applicant pools for jobs in suburban areas and also showed evidence of "crowding" in lower paying jobs. Holzer and Reaser's work provides an important window into the sorting of applicants across different job sectors. At the same time, a perspective based on employer self-reports remains somewhat limited in its ability to identify the processes leading to an observed distribution of applicants. Applicant pools differ by education and work experience, among other characteristics, which themselves may account for much of the differential sorting by racial groups. Likewise, employers receptive to hiring blacks may be more likely to notice and report large numbers of blacks among their applicant pool. At the aggregate level, this study does point to some evidence of self-selection: blacks appear to be better represented in the applicant pools for jobs that are more likely to hire blacks. But beyond that, we know little about how this association comes about.

While very little empirical literature has studied patterns of self-selection on the basis of race, there does exist a small literature considering self-selection on the basis of gender. In this research we find evidence that women

[10] A large number of empirical studies in economics address the topics of "self-selection" and "job search." This literature, however, tends to observe the placement of workers across sectors or occupations and assume that their relative positions are the result of worker preferences (which are empirically differentiated from random sorting). The relative influences of worker self-selection and employer-driven selection tend not to be discussed or empirically differentiated (e.g., Roy 1951; Heckman and Sedlacek 1985; Demiralp 2007).

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self-select into college majors and occupational tracks based on gendered considerations (including discrimination) and that processes of self-selection explain a large fraction of occupational segregation (Jacobs 1995; Correll 2001) and in turn the gender gap in pay (England 1989; Kilbourne et al. 1994). Recent work by Fernandez and Friedrich (2011) directly measures the decision making of job seekers by studying selection into two gender-typed jobs (receptionist and computer programmer) within a single call-center firm. The authors find clear evidence of gender sorting—net of measured skill differences, urgency of search, and other relevant controls—with women applicants more often opting in to the stereotypically female job type and vice versa for men. The authors find no differences in patterns of gender sorting by race. Despite clear evidence of gendered preferences on the part of applicants, the authors conclude that the degree of self-selection observed at this stage is not sufficient to explain patterns of occupational segregation within the local labor market. Ultimately these results suggest that applicants do self-select into occupations on the basis of gender, but that employer sorting also plays an important role in maintaining a gendered division of labor. This work significantly contributes to our understanding of the job sorting process by explicitly taking the supply-side decision making of applicants into account. At the same time, the focus on two highly gendered job types provides little opportunity to examine to what extent sorting on the basis of race guides search behavior in these or other occupational domains.

Our analysis builds on this small body of existing research to further investigate patterns of self-selection into job types on the basis of race. It may be the case that, similar to women, blacks exhibit high degrees of self-selection into job types that are perceived to be race appropriate, such as jobs with less customer interaction or those requiring more manual skill (e.g., Kirschenman and Neckerman 1991; Moss and Tilly 2001). On the other hand, unlike the case for gender, for which an extensive array of job types can be reliably coded as "male" or "female," the degree of occupational segregation by race is not nearly as pronounced (Alonso-Villar, Rio, and Gradin 2012). This difference has implications both for the development of preferences for gendered or racialized job types as well as for the ability to reliably identify those jobs for which a member of one's group is more or less likely to encounter barriers to entry. The existing literature on self-selection by gender thus represents a useful starting point for this analysis, but it remains an open question as to whether search patterns by race will mirror those by gender. Our empirical analysis contributes to this question by directly comparing patterns of job search behavior by both race and gender.

In our empirical analysis, discussed in depth below, we draw on original high-frequency longitudinal survey data that enable us to explore detailed information about the actual application pools of job seekers. With unique prospective information on the pool of jobs respondents apply to during

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the course of job search, this study allows us to assess the extent to which self-selection by race influences the pattern of labor market entry.

DATA AND METHODS

Our primary analyses draw on data from the New Jersey Unemployment Insurance (NJUI) survey, which followed a random sample of New Jersey Unemployment Insurance recipients over a 12-week period at the end of 2009 and beginning of 2010 using a series of online surveys (Krueger and Mueller 2011).[11] Typical of online panels, response rates were low (10%) and attrition further reduced participation over the course of the study. Since response rates and sample attrition have important implications for the representativeness and generalizability of any survey data, we devote considerable attention to this issue before proceeding to our analysis.

Response rates are often used as an indirect proxy for sample selectivity, but they are in and of themselves a relatively crude measure of representativeness. In a recent review of the literature, Groves (2006) suggests that the "nonresponse rate alone is a weak predictor of nonresponse bias" (p. 662; see also Massey and Tourangeau 2013).[12] In our case, the unusual nature of our data allows for explicit tests of the extent of bias introduced by selective response. Indeed, Krueger and Mueller (2011) were granted access to the administrative data for the full universe of unemployment insurance (UI) recipients in New Jersey, allowing them to conduct a thorough examination of differences between the present sample and the full population ($N = 362,292$). Their analyses indicate that the NJUI sample is more likely to have a college degree, to be female, and to have had high earnings in the year prior to becoming unemployed relative to the larger population, factors they correct for using survey weights (see Krueger and Mueller 2011). We conducted further comparisons between the full UI population and the current sample, focusing particularly on possible racial differences in sample selection. In these analyses we find some evidence that black men are less likely to participate than their white counterparts, though there is little evidence that this relationship differs by educational attainment (an important proxy for skill). As we discuss below, we pay special attention to the balance of gender,

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[11] The job search module, from which the data for this study were drawn, was administered in 11 of the 12 weeks of this survey.

[12] Leading social science journals show increasing recognition of the distinction between response rates and response bias, as reflected in recent publications that carefully assess processes of sample selection in the face of low response rates. See, e.g., Shiao and Tuan (2008) with a response rate of 16.3%; Rosenfeld and Thomas (2012) with a composite overall response rate of 13%; Marx (2011) 20.6%; Allgood et al. (2004) 9%; Bode et al. (2011) 11.5%; Goren et al. (2009) 18.2%.

age, and education between the white and black respondents in our sample in all analyses through the use of matching techniques.

Corrections for sample selectivity on the basis of observable characteristics are relatively straightforward and well understood. Of course the real concern of sample bias relates to the role of possible unobserved differences between the sample and the relevant population from which it is drawn. Fortunately, here again access to the administrative database with the full universe of UI recipients allows us to explore some key possible unobserved differences between our sample and the larger population. In particular, we compare the trajectories of UI recipients who participated in the survey with the overall UI universe according to rates of exit from UI benefits. Exit rates from UI are primarily determined by reemployment or the expiration of benefits. After matching individuals on duration of benefit receipt, remaining differences in exit rates should be primarily driven by rates of job acquisition. Following this approach, Krueger and Mueller (2011) report Kaplan-Meier estimates of the UI exit rate indicating a weekly exit rate for survey respondents that closely tracks that of nonrespondents and is within the 95% confidence interval at almost all durations. We replicate this analysis with models run separately by race and find that the pattern for blacks closely matches that of the overall sample. Given that a key selection concern in any study of job search is that the sample represents an unusually motivated group, the fact that exit rates for the sample appear similar to exit rates for those who did not opt into the study is reassuring. Whatever selection pressures may affect sample inclusion, they do not appear closely related to the success of job search.

As a final check on the selectivity of our sample, we replicate our key findings using a national probability sample of job seekers with a significantly higher response rate (see details below). Our results appear highly consistent across the two samples, suggesting that the underlying association between race and search breadth is both robust and generalizable.

Overall, then, while response rates in the NJUI survey are low, we have unusually good information about the nature of selection into this sample, allowing us to adjust for existing differences in our analysis and to test for sensitivity along key dimensions of differentiation. Fortunately, apart from the observed differences noted above, we have little reason to believe that our sample systematically differs from the broader population—in New Jersey or nationally—on key indicators of job search success.

Data Description

The NJUI data are drawn from three sources. First, administrative data are drawn from New Jersey's Department of Labor and Workforce De-

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velopment (NJDLWD), which runs the state's unemployment insurance program. The administrative data fields include respondents' gender, race, ethnicity, age, education, previous occupation, previous industry, and earnings and weeks worked in the year prior to unemployment. Second, each respondent completed an entry survey during the first week that collected information about the respondents' previous work experience, including job tenure and duration of unemployment at the start of the survey period. Finally, respondents completed a survey each week containing questions about their job search activities and their employment status.[13]

The NJUI job search module was administered to a sample of 4,792 respondents. We limit our sample to white and black respondents of prime working age—between the ages of 18 and 64 ($n = 3,447$).[14] Because we are interested in the search strategies of those actively looking for work, in the primary analyses below we exclude individuals not engaged in positive search (i.e., those who did not list any job titles) during the full period of observation (16%). After this exclusion, our final analytic sample ($n = 2,910$) is 18% black, 46% male, and has a mean age of 45.7. Of the respondents, 18% have no more than a high school degree, 30% have some college, 38% are college graduates, and 14% have graduate degrees.[15] Because these sample members qualify for unemployment insurance benefits, they have generally more stable work histories than the average unemployed individual, with tenure in their last job averaging over five years.[16] Mean unemployment duration for this sample at the start of the survey period was 12.6 months. Additionally, because our sample is drawn from UI recipients, it is by definition focused on the unemployed. We leave for future research the task of investigating whether the patterns identified here obtain for

[13] In a letter inviting their participation as well as on a consent screen at the start of the survey, respondents were assured that their participation was voluntary and would not affect their eligibility for UI benefits. They were also assured that their survey responses would remain confidential and would not be shared with NJDLWD.

[14] To accommodate the use of matching techniques, discussed below, we limit our sample to non-Hispanic black and white respondents. Analyses with the full sample indicate that racial differences in job search, and particularly job search breadth, are most pronounced between blacks and whites.

[15] Less than 2% of respondents in our sample are high school dropouts; given their small numbers we combine them here with high school graduates. Results are not substantively affected by this categorization.

[16] In order to qualify for UI benefits in New Jersey a worker must demonstrate 20 weeks of work in the past year, earning a minimum of $143 in each week, or must demonstrate total annual earnings of at least 1,000 times the state minimum hourly wage ($7.25 per hour as of July 2009). At the time of this survey N.J. workers were eligible for up to 99 weeks of coverage, including regular UI and extended coverage (see Krueger and Mueller [2011] for additional details).

those employed full-time while searching for work (see app. A for additional details about the NJUI sample).

Each week, respondents were asked to report the number of jobs they had applied to in the past seven days and then to list the job titles for the three most recent jobs they had applied to during that time.[17] Over the course of the study, the full sample of respondents listed a total of 35,106 job titles. These open-text job titles were then coded into Standard Occupational Classification (SOC) codes, a system generated by the Bureau of Labor Statistics for classifying workers into uniform occupational categories. The 2000 SOC is organized as a four-tiered classification system, with each tier reflecting a different level of aggregation. The first tier includes 23 major occupational groups, which are then further subdivided into 96 "minor groups" (tier 2). The third and fourth tiers further subdivide occupations into 449 and 821 categories, respectively. In the following analysis, we rely on the first two tiers, representing the 23-category and 96-category coding schemes. Differences among categories according to more detailed coding schemes are small and subtle and may lead to an overstatement of the degree of diversity in job search. For example, the category "sales and related occupations" from the 23-category scheme can be further disaggregated into the more specific positions of "supervisors of sales workers," "retail sales workers," "sales representatives, services," "sales representatives, wholesale," and "other sales and related workers," which are each separately identified in the 96-category scheme. Further differentiation according to more detailed classification schemes goes beyond our goal of identifying heterogeneity in job search (see app. B for the full list of 23- and 96-category SOC titles).[18]

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[17] An important feature underlying our argument is that job seekers bear some cost when applying for jobs. If there were no costs associated with submitting an application, we would expect job seekers to apply for all existing openings. By contrast, we believe there are at least two primary costs faced by job seekers. First, despite the ease of online job applications, widespread advice to job seekers emphasizes the importance of customizing application materials for each opening (see, e.g., Greene and Martel 2015). Likewise, both online and in-person applications require the completion of forms specific to each employer. Thus, there is a clear cost of time for submitting a high-quality application. Second, and particularly important in the context of understanding racial differences in job search behavior, the job search process can impose significant psychic costs. Research suggests that job search can be a tiring and demoralizing experience that can be made even more challenging when an applicant faces discrimination (see Pager 2007, p. 148). For these reasons, we do not expect job seekers to apply to every available job opening, but rather to select a subset of jobs that they hope will maximize their chances of success. Indeed, roughly one-third of both black and white respondents in the NJUI study reported having *not* applied for at least one job for which they were qualified over the past week (see also n. 33 below).

[18] For example, the "sales representatives, services" category can be further disaggregated into advertising sales, insurance sales, financial services sales, and so on at the 441 aggregation scheme. We are not convinced that this level of detail will better capture the

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Classifying job titles into corresponding SOC codes requires extensive training and expertise. The job titles for this project were coded by trained coders at the University of Wisconsin Survey Center, which has long-standing expertise in this area. More than 97% of the job titles provided by respondents were successfully matched to three-digit SOC codes. We then performed a series of reliability checks on the codes using contextual information from prior and subsequent reporting weeks and by comparing similarly worded open-text responses to assigned SOC codes. The final codes used in this study thus represent the combined efforts of multiple rounds of review.

We use information about the specific pool of jobs a given respondent applied to over the course of the entire survey period to construct measures of targeting and breadth of search. One set of analyses uses occupations as discrete variables, examining the selection into specific occupational categories. A second set of analyses investigates targeting and breadth of search along more continuous dimensions. For these analyses, we match our occupational codes for the jobs to which respondents applied with information about those occupations from the American Community Survey (ACS) and data from O*NET (a classification of occupational skills created by the Bureau of Labor Statistics). From the ACS, we include measures of occupational racial composition (the proportion of workers in an occupation who are black), socioeconomic status, and occupational earnings scores.[19] Using the O*NET data, we consider the importance of a range of skills, including service orientation, critical thinking, and physical abilities (see app. C). These variables capture important dimensions of work that have been featured in discussions of racial disparities in employment; for example, service orientation can be considered a proxy for soft skills, critical thinking is a proxy for cognitive skills, and physical activities is a proxy for manual skills.

In studying racial differences in job search, it is important to control for a wide range of personal and human capital characteristics that may be correlated with race and the outcome of interest. Fortunately, the NJUI data contain a rich set of information about respondents from administrative records and survey responses, allowing us to better isolate the effects of race on job search. All models include controls for age, gender,

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substantive process of interest, but instead may reflect subdivisions that are not meaningful to the respondents themselves. At the same time, we find substantively similar results for analyses relying on both the 449 and 821 levels of aggregation.

[19] The occupational earnings score from the ACS represents a standardized percentile rank of median earnings. Scores on this variable represent the percentage of persons in occupations with lower standardized median earnings than the respondent's occupation. Scores are based on the earnings levels of the employed civilian labor force age 16 and above, excluding persons who did not work in the past year.

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education, marital status, number of children, and home ownership. In addition, we have a rich array of information about respondents' work histories. We control for the respondent's prior occupation and industry, allowing us to take into account the fact that some occupations and industries may be contracting while others are expanding, which themselves may influence search strategy and search breadth. We control for a respondent's earnings in the year prior to unemployment, which is often used as a proxy for the value of a worker's skill and experience up to that point (e.g., Fryer et al. 2011).[20] Together, earnings and weeks worked in the year prior to unemployment are the primary basis for determining a worker's UI benefit level and duration, which provides some sense of the buffer individuals can rely on while searching. We include controls for tenure in prior job and duration of unemployment. And finally, we include controls for the geographic scope of search, and, given the emphasis on search methods in existing studies of job search, for whether or not a respondent relied on referrals from friends or family.[21] Together this extensive range of control variables gives us confidence that we can identify racial differences in search strategy among otherwise very similar applicant profiles.

Matching for Sample Balance

Beyond standard covariate adjustment using multiple regression techniques, we pay particular attention to sample balance by race, the primary independent variable in our analyses. While multiple regression techniques introduce "controls" into the model to adjust for observable differences between groups, this approach may not be adequate if there is insufficient overlap, or balance, in the distribution of characteristics (i.e., education, gender, age, etc.) between key comparison groups. In order to address the problems that arise from sample imbalance across key variables of interest, researchers have turned to "matching" techniques (Harding 2003; Gangl 2010; Pais 2011). As Iacus, King, and Porro (2011) argue, "The key goal of matching is to prune observations from the data so that the remaining data have a better balance between the treated and control groups, meaning that the empirical distributions of the covariates (X) in the groups are more similar" (p. 2).

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[20] In fact, this variable is likely to represent a conservative estimate for African-Americans, given that it also reflects prior influences of discrimination.

[21] In other models we have controlled for the full array of search methods, including referrals from friends/family, employment agencies, direct contact with employers, and other means for finding out about job openings. These additions have little impact on our substantive findings. In addition, we find few significant racial differences in search methods: black job seekers do appear more likely to use formal job search methods than white job seekers, but use of other search methods (friends/family, direct contact, etc.) appear similar by race.

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For this analysis we use coarsened exact matching (CEM). In contrast to propensity score matching, which reduces multiple indicators to a single dimension, CEM allows researchers to independently and exactly match groups across multiple characteristics of interest. To execute this technique, the researcher first temporarily "coarsens" the matching variables into broader groups (e.g., continuous variables such as age can be "coarsened" into age categories); respondents from the treatment and control groups are then matched exactly within these coarsened groups. Once the matched samples have been generated, subsequent data analysis resumes use of the original (uncoarsened) values of all covariates (Blackwell et al. 2009).[22]

There are multiple advantages to using CEM. First, CEM is part of the monotonic imbalance class of matching methods, which means that reductions in imbalance on one variable do not impact balance on the other variables. Second, with CEM, the degree of model dependence is bounded ex ante by the researcher, leaving less vulnerability to misspecification of functional form. Third, CEM balances the nonlinearities and interactions between variables that exist in the data. Fourth, CEM restricts the matched data to areas of common empirical support, helping to ensure that the researchers are not extrapolating beyond the data. And, finally, comparisons with other matching methods, including optimized propensity score models, indicate that models using CEM achieve better balance and have a lower root mean square error (Ho et al. 2007; Blackwell et al. 2009; Iacus, King, and Porro 2011, 2012).

In our analysis we use the CEM routine in Stata to match white and black respondents on sex (2 groups), education (5 groups), age (5 groups), and the number of weeks they participated in the survey (11 groups).[23] We were able to successfully match 495 of the 525 black respondents in our sample, meaning that only 30 black respondents were not matched.[24] Additionally, the multivariate imbalance statistic was reduced from 0.6651 to 0.4377 using the CEM matching procedure, indicating a substantial

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[22] Note, however, that covariates in matched models do not allow for the same interpretation as those in standard regression analyses because the sample has been selected in such a way as to minimize the influence of these variables on the key relationship of interest.

[23] We coarsen the education variable into five groups: less than high school, high school degree, some college, college degree, and graduate degree. The age variable is coarsened into five groups: 18 to 25.5, 25.5 to 35.5, 35.5 to 45.5, 45.5 to 55.5, and 55.5 to 64 years old.

[24] Overall, 73% of the sample was successfully matched in the CEM procedure. Of the 30 black respondents who did not match, 27% were male, 20% had a graduate school education, 24% were married, and their average base year earnings were $28,292. Of the white respondents who did not match, 59% were male, 27% had a graduate school education, 29% were married, and their average base year earnings were $54,786.

improvement in the overall balance of the sample. We utilize the CEM matched sample for the analyses throughout the article.[25]

In order to test for possible biases introduced by our selection criteria and matching techniques, we conducted several sensitivity checks. First, we assess the sensitivity of our results to the exclusion of respondents not engaged in active search (e.g., those who listed no job titles over the course of the survey). Importantly, we find no significant racial differences in active search, suggesting that this condition of inclusion is not driving our finding of racial differences in job search.[26] Further, we test the sensitivity of our models to this exclusion criterion by including nonsearchers as "zeroes" in our models of search breadth. Our main findings remained unchanged (results are presented in app. D). In addition, we ran several checks on the sensitivity of our modeling approach. First, we ran the same models without the CEM matching. Second, we ran the same models using propensity score matching, which allows for the inclusion a large set of theoretically relevant variables in the matching algorithm, rather than CEM. Again, our findings are robust to these sensitivity checks.

RESULTS

The main goal of this investigation is to identify whether and to what extent job search strategies differ by race. One branch of economic theory predicts that minority job seekers will self-select into sectors of the labor market where their chances of encountering discrimination will be reduced. Other perspectives, by contrast, suggest that discrimination is difficult to identify and avoid, and therefore job seekers facing barriers to employment will cast a wider net in hopes of finding a match.

In the following analyses, we investigate these claims along a number of dimensions. The first set of analyses focus on *occupational targeting or*

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[25] In the instances where gender is the primary explanatory variable, we use a sample that is matched on gender. In this case, we match the sample on race, education, age, and number of weeks the respondent participated in the survey. To limit our analysis to the CEM-matched sample, we include the CEM weight generated by the matching process in the estimation of our models.

[26] There are also no significant differences in active search by gender, age, education, unemployment duration, previous job tenure, home ownership status, marital status, or having children. By contrast, nonsearchers are more likely to have lower base earnings, are less likely to be searching through personal networks, demonstrate smaller search distances, and remain in the survey for fewer weeks relative to those reporting active search. In our main analyses, we remove respondents who did not list any job titles, rather than including them as zeroes, to provide sample consistency across our analyses of search targeting and search breadth (i.e., values of targeting and breath are not identified for those who did not search for a job). As we note in the text, our main results are not sensitive to the inclusion of zero searchers.

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*avoidance*, examining the extent to which blacks and whites differ in the types of occupations or occupational characteristics targeted in their search. The second set of analyses focus on *search breadth*, or the degree of variation in the pool of jobs or job characteristics to which a given respondent applies. The third section of the analyses explores a possible mechanism by which racial differences in search may arise. Finally, we consider alternative interpretations and implications of the current findings.

Occupational Targeting or Avoidance

In assessing the degree to which black job seekers target or avoid particular occupational sectors in the course of their search, we begin with an analysis of the likelihood of applying to each major occupational category. Here we focus on the likelihood of "ever applying" for a particular category of occupation during the course of the survey. We run separate models for each of the 23 major occupational categories,[27] with our dependent variable equal to one if a respondent applied for a job in that occupation at any time during the survey period. Because the process of selecting into each occupational category may not be independent, we use seemingly unrelated probit (SUP) models for each of six broad occupational clusters.[28] Each of the models is estimated on a balanced sample (using the CEM procedure), in addition to controls for an extensive set of background characteristics, including gender, age, education, family structure, home ownership, tenure in last job, search methods, duration of unemployment, prior occupation, prior industry, and earnings and weeks worked in the year prior to unemployment. Our key independent variable here is race ("black"), which indicates whether or not there are racial differences in the likelihood of applying for a particular occupation among otherwise similarly situated job seekers. As a way of calibrating the effects of race, we provide additional results by gender ("female"), indicating the difference between men and women in the likelihood of applying for a given occupation.

[27] While we use the 23 major occupational category classification scheme for these analysis, in practice we examine only 21 occupational groups. We remove "Farming, Fishing, and Forestry Occupations" and "Military Specific Occupations" given the limited number of applications submitted for these job types.

[28] For the SUP analyses, we clustered the 21 occupations into 6 groups: (1) management, business, computers, architecture, science; (2) social services, legal, education, entertainment, health practitioners; (3) health support, protective services, food preparation, cleaning, personal services; (4) sales, office/clerical; (5) construction, repair; (6) production, transportation. In fact, the empirical correlation among these equations is not all that strong, and the results from the SUP models are very close to those run without this correction.

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The left panel of figure 1 presents racial differences in the likelihood of applying for each occupational category, with black shaded dots representing a statistically significant difference. Across the range of 21 major occupational categories that we analyze, we see six categories that show significant differentiation by race: blacks are more likely to apply for jobs in community and social services, health care support, protective services, sales, and office support occupations. They are less likely to apply for construction occupations. These findings are broadly consistent with existing patterns of occupational segregation by race and reflect particular occupational sectors in which blacks have historically been accepted or excluded from entry (e.g., Royster 2003). And yet, overall we see only a handful of occupations showing significant racial differentiation. Further, even where significant, the effect sizes for many of these contrasts are small.

To put these results in context, we compare the degree of racial targeting to that on the basis of gender, shown on the right panel of figure 1. Here we see that fully 17 of the 21 occupations under investigation show significant gender differences in the likelihood of "ever applying" over the course of the survey. Likewise, the degree of spread across coefficients appears substantially broader, suggesting considerable differentiation in the selection or avoidance of occupational categories by men and women. Self-selection therefore appears quite strong on the basis of gender, whereas far fewer occupational categories appear to be uniquely appealing or off-putting to African-American job seekers.[29]

An additional way of examining self-selection in job search moves from an analysis of categorical concentrations to consider the qualitative characteristics that describe job openings selected by black and white job seekers. For example, there has been significant attention to the growing importance of "soft skills" in the new service economy, and the fact that black men are considered poorly suited to jobs requiring extensive customer contact (Kirschenman and Neckerman 1991; Wilson 1996). Evidence from field experiments has shown more discrimination against African-Americans in jobs requiring extensive client interaction and the channeling of black

[29] We included a separate item on the survey asking respondents more explicitly about occupational avoidance. This question asked: "What about jobs you *did not* apply for? Did you find or hear about any jobs in the last 7 days for which you are qualified but did not apply for?" Respondents answering yes were presented with the follow-up question, "Why not? Please check all that apply." Responses included (a) did not know how to apply; (b) transportation problem/too far away; (c) don't want to work there; (d) pay is too low; (e) would not be hired because of my race; (f) would not be hired because of my sex; (g) would not be hired because of my age; or (g) other (please specify). Blacks and whites were fairly similar in their likelihood of *not* applying for a job opening over the survey period (31.6% vs 32.7%, respectively). Racial reasons for not applying were more common among blacks than whites (5.4% vs 1.8%, respectively); but for both groups the predominant reasons for not applying for a given position were low pay (38.6% and 46.6%, respectively) and transportation issues (48.2% and 50.6%, respectively).
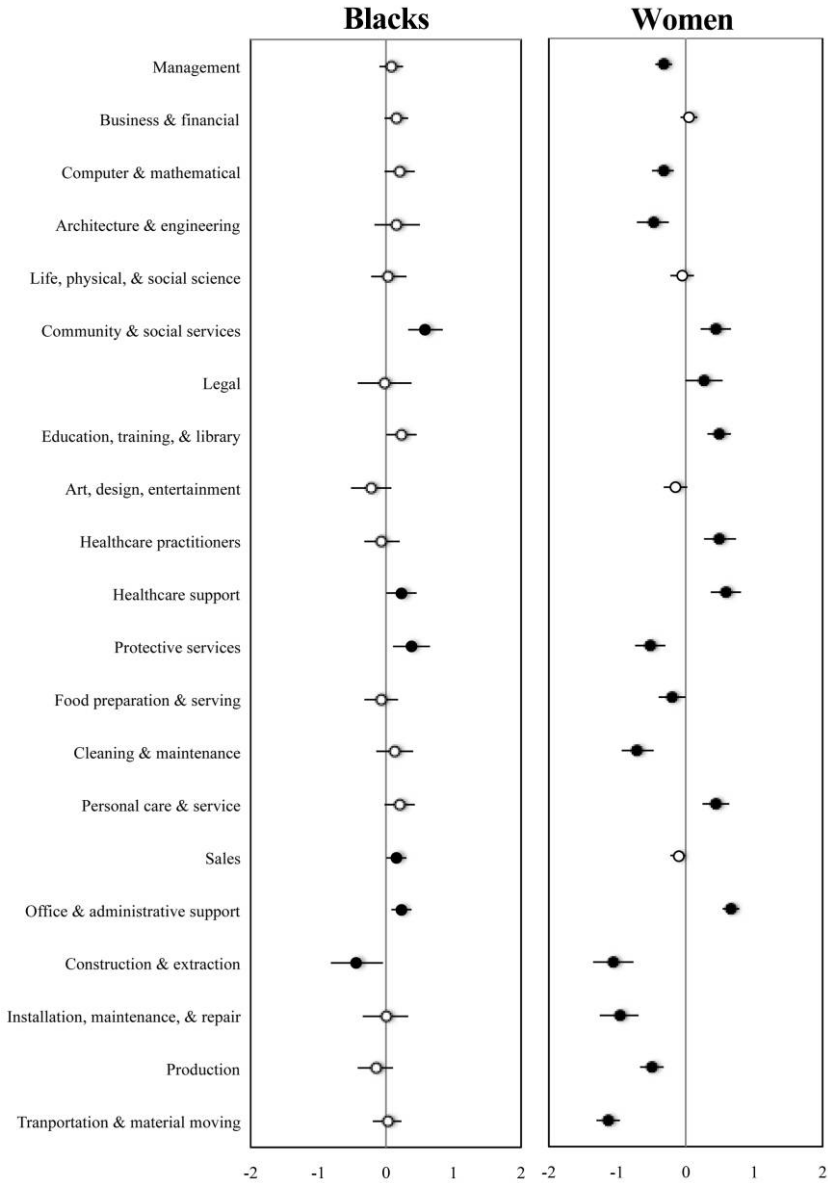
FIG. 1.—Differences in the likelihood of "ever applying" for each occupational type. A respondent is coded as "ever applying" for a particular job type if she or he submitted an application for that job type at some point over the survey period. The coefficients reported above are net of all personal and human capital control variables and derived using CEM to preprocess the data (see text). Black "dots" represent statistically significant differences at the .05 level. The ranges are for 95% confidence intervals. The sample sizes for each of the race and gender models are 1,963 and 2,493, respectively. Farming, fishing, and forestry occupations and military specific occupations are not included in the above analyses due to the limited number of applications submitted to these two occupational categories. Data come from the New Jersey Unemployment Insurance Survey.

applicants away from such positions and into jobs at the "back of the house" (Pager et al. 2009). It may be the case, then, that black job seekers aiming to avoid discrimination will steer clear of positions requiring extensive customer contact. The following analysis considers the extent to which various attributes or skill characteristics of jobs affect the likelihood of drawing applications from white and black job seekers. For this analysis we turn to continuous measures of occupations, including racial composition, socioeconomic status, occupational earnings, service orientation, critical thinking, and physical activity.

We examine racial differences across each of these dimensions with respect to the pool of jobs our respondents applied to over the course of the survey. We consider occupational characteristics coded at both the 23- and 96-category levels, allowing us to capture possible variation within broad occupational categories. Our analyses focus on the mean of each occupational dimension for the pool of jobs a respondent applied to, controlling for the full host of background characteristics listed above. We find that the only dimension on which blacks and whites consistently differ is in the average racial composition of jobs to which they apply. Not surprisingly, blacks are more likely to apply for occupations that have a higher percentage of black workers (see fig. 2). Additionally, at the detailed occupational level (96 categories), we see a small negative relationship between race and mean socioeconomic status in the pool of jobs to which respondents applied. We see no differences in the characteristics of application pools by race in terms of occupational earnings, service orientation, critical thinking, or the importance of physical activity. For comparison, the application pools of men and women significantly differ with respect to every occupational dimension across both the 23- and 96-category schemes.[30]

Overall, then, we see limited racial differentiation in terms of the targeting of particular occupational categories or characteristics. The applicant pools of blacks and whites appear quite similar; in comparison to the degree of gendered self-selection, the degree of racial differentiation in occupational targeting or avoidance is small.

### Breadth of Search

The first part of this analysis sought to identify possible racial targeting or avoidance in the application patterns of job seekers, for which we find little evidence. In the next set of analyses, we move beyond the likelihood of applying for jobs in particular categories to consider the *range* of jobs

[30] Race by gender interactions are generally not significant in these models. None of the interactions are significant at the 23-category level of aggregation. At the 96-category level of aggregation, the interaction between being black and female is significant and positive in the models predicting critical thinking and occupational earnings scores.

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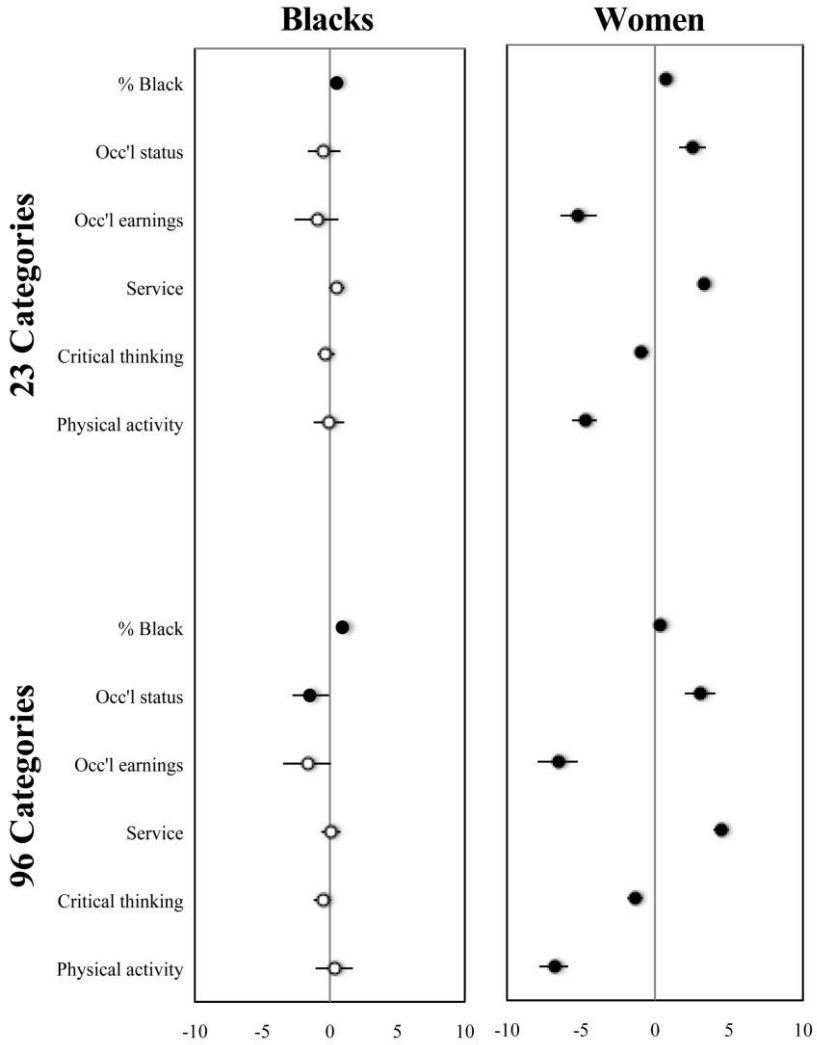
FIG. 2.—Differences in the mean characteristics of application pools, by race and gender. The coefficients reported above are net of all personal and human capital control variables and derived using CEM to preprocess the data (see text). Black "dots" represent statistically significant differences at the .05 level. The ranges are for 95% confidence intervals. The sample sizes for the race and gender models are 1,964 and 2,495, respectively. Data come from the New Jersey Unemployment Insurance Survey.

applied to over the course of the search process. To the extent that black job seekers actively tailor their job search to avoid discrimination, we may see individual black applicants clustering in a narrower range of occupations. Indeed, given difficulties in identifying when or where discrimination will take place, familiarity with an occupational sector (and the relevant employers within that sector) may represent an important part of the strategy for avoiding the time-consuming exercise of applying for jobs that offer little chance of success. On the other hand, barriers to employment (including discrimination) may drive job seekers to broaden their search, moving beyond preferred occupations to consider a wider range of options. In the following analyses, we measure the breadth of search across occupational groupings to assess the extent to which black job seekers may be narrowing or broadening their search relative to otherwise similar whites.

To illustrate the patterns of search breadth in our data, we can look at the detailed profiles of individual respondents. Respondent 325175 (R1), for example, is a 38-year-old black man with some college-level education who at the start of our survey had been unemployed for 10 months. His last job was as a "material moving worker." Over the course of the survey, this respondent applied for jobs consistent with his prior work experience, such as "material handler" and "warehouse worker." In addition, the respondent also reports applying for jobs in retail sales, as an IT technician, a delivery driver, a security guard, a mailroom clerk, and a short-order cook. Altogether this respondent is coded as having applied to jobs in a total of seven different occupation types over the course of the survey, reflecting a fairly broad approach to job search.

By contrast, respondent 178793 (R2), a white 51-year-old high school graduate, stays within a very narrow range in his pattern of applications. Consistent with his last job as a bus driver, he applies for positions as "bus driver," "truck driver," "charter bus driver," and "delivery driver." This respondent applied to 11 jobs over the course of the survey period but is coded as having applied to only one distinct occupation type for the duration of the survey ("motor vehicle operators").[31]

These respondent profiles demonstrate substantial heterogeneity in job search strategies, with some respondents limiting their search to a narrow range of occupations while others cast a wider net over the course of their search. Investigating to what extent these strategies differ systematically by race represents a central focus of this analysis.

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[31] Note that while higher levels of education and professional training undoubtedly reduced the breadth of search, it is not the case that this is an exclusively "blue-collar" phenomenon. For example, respondent 147797 is a 38-year-old white male whose last position was as a lawyer. While this individual continues to search for attorney positions during the course of the survey, he also lists applications for positions as mortgage loan analyst, claims examiner, contract associate, and personal banker.

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To examine patterns of search breadth among the larger sample, we conduct a series of analyses investigating variation in the range of job openings applied to by black and white job applicants. We operationalize search breadth according to several metrics. The first measure of search breadth is captured by the number of *distinct* job titles a respondent listed, relative to the total number of job titles listed.[32] By standardizing search breadth relative to search intensity, we can control for the fact that those applying to more jobs are at greater risk of applying to more distinct job titles.[33]

One limitation of this approach, however, is that it does not allow us to examine the dimensions by which search breadth may differ by race. For example, in this first approach, a construction worker is just as distinct from an installation worker as he is from a physician (each representing different 23-category occupations). An additional way of examining self-selection in job search considers the range of characteristics that describe job openings selected by black and white job seekers. For this analysis, we look again to our continuous measures of occupational standing and skill. In the analyses above we reported racial differences in the *means* of these dimensions, with the finding that the pool of jobs to which whites and blacks apply are largely similar in their average characteristics. Here we extend this analysis by looking at the degree of variation around these central tendencies. It may be the case that while blacks and whites share similar mean characteristics of the occupations to which they apply, blacks may apply for jobs with a broader or narrower *range* along one or more dimensions. In this analysis, the standard deviation of an occupational

[32] The use of ratios as dependent variables has a long history in the social sciences (cf. Firebaugh and Gibbs 1985). We choose this specification—rather than a simple count of unique jobs listed—for its compatibility with our other indicators of search breadth, all continuous variables modeled in a seemingly unrelated regression (SUR) framework. At the same time, to ensure that our estimates of racial differences captured by this ratio measure are not simply an artifact of variable creation, we also estimated a negative binomial model for count data in which the "distinct number of jobs a respondent applied to" served as the dependent variable, with the "total numbers of jobs listed" included as a covariate. Our key finding—that blacks apply for a greater number of distinct job titles relative to whites—remains unchanged in this specification (results available upon request).

[33] Our data contain two measures of search intensity: the number of jobs applied to (not top coded) and the number of job titles listed (limited to 33 over the survey period, or 3 job titles each week). Despite top coding, these two measures are highly correlated ($r = .74$). In the current analyses, we standardize the *distinct* number of job titles a respondent listed by the *total* number of job titles that he or she listed. The models also control for the total number of jobs that the respondent applied to (logged), though our results are not sensitive to the inclusion of this variable. Additionally, while blacks reported a higher number of applications submitted overall (as a simple bivariate association), we find no racial differences in search intensity after matching and covariate adjustment (see app. D).

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characteristic serves as our dependent variable. For each respondent, we calculate the standard deviation of a given occupational characteristic (e.g., service orientation) for the pool of jobs the respondent applied to over the survey period.[34]

Each indicator of search breadth is then modeled as a function of race ("black") and the full range of demographic and human capital controls. We again use the CEM matched sample to ensure greater balance between black and white job seekers. To account for correlated error terms among our different measures of search breadth, we run the seven models using the SUR (sureg) command in Stata, with models run separately at the 23- and 96-category level of occupational aggregation.

As shown in the left panel of figure 3, we find that blacks apply to a significantly broader range of jobs than similarly situated whites. This holds true for each of our seven indicators at both the 23- and 96-category classification of occupations. Looking to the first measure of search breadth, representing the total number of distinct occupation types a respondent applied to relative to the total number of jobs listed, the results suggest that at the median, black job seekers would be expected to apply to approximately 15% more distinct jobs than observationally similar whites.[35] Contrary to theories of self-selection that predict blacks will channel their effort within a narrow set of occupations, these results suggest that blacks span a wider, more heterogeneous range of job types in the course of their job search than similar whites.

Similar to the first indicator (the ratio of distinct jobs to total jobs listed), the findings also reveal that blacks apply to a wider range of positions according to their racial composition, occupational status, occupational earnings, and their levels of service, critical thinking, and physical activities required. We do not find evidence that blacks are applying for a narrower range of job types than whites along any of the dimensions in our analysis. Rather, these findings suggest that blacks apply to a more diverse pool of jobs than whites across a wide range of dimensions.

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[34] Sociologists tend to emphasize mean differences as opposed to differences in distributions, though the latter also have important implications for our understanding of inequality (cf. Western and Bloome 2009). There are numerous options for measuring dispersion (Cowell 2011). We choose the standard deviation relative to alternate approaches—e.g., the range or the relative mean deviation—because it has a number of desirable properties for our purposes. In particular, the standard deviation incorporates all data points in its estimates of dispersion (as opposed to only high and low values), and its values are not affected by their relative position in the larger distribution.

[35] The median ratio of unique jobs titles to total job titles listed at the 23-category of aggregation was 0.333. Our model of this dependent variable suggests that if the ratio for a white respondent was 0.333 then the ratio for a similar black respondent would be 0.384: (0.384−0.333)/0.333 = 0.153, or 15% larger).

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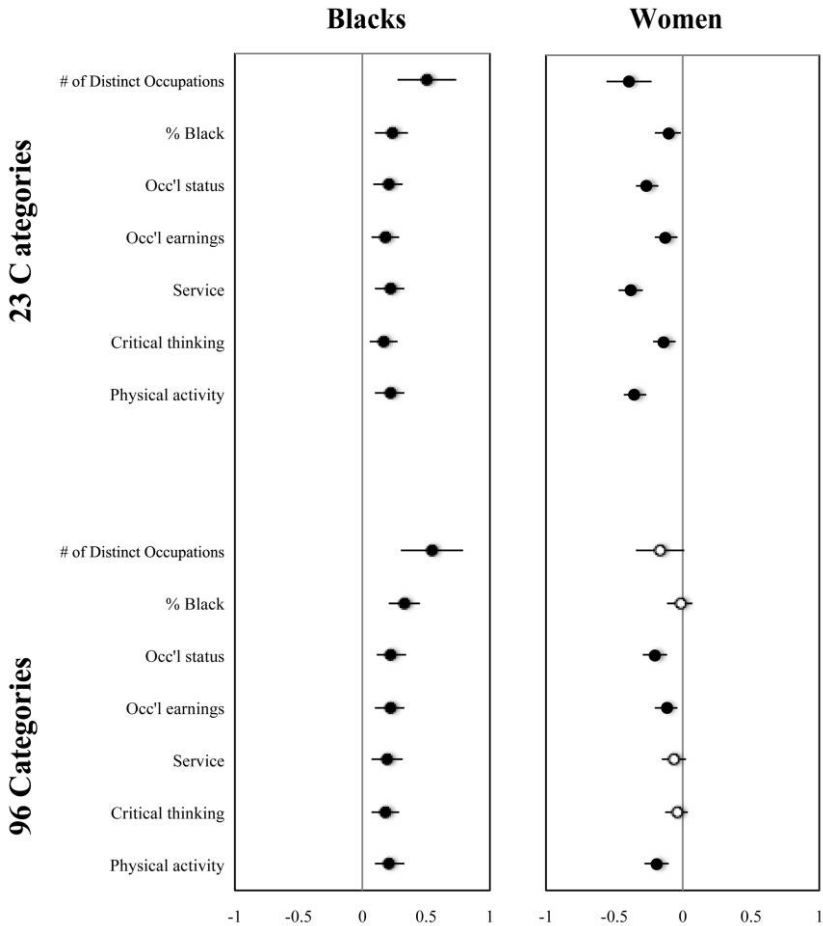
Fig. 3.—Differences in search breadth of application pools, by race and gender. The coefficients and SEs for the "# of Distinct Occupations" have been multiplied by 10 for display purposes. The coefficients reported above are net of all personal and human capital control variables and derived using CEM to preprocess the data (see text). Black "dots" represent statistically significant differences at the .05 level. The ranges are for 95% confidence intervals. The sample sizes for the race and gender models are 1,964 and 2,495, respectively. Data come from the New Jersey Unemployment Insurance Survey.

For comparison, we also report gender differences in the degree of variation among the jobs to which men and women apply. Here we also see significant differences in the number and range of characteristics represented by the job pools considered by men and women. But unlike the case for blacks, we see here clear evidence of *narrowed* search among female

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job seekers. The first indicator on the right panel of figure 3 shows that women apply to significantly fewer distinct occupation types than men over the course of their search, at least across broad (23-category) occupational boundaries. This is consistent with prior research pointing to greater occupational crowding among "female jobs" (England et al. 1988; Lewis 1996), and the fact that self-selection into those gendered occupations represents at least part of the processes by which occupational segregation is maintained. Likewise, the application pools of women are characterized by significantly smaller standard deviations across all the characteristics reported for the 23-category distribution. At the 96-category level of aggregation, we see narrowed search for women compared to men in terms of occupational status, occupational earnings, and level of physical activity. It appears, then, that women self-select into distinctive occupational categories and consider a narrower range of occupational characteristics over the course of their search relative to similarly situated men. In terms of race, by contrast, we see the opposite pattern at work, with black job seekers casting a wider net and applying to a more heterogeneous pool of jobs than whites with similar qualifications.[36]

Together, the results reported thus far point to three general conclusions about patterns of self-selection and job search: (1) blacks overall demonstrate little evidence of self-selection in their search strategy, applying to similar kinds of occupations as do their white counterparts; (2) black applicants cast a wider net in their search than similarly situated whites, including a greater range of occupation types and occupational characteristics in their search pool; (3) the search strategy of blacks appears very different from that of women, with the latter characterized by a narrowed pool of job types and characteristics.

These findings offer novel evidence on the role of self-selection in the job search process. To the extent that race affects the strategies of job seekers, black workers appear to broaden their search and to consider more, rather than fewer, occupational opportunities. In the next section we consider the mechanisms underlying racial differences in search breath and, in particular, how perceived discrimination may shape job seekers' strategies.

EXPLAINING RACIAL DIFFERENCES IN SEARCH BREADTH

Throughout this investigation we have conceptualized racial differences in search breadth in terms of an implicit mechanism. The initial framework introduced by Heckman suggests that minority job seekers respond to dis-

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[36] We also tested for interactions between race and gender across the full set of models. The interaction between being black and female is rarely significant (results available upon request).

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crimination by narrowing or targeting their search. We find, by contrast, that blacks actually cast a wider net in their job search. But, can we say this empirical pattern has anything to do with discrimination? Because the NJUI data do not contain explicit measures of labor market discrimination or respondents' perceptions thereof, we can only infer possible mechanisms from the behavioral patterns we observe.

Fortunately, we were able to collect an additional source of data that allows us to more directly assess the role of discrimination in shaping job search strategies. The National Study of Job Search (NSJS) represents a national probability sample of 2,060 job seekers interviewed in February 2013 (for a more detailed discussion of the NSJS data, see app. E). The NSJS sample targeted those individuals who had looked for a job in the previous four weeks, including those who were looking for new work while employed. In the following analysis, we exclude individuals in the NSJS sample who were employed full-time ($n$ = 655) to make the NSJS sample conform more closely to the NJUI sample. In addition to questions about job search behaviors and experiences over the previous four weeks, respondents were asked a series of questions about discrimination in the workplace. Thus, these data allow us to replicate the key results from above and, further, to directly investigate the role of labor market discrimination as a possible mechanism shaping search breadth.[37]

In the first stage of our analysis, we generated a series of variables that match those used in the NJUI analyses. As our key dependent variable, we created a measure that captures the ratio of distinct job titles that a respondent applied to relative to the total number of job titles that he or she listed on the survey, identical to our measure of search breadth from the NJUI data. We then created a series of variables to replicate the controls included in the NJUI analysis above (i.e., gender, age, previous job tenure, previous occupation and industry, etc.). Finally, we employed the same CEM technique used for the NJUI analysis, matching black and white respondents exactly on gender, age, and education.[38] The CEM process reduced the multivariate imbalance statistic from 0.3665 to 0.2199, significantly improving the balance of the analytic sample.

The first two columns in table 1 present the findings from our regression analysis using the NSJS data. As with the NJUI data, we find that black job seekers apply to a statistically significant higher proportion of discrete job titles than comparable whites, net of the covariates in the model. Additionally, the point estimates of the coefficients for the black respondents in the NSJS sample (0.056 at the 23-category level and 0.061 at the 96-category

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[37] Because the NSJS includes information on a more limited window of job search, we prefer the NJUI data for our primary analyses.

[38] The matching algorithms across data sets are identical with the exception of "number of weeks in survey," which does not apply for the cross-sectional NSJS data.

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TABLE 1
Race, Experience with Discrimination, and Search Breadth

| | Search Breadth | | | |
|---|---|---|---|---|
| | Model 1 | Model 2 | Model 3 | Model 4 |
| Race/ethnicity: | | | | |
| Blacks[a]. . . . . . . . . . . . . . . . . . . . . . | .056** | .061** | .048* | .055* |
| | (.020) | (.022) | (.020) | (.022) |
| Experience with discrimination . . . . . . . | . . . | . . . | .051* | .043[+] |
| | | | (.020) | (.022) |
| Adjusted $R^2$ . . . . . . . . . . . . . . . . . . . . . | .4390 | .3162 | .4433 | .3189 |

Note.—All models include the full set of controls. Estimates derived from Coarsened Exact Matching process where white and black respondents were matched exactly on gender, age, and education. Models 1 and 3 use 23-category coding; models 2 and 4, 96 category coding. $N = 757$; numbers in parentheses are SEs.

[a] The omitted category is "white."

[+] $P < .10$ (two-tailed tests).

* $P < .05$.

** $P < .01$.

*** $P < .001$.

level) are nearly identical to the point estimates obtained when analyzing the NJUI sample (0.051 at the 23-category level and 0.055 at the 96-category level). Replicating this key finding with a high level of precision and using two distinct samples provides compelling evidence that the finding of broader search among African-Americans generalizes well beyond one specific data source or sample.

Having replicated the key findings from the NJUI data, we next explore the degree to which racially distinct patterns of search breadth may be driven by perceptions of or experiences with discrimination. The NSJS survey includes two key items about racial discrimination in the labor market: (1) "During the last year you worked, did you witness any discriminatory comments or actions at your workplace related to race or ethnicity?" and (2) "Have you felt at any time in the past that your work opportunities have been limited by your race or ethnicity?" We combine these two items in to a single measure of respondents' experiences with racial discrimination, equal to 1 if the respondent answered yes to either question and equal to 0 otherwise.[39] Note that these two indicators capture only a fraction of the possible ways individuals may perceive discrimination in the labor market by focusing primarily on recent and personal experience. Nevertheless, we view

[39] This indicator is robust to alternative specifications, with similar substantive results obtained from an additive coding scheme or with each item entered separately, though levels of significance vary.

these items as a useful first step in assessing the relationship between perceptions of discrimination and search strategy.

As expected, African-American respondents are far more likely than white respondents to indicate experience with racial discrimination in the workplace (36.6% for blacks vs. 18.1% for whites; $|z| = 5.21$, $P < .001$). More specifically 20.9% of African-Americans report having witnessed discriminatory comments or actions in their last year of work and 33.0% report the view that their opportunities have been limited by race (relative to 12.3% and 11.1% for white respondents, respectively).

Next, we examine whether there is a significant association between perceived discrimination and search breadth. Indeed, those who report having experienced or witnessed racial discrimination in the workplace are more likely to cast a broad net in their job search process (see table 1, models 3 and 4). This finding is statistically significant at conventional levels for the 23-category search breadth measure and marginally significant at the 96-category level ($P = .052$). The magnitude of the association between perceived discrimination and search breath is quite similar to the difference in search breadth between blacks and whites. Finally, we explore the degree to which perceived discrimination helps to explain the relationship between race and search breadth. Models 3 and 4 in table 1 indicate that, when the perceived discrimination variable is included in the search breadth model, the coefficients for race ("black") are indeed reduced (from .056 to .048 for the 23-category occupational level and from .061 to .055 for the 96-category level, respectively). We can more effectively test this relationship by conducting a formal mediation analysis. Using the simulation-based approach proposed by Imai, Keele, and Tingley (2010), we find an average causal mediation effect (ACME) at the 23-category level of aggregation of .008; the 95% confidence interval does not include zero (.002, .016). These results suggest that respondents' experiences with discrimination mediate 14.0% of the total relationship between race and search breadth. At the 96-category level of aggregation, the ACME is .007 (95% confidence interval is .000, .015) and experiences with discrimination mediate 10.8% of the association between race and search breadth. Of course, with observational data it is difficult to make strong claims about processes of causal mediation. Likewise, as noted above, our indicators of discrimination capture only part of the myriad ways individuals may perceive discrimination in the labor market. Nevertheless, we take these results as highly suggestive that perceptions of racial discrimination play an important role in explaining the greater search breadth exhibited by African-American job seekers. Moreover, contrary to the predictions of Heckman (1998) and others, the presence of discrimination in the labor market leads job seekers to cast a broader net rather than to narrow their search.

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ADDITIONAL CONSIDERATIONS

The finding of broader search among African-American job seekers appears robust and systematic. And yet, as with any analysis of observational data, certain alternative explanations of the results remain possible. In this section we consider three key issues that may complicate our interpretation of racial differences in search behavior: (1) sorting by firm or occupation, (2) sorting by education/skill, and (3) searching broadly versus searching down.

Sorting by Firm or Job?

The first key consideration relates to the unit of analysis used in this study. For our measures of search breadth, we have focused on occupations as the unit of analysis. It may be the case, however, that sorting primarily occurs across firms rather than jobs, in which case we may be missing key aspects of the sorting process.[40] For example, research from the 1970s suggested that African-Americans flocked to the public sector in part due to that sector's more formalized hiring practices and the institutionalization of affirmative action policies (Freeman 1976; Collins 1983; Hout 1984). In this context, job seekers appeared to be sorting on the basis of employer/sector rather than job. At the same time, more generalized sorting by firm is likely to be harder to achieve. Apart from extreme and well-known cases (either of employers friendly to blacks or those widely known for their discriminatory practices), information shortages for effective sorting across firms quickly become a problem. How does one obtain accurate information about which firms are likely to discriminate and which are not? For those conducting highly targeted searches or relying on direction from close network ties, applicants may have fairly good information about internal firm dynamics. But in longer-term job searches that span a wider number of openings, it is difficult to acquire sufficient firm-level information (particularly about sensitive topics like discrimination) to effectively guide search behavior.[41]

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[40] Sorting by neighborhood is also a possibility, though this process has been addressed more extensively in the spatial mismatch literature (for a review, see Ihlanfeldt and Sjoquist [1998]). In addition to controlling for search distance in all our models, we tested for the possibility of spatial segregation as a factor driving the association between race and search breadth by including fixed effects for respondents' county of residence, thus focusing on the contrast between individuals with access to the same local labor markets. In these models we continue to see a substantial positive relationship between being black and search breadth.

[41] Purdie-Vaughns et al. (2008) present an experimental setting in which subjects are exposed to information about workplace culture through corporate brochures depicting more or less employee diversity and stating a corporate philosophy that emphasized either color blindness or the value of diversity. Both employee composition and diversity

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The racial composition of occupations, by contrast, is easier to observe than the racial dynamics of firms. We have a sense of what kinds of people tend to perform what kinds of jobs, whether based on gender or race, and occupations often develop reputations for their openness to workers on the basis of demographic characteristics. For example, employers routinely comment on the perceived mismatch between black men and service oriented jobs (Kirschenman and Neckerman 1991; Moss and Tilly 2001), and evidence from field experiments shows more discrimination against African-Americans in jobs requiring extensive client interaction and the channeling of black applicants away from such positions and into jobs at the "back of the house" (Pager et al. 2009). Further, Carrington and Troske (1998) find that "the interfirm distribution of black and white workers is close to what would be implied by random assignment" and that "the black/white wage gap is primarily a within-firm [or job-level] phenomenon" (p. 231). Likewise, in a study of workers from North Carolina, Tomaskovic-Devey (1993) concludes that "organizational segmentation is not a dominant source of gender and particularly racial wage inequality. This suggests clearly that most gender and racial inequality happens through social closure at the job level" (p. 12). There is good reason to believe, therefore, that specific features of the job, rather than characteristics of the firm, are often more relevant to the likelihood of discrimination and thereby what may shape job seekers' selection into openings.

It thus remains an open question as to what fraction of discrimination takes place within or between firms. It is also possible that sorting occurs at both levels simultaneously, with black applicants applying to a wider range of openings among a smaller pool of firms. This project represents a first step at investigating racial differences in search. Future research would be useful in extending the current research to other units of analysis.

## Sorting by Race or Skill?

A second consideration in this research is the question of whether racial differences in search strategy are in fact driven by race or whether this analysis is instead picking up search strategies characteristic of workers with different levels of education or skill. Noncollege jobs typically do not require specialized training, and thus there may be less of a penalty in moving across

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philosophy affected subjects' levels of trust and comfort with the hypothetical workplace. This work suggests that African-Americans are conscious of and concerned about workplace characteristics that may affect their likelihood of encountering discrimination. Unfortunately, this experiment does not provide any indication of how subjects' evaluations of the workplace affect their likelihood of applying for an open position during the course of an ongoing job search.

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occupational boundaries for lower-skill positions. Jobs that require advanced educational credentials, by contrast, require more occupation-specific investments that are likely to limit search in more distant occupational categories. We attempt to address this concern in several ways. First, as noted above, we closely match respondents by level of education (using CEM) and control for both education and prior occupation in all our analyses. In addition, we re-ran the analyses separately by education (college/noncollege) to assess whether racial differences were being driven by the less credentialed of the sample. While education does reduce the breadth of search on average, racial differences do not appear substantively different across these groups. It does not appear to be, then, simply a matter of skill or credentialing that differentiates black and white job seekers.

Search Breadth or Searching Down?

A final consideration in this analysis is the question of whether "search breadth" is in fact simply a measure of downward search. Previous research has documented significant underemployment and overqualification among the workforce, with African-Americans generally more likely to experience underemployment than otherwise similar whites (for reviews of the literature on underemployment, overqualification, and race, see McGuinness 2006; Maynard and Feldman 2011; McKee-Ryan and Harvey 2011). It may be the case, then, that rather than searching more broadly, African-Americans respond to employment constraints by searching for jobs of lower quality relative to their prior occupation.[42] We tested for this by dividing job search into three categories: "downward search" represents positions applied to that are greater than one-quarter of a standard deviation lower in occupational earnings than a respondent's prior occupation; "lateral search" refers to positions that are within plus or minus one-quarter of a standard deviation of the respondent's prior occupational earnings; and "upward search" refers to applications submitted for jobs that are more than one-quarter of a standard deviation higher than the occupational earnings of the respondent's prior occupation. We find only small differences in directional search by race. For example, 29% of search efforts by white respondents was coded as downward search, relative to 32% by black respondents. The majority of search for both race groups was lateral (64% of whites and 63% for blacks).[43] When we

[42] Likewise, if differential search breadth were simply a matter of greater urgency or desperation on the part of African-American job seekers, we would expect to see a disproportionate amount of search focused downward.

[43] In supplementary analyses, we find that blacks apply for a greater proportion of distinct job titles than whites conditional on both upward and downward search.

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remove search targeted at the same occupational category as the respondent's previous occupation, we find a higher incidence of downward search; but again racial differences are not large: 46% of search outside of a respondent's prior occupation was downward for whites relative to 48% for blacks. We also see limited differences for lateral (23 vs. 26%, respectively) and upward search (31 vs. 26%, respectively), but these differences are not statistically significant. Similar results are found when search direction is measured according to other occupational characteristics, such as the socioeconomic status or service orientation of the jobs to which respondents apply. Overall, then, only about one-third to one-half of search is directed at jobs of lower quality than an applicant's prior occupation, and we see minimal racial differences in these patterns. The finding of racial differences in search breadth appears not to be driven by this vertical dimension of occupations.

CONCLUSION

We began this investigation questioning whether and to what extent blacks adjust their search strategies in response to labor market discrimination. One branch of economic theory predicts that blacks will self-select into segments of the labor market where their characteristics will be better rewarded (e.g., Heckman 1998). This theory assumes that job seekers have access to accurate information about the likelihood of discrimination across possible job openings with which to guide their search efforts. By contrast, other perspectives emphasize the difficulties of identifying and avoiding discrimination, leading instead to a more diffuse search strategy (e.g., Goldsmith et al. 2004). In this framework, job seekers are generally aware of widespread racial discrimination, but do not have specific information as to where or when it may occur. Our research takes one step toward adjudicating among these predictions by offering the first empirical examination of the actual pool of job applications submitted by black and white job seekers.

Across a number of measures of occupational categories and characteristics as well as in multiple datasets, we see little evidence of self-selection among black job seekers. By contrast, these results suggest a strategy of net widening. Blacks apply to a broader range of job openings than otherwise similar whites. Contrary to Heckman's assumption that blacks avoid discrimination through self-selection, the results we see here are more consistent with a reality in which discrimination is pervasive, but difficult to pinpoint. Under these conditions, casting a broad net during the job search process may be the most effective strategy for responding to such diffuse constraints. While broad search may expose black job seekers to substantial discrimination in the job search process, this strategy also potentially maximizes encounters with less discriminatory opportunities.

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If discrimination, in part, drives the search behavior of African-Americans, why do we not see similar adaptations by women, who also undoubtedly face varying forms of employment discrimination? (See, e.g., Neumark, Bank, and Van Nort 1996; Correll, Benard, and Paik 2007.) We suspect the answer is related to the more entrenched and explicit nature of gender inequality in the labor market relative to what is observed on the basis of race. Indeed, given the stark and persistent forms of occupational segregation by gender (Alonso-Villar et al. 2012; Gauchat, Kelly, and Wallace 2012), individuals from an early age can identify male- and female-associated jobs. This has implications both for the shaping of occupational aspirations (Correll 2001, 2004; Francis 2002) and the mapping of occupational barriers (see Altonji and Blank 1999). Whether motivated by preferences or perceived constraints, women's self-selection into narrowly defined gendered occupations allows them to avoid job types where they are more likely to experience discrimination while at the same time reproducing the existing uneven gender distribution across occupations (Moss 2004).

For African-Americans, by contrast, the landscape is not quite so settled. Far from there being readily identifiable "black" or "white" jobs, the barriers facing African-American job seekers can emerge across the occupational distribution. While certain job types or sectors—such as customer-facing jobs, jobs requiring manual skill, or jobs in the public sector—may be considered more or less open to African-Americans (Collins 1983; Moss and Tilly 2001; Waldinger and Lichter 2003), far more of the labor market represents contested terrain (Tomaskovic-Devey 1993). Under these conditions, the ability to reliably select into race-aligned positions becomes far more difficult. By contrast, a strategy of broad search allows black job seekers to reach otherwise difficult-to-identify job opportunities in which racial discrimination is less prevalent.

Where broad search may represent a strategy of compensation for discrimination, are there potential negative consequences of this approach? To the extent that broad search leads job seekers to occupations that are distant from their prior experience, this approach may have important implications for the coherence of career trajectories. While there are certainly legitimate reasons job seekers may wish to depart from their prior occupation (e.g., large-scale layoffs in particular occupational sectors, opportunities for mobility, etc.), the costs of moving into a new occupational sector may include a loss of occupation-specific human and social capital and disruption in the development of coherent career trajectories. Prior research suggests that changing occupational sectors has negative consequences for longer-term advancement and wage growth (Kambourov and Manovskii 2009*a*, 2009*b*). A broad application pool yields fewer opportunities to privilege one's chosen field, with corresponding consequences for career continuity and the ability to capitalize on occupation-specific experience. Indeed, the likelihood of

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applying for a job in the same category as one's prior occupation is mechanically and inversely related to breadth of search.[44] In supplementary analyses, we also examined the possible consequences of broad search for the likelihood of receiving a job offer and the quality of that offer (i.e., wages). We find that broader job search is related to a higher likelihood of receiving a job offer. Search breadth, however, is also associated with lower wage offers (see app. F). Thus, job seekers appear to face a trade-off between the goal of finding a job of some kind and the goal of securing the highest possible wage or building coherent career trajectories consistent with their experience and aspirations. Given significant racial differences in the breadth of search, these dynamics are likely to contribute to persistent racial disparities in labor market outcomes in important ways.

Together these findings suggest that supply-side decisions play an important role in shaping, reinforcing, and sometimes counteracting prevailing systems of inequality. At the same time, these supply-side patterns cannot be fully understood without taking into account the broader context of demand-side constraints (Sunstein 1993; Bowles 1998). As the comparison of race and gender suggests, the adaptations of actors to labor market barriers can take different forms and have differing consequences. In the case of women, we see a contraction of search scope, reinforcing existing patterns of occupational segregation. By contrast, the broad search strategy of African-Americans resists processes of segregation, but with potentially negative implications for the wages and career coherence of this group. In each case, the group-specific nature of labor market inequality helps us to understand the subsequent adaptations we observe among individual actors.

We view these results as providing strong support for the notion that African-Americans search more broadly than similarly situated whites, in part as a response to labor market discrimination. At the same time, we must acknowledge that perceived discrimination, at least as measured here, explains only a part of the differential patterns we observe. Future research should explore other measures of discrimination, both perceived and observed, to better hone in on this key mechanism. Likewise, additional research is needed to explore additional or alternative explanations for the present results. It may be the case, for example, that blacks are less attached to particular career paths than similar whites, irrespective of discrimination,[45] or

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[44] For example, at the 25th percentile of job search breadth, roughly 42% of job applications submitted by respondents were for jobs in the same occupational category as their previous occupation; that drops to 29% at the 75th percentile of job search breadth.

[45] Chung (2002) finds that black college students in a large southern university had higher scores on a Career Commitment Scale than similar whites. By contrast, Zweigenhaft and Domhoff (2003) describe a process of disengagement with initial career aspirations among several of their elite black respondents; though in these cases, diminished attachment was a direct response to racial barriers encountered on the path to a chosen occupation.

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have less information about relevant job openings. It may also be the case that, to the extent that self-selection by race does take place, it operates on the basis of the employer/firm or neighborhood rather than the job. While the present research cannot rule out all concurrent or competing possibilities, we do find strong evidence that African-Americans do not constrain their search by job type, as would be predicted by Heckman's theoretical model, but instead apply to a wider pool of openings relative to comparable whites. The causes and consequences of racial differences in search strategies with respect to career paths, earnings trajectories, and the experience of discrimination warrant continued investigation.

APPENDIX A

Descriptive Statistics for Independent Variables

TABLE A1
Descriptive Statistics for Independent Variables

| Variable | Mean | Min | Max |
|---|---|---|---|
| Race/ethnicity (%): | | | |
|    White | 82.0 | 0 | 1 |
|    Black | 18.0 | 0 | 1 |
| Male | 46.5 | 0 | 1 |
| Mean age (years) | 45.7 | 18 | 64 |
| Education (%): | | | |
|    High school or less | 18.3 | 0 | 1 |
|    Some college | 30.0 | 0 | 1 |
|    College | 37.7 | 0 | 1 |
|    Graduate school | 14.0 | 0 | 1 |
| Total months unemployed | 12.6 | 0 | 106 |
| Job tenure (years) | 5.66 | 0 | 42 |
| Homeowner (%) | 62.7 | 0 | 1 |
| Married (%) | 50.9 | 0 | 1 |
| No. of children | 1.47 | 0 | 13 |
| Base earnings ($) | 47,316 | 0 | 1,000,000 |
| Base weeks | 45 | 0 | 120 |
| Previous occupation (%): | | | |
|    Management, business, and financial | 24.9 | 0 | 1 |
|    Computers, engineering, and science | 6.6 | 0 | 1 |
|    Ed., legal, comm. serv., arts, and media | 8.3 | 0 | 1 |
|    Health care practitioner | 1.9 | 0 | 1 |
|    Health services | 5.3 | 0 | 1 |
|    Sales | 9.1 | 0 | 1 |
|    Office and administrative support | 17.0 | 0 | 1 |
|    Construction and extraction | 7.2 | 0 | 1 |
|    Installation, maintenance, and repair | 2.1 | 0 | 1 |
|    Production | 6.9 | 0 | 1 |
|    Transportation | 9.2 | 0 | 1 |
|    Missing previous occupation | 1.6 | 0 | 1 |

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TABLE A1 (*Continued*)

| Variable | Mean | Min | Max |
|---|---|---|---|
| Previous industry (%): | | | |
|   Mining, utilities, and construction | 3.9 | 0 | 1 |
|   Manufacturing | 7.8 | 0 | 1 |
|   Wholesale and retail trade, transp. | 22.0 | 0 | 1 |
|   Information, finance, real estate | 38.8 | 0 | 1 |
|   Education, healthcare, and social assist. | 11.7 | 0 | 1 |
|   Arts, entertainment, accommodations | 3.6 | 0 | 1 |
|   Other services | 2.0 | 0 | 1 |
|   Public administration | 1.1 | 0 | 1 |
|   Missing previous industry | 11.1 | 0 | 1 |
| Used informal job search methods (%) | 79.4 | 0 | 1 |
| Maximum job search distance (miles) | 28.04 | 0 | 100 |

# APPENDIX B

# SOC Codes

TABLE B1

2000 STANDARD OCCUPATION CLASSIFICATION CODES: MAJOR GROUPS (23 CATEGORIES)

| Code | Occupation Title |
|---|---|
| 11-0000 | Management |
| 13-0000 | Business and financial operations |
| 15-0000 | Computer and mathematical |
| 17-0000 | Architecture and engineering |
| 19-0000 | Life, physical, and social science |
| 21-0000 | Community and social services |
| 23-0000 | Legal |
| 25-0000 | Education, training, and library |
| 27-0000 | Arts, design, entertainment, sports, and media |
| 29-0000 | Healthcare practitioners and technical |
| 31-0000 | Healthcare support |
| 33-0000 | Protective service |
| 35-0000 | Food preparation and serving related |
| 37-0000 | Building and grounds cleaning and maintenance |
| 39-0000 | Personal care and service |
| 41-0000 | Sales and related |
| 43-0000 | Office and administrative support |
| 45-0000 | Farming, fishing, and forestry |
| 47-0000 | Construction and extraction |
| 49-0000 | Installation, maintenance, and repair |
| 51-0000 | Production |
| 53-0000 | Transportation and material moving |
| 55-0000 | Military specific |

TABLE B2

2000 STANDARD OCCUPATION CLASSIFICATION CODES: MINOR GROUPS (96 CATEGORIES)

| Code | Occupation Title | Code | Occupation Title |
|---|---|---|---|
| 11-1000 | Top executives | 39-4000 | Funeral service workers |
| 11-2000 | Advertising, marketing, public relations, and sales managers | 39-5000 | Personal appearance workers |
| 11-3000 | Operations specialties managers | 39-6000 | Transportation, tourism, and lodging attendants |
| 11-9000 | Other management occupations | 39-9000 | Other personal care and service workers |
| 13-1000 | Business operations specialists | 41-1000 | Supervisors, sales workers |
| 13-2000 | Financial specialists | 41-2000 | Retail sales workers |
| 15-1000 | Computer specialists | 41-3000 | Sales representatives, services |
| 15-2000 | Mathematical science occupations | 41-4000 | Sales representatives, wholesale and manufacturing |
| 17-1000 | Architects, surveyors, and cartographers | 41-9000 | Other sales and related workers |
| 17-2000 | Engineers | 43-1000 | Supervisors, office and administrative support workers |
| 17-3000 | Drafters, engineering, and mapping technicians | 43-2000 | Communications equipment operators |
| 19-1000 | Life scientists | 43-3000 | Financial clerks |
| 19-2000 | Physical scientists | 43-4000 | Information and record clerks |
| 19-3000 | Social scientists and related workers | 43-5000 | Material recording, scheduling, dispatching, and distributing workers |
| 19-4000 | Life, physical, and social science technicians | 43-6000 | Secretaries and administrative assistants |
| 21-1000 | Counselors, soc. workers, and soc. service specialists | 43-9000 | Other office and administrative support workers |
| 21-2000 | Religious workers | 45-1000 | Supervisors, farming, fishing, and forestry workers |
| 23-1000 | Lawyers, judges, and related workers | 45-2000 | Agricultural workers |
| 23-2000 | Legal support workers | 45-3000 | Fishing and hunting workers |
| 25-1000 | Postsecondary teachers | 45-4000 | Forest, conservation, and logging workers |
| 25-2000 | Primary, secondary, and special education school teachers | 47-1000 | Supervisors, construction and extraction workers |
| 25-3000 | Other teachers and instructors | 47-2000 | Construction trades workers |

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| | |
|---|---|
| 25-4000 | Librarians, curators, and archivists |
| 25-9000 | Other education, training, and library occupations |
| 27-1000 | Art and design workers |
| 27-2000 | Entertainers and performers, sports and related workers |
| 27-3000 | Media and communication workers |
| 27-4000 | Media and communication equipment workers |
| 29-1000 | Health diagnosing and treating practitioners |
| 29-2000 | Health technologists and technicians |
| 29-9000 | Other healthcare practitioners and technical occupations |
| 31-1000 | Nursing, psychiatric, and home health aides |
| 31-2000 | Occupational and physical therapist assistants and aides |
| 31-9000 | Other healthcare support occupations |
| 33-1000 | First-line supervisors/ managers, protective service workers |
| 33-2000 | Fire fighting and prevention workers |
| 33-3000 | Law enforcement workers |
| 33-9000 | Other protective service workers |
| 35-1000 | Supervisors, food preparation and serving workers |
| 35-2000 | Cooks and food preparation workers |
| 35-3000 | Food and beverage serving workers |
| 35-9000 | Other food preparation and serving related workers |
| 37-1000 | Supervisors, building/grounds cleaning/mainten. workers |
| 37-2000 | Building cleaning and pest control workers |
| 37-3000 | Grounds maintenance workers |
| 39-1000 | Supervisors, personal care and service workers |
| 39-2000 | Animal care and service workers |
| 39-3000 | Entertainment attendants and related workers |
| 47-3000 | Helpers, construction trades |
| 47-4000 | Other Construction and related workers |
| 47-5000 | Extraction workers |
| 49-1000 | Supervisors of installation, maintenance, and repair workers |
| 49-2000 | Electrical/electronic equipment mechanics, installers, repairers |
| 49-3000 | Vehicle and Mobile equipment mechanics, installers, repairers |
| 49-9000 | Other installation, maintenance, and repair occupations |
| 51-1000 | Supervisors, production workers |
| 51-2000 | Assemblers and fabricators |
| 51-3000 | Food processing workers |
| 51-4000 | Metal workers and plastic workers |
| 51-5000 | Printing workers |
| 51-6000 | Textile, apparel, and furnishings workers |
| 51-7000 | Woodworkers |
| 51-8000 | Plant and system operators |
| 51-9000 | Other production occupations |
| 53-1000 | Supervisors, transportation and material moving workers |
| 53-2000 | Air transportation workers |
| 53-3000 | Motor vehicle operators |
| 53-4000 | Rail transportation workers |
| 53-5000 | Water transportation workers |
| 53-6000 | Other transportation workers |
| 53-7000 | Material moving workers |
| 55-1000 | Military officer special and tactical operations leaders/ managers |
| 55-2000 | First-line enlisted military supervisor/managers |
| 55-3000 | Military enlisted tactical ops and air/weapons spec. and crew |

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APPENDIX C

Descriptive Statistics for Dependent Variables

TABLE C1
Descriptive Statistics for Dependent Variables

|  | Mean | Min. | Max. |
|---|---|---|---|
| Ratio of distinct jobs to total jobs listed (23 categories) . . . . . . . . . . . . . . . . . . . . | .39 | .03 | 1 |
| Ratio of unique jobs to total jobs listed (96 categories) . . . . . . . . . . . . . . . . . . . . | .48 | .03 | 1 |
| Mean occupational characteristics, 23 categories: |  |  |  |
| %black . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 10.91 | 5.31 | 25.76 |
| Duncan SEI . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 53.44 | 11.05 | 78.57 |
| Occupational earnings score . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 52.52 | 12.80 | 90.00 |
| Service orientation . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 54.48 | 33.71 | 70.96 |
| Critical thinking . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 61.74 | 46.00 | 75.26 |
| Physical activity . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 36.50 | 13.38 | 73.95 |
| Mean occupational characteristics, 96 categories: |  |  |  |
| %black . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 10.88 | 3.40 | 33.16 |
| Duncan SEI . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 53.53 | 9.51 | 93.00 |
| Occupational earnings score . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 51.07 | 11.70 | 99.90 |
| Service orientation . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 55.44 | 28.63 | 76.22 |
| Critical thinking . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 61.56 | 44.70 | 85.15 |
| Physical activity . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 35.50 | 4.43 | 76.25 |

Note.—Sample limited to white and black respondents in the job search module between the ages of 18 and 64 who were actively engaged in job search. Data are from the New Jersey Unemployment Insurance Survey.

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Supplementary Analyses

TABLE D1

Supplementary Analyses of the Relationship between Race, Search Breadth, and Search Intensity

| | Search Breadth | | | | Search Intensity |
| | Excluding Nonsearchers | | Including Nonsearchers | | |
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|---|---|---|---|---|---|
| Race/ethnicity: | | | | | |
| Black[a] | .051*** | .055*** | .040** | .044** | .107 |
| | (.012) | (.013) | (.014) | (.015) | (.062) |
| N | 1,964 | 1,964 | 2,238 | 2,238 | 2,238 |
| Adjusted $R^2$ | .5431 | .4664 | .3468 | .2767 | .3724 |

Note.—All models include the full set of controls. Estimates derived from Coarsened Exact Matching process where white and black respondents were matched exactly on gender, age, education, and number of weeks in the survey. Data are from the New Jersey Unemployment Insurance Survey. Numbers in parentheses are SEs. Models 1 and 3 are for the 23-category occupation codes and models 2 and 4 are for the 96-category occupation codes.

[a] The omitted category is "white."

+ $P < .10$ (two-tailed tests).
* $P < .05$.
** $P < .01$.
*** $P < .001$.

APPENDIX E

The National Study of Job Search

*Background on the Gfk Panel*

The National Study of Job Search (NSJS) was conducted in collaboration with Gfk (formerly Knowledge Networks), a leading survey research company with a standing panel of respondents. The sampling design for the Gfk panel—referred to as KnowledgePanel—is based on a combination of random-digit dial (RDD) methods and address-based sampling (ABS) methods, with a sampling frame that covers approximately 97% of all U.S. households (Knowledge Networks 2011). Once a household is selected for inclusion in KnowledgePanel, Gfk actively recruits the household through mailings (in both English and Spanish) and telephone calls (Knowledge Networks 2011).

Unlike most online panels, households without Internet access or a computer are still able to participate in KnowledgePanel. If a household is sampled by Gfk but does not have a computer or access to the Internet, Gfk provides the prospective participants with both a netbook computer and free Internet service. Additionally, Gfk oversamples African-American and Latino households, ensuring coverage of traditionally harder-to-reach populations.

As with all national probability surveys, declining response rates are cause for concern. Estimates indicate that approximately one-third of the households selected for KnowledgePanel become active panel members (Rosenfeld and Thomas 2012). To correct for nonparticipation, Gfk generates weights that make the active panel of respondents representative of the U.S. population along key sociodemographic characteristics. These weights are created using benchmarks from the most recent Current Population Survey.[46]

The within-panel response rate for KnowledgePanel is exceptionally high relative to typical online surveys (the average is 65%). In addition, a key benefit of the Gfk panel is that researchers are able to obtain detailed information about individuals who are selected for participation but opt not to respond. All members who join KnowledgePanel answer a profile survey that captures a broad array of demographic information, including gender, age, race, ethnicity, income, and education. Thus, unlike most survey collection efforts, where researchers need to make heroic assumptions about nonrespondents, researchers using KnowledgePanel know a significant amount

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[46] The weight adjusts for gender, age, race/ethnicity, education, census region, household income, home ownership status, living in a metropolitan area, and having Internet access.

about nonparticipants among the active panel. This information is useful in testing for differential selection based on key demographic variables, and it allows the researchers to create weights to adjust the survey sample for nonresponse (Knowledge Networks 2011). One additional concern about standing online panels is the issue of respondent fatigue. To address this concern, Gfk attempts to assign no more than one survey of approximately 15 minutes in length to each respondent in a given week (Knowledge Networks 2011).

Recent analyses by leading social science methodologists indicate that survey results produced by KnowledgePanel are similar to survey results obtained through more traditional sampling and survey methods (Chang and Krosnick 2009; Yaeger et al. 2011); although Smith (2003) found that KnowledgePanel produced higher levels of don't know responses and slightly more extreme responses to agree/disagree scales than found in the GSS.

Articles using survey data collected through KnowledgePanel have been published in leading peer-review social science journals, including *American Sociological Review, Social Forces, American Journal of Political Science, American Political Science Review, Public Opinion Quarterly,* and *Journal of Personality and Social Psychology*. Additionally, the NSF-funded Time-Sharing Experiment for the Social Sciences (TESS), a program that funds population-based survey experiments for social scientists, relies on KnowledgePanel to conduct all of its survey research. We believe that, overall, the data produced through KnowledgePanel are comparable or favorable relative to other survey data collection efforts, thus giving us confidence in the quality of the data for the NSJS survey.

*National Study of Job Search*

The NSJS was conducted with KnowledgePanel respondents and was fielded between February 8, 2013, and February 25, 2013. The target population for the NSJS was noninstitutionalized adults ages 18–64 who were residing in the United States and who had looked for work over the previous four weeks. The NSJS also oversampled African-American respondents to ensure that there would be an adequate sample for statistical comparisons with white respondents.

To recruit participants for the NSJS, Gfk sampled 19,509 of its KnowledgePanel members and sent email invitations to this group to screen them for eligibility. Of those 19,509 individuals, 11,231 (57.6%) completed the screening items. We screened individuals for eligibility on two items. First, the respondent had to provide informed consent. Second, the respondent had to have been looking for work in the four weeks prior to participating in the

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survey. Of the 11,231 respondents who completed the screening items, 2,092 (18.6%) were eligible to participate in the NSJS. Of those eligible for participation, 98.5% completed the survey. To ensure comparability with the NJUI sample of UI recipients, we limit our NSJS sample to respondents who were not employed full-time. This exclusion led to the removal of 655 respondents (32% of the NSJS sample). The median length of time it took respondents to complete the NSJS survey was 24 minutes.

The NSJS collected detailed information about respondents' employment histories, their job search behaviors and goals for the future, and their experiences with workplace discrimination. The information collected through the NSJS enabled us to produce comparable measures to those in the NJUI survey as well as to understand other aspects of respondents' social and economic experiences not captured by the NJUI data. We view the NSJS data set and analyses as an ideal supplement to the NJUI data set and analyses. Together, these two surveys provide insights into racial differences in job search behavior and the mechanisms underlying these racial differences; they increase our confidence that the findings are generalizable beyond a single sample.

APPENDIX F

The Job Offer and Wage Offer Consequences of Search Breadth

Rather than limiting oneself to a narrow range of job prospects, black job seekers cast a wide net in their search process. In this appendix, we consider the consequences of these supply-side processes—rarely captured in studies of job search—for labor market outcomes. In particular, we investigate the potential consequences of search breadth with respect to the likelihood of receiving a job offer and the quality of the offers received (i.e., wages). While this analysis can provide important supplementary insights about the dynamics under investigation, we view it as primarily suggestive and in support of future research.

Of all the possible implications of search breadth, the one most pressing for those out of work is the likelihood of receiving a job offer. In this analysis, we explore the association between search breadth and search success by regressing the receipt of a job offer on search breadth (the number of distinct job titles applied to relative to the total number of jobs titles listed), race, and the set of controls included in the full models presented above. We also include a quadratic term for search breadth since the consequences of this variable appear to be nonlinear. Using a probit regression model, the findings (presented in the left panel of fig. F1) indicate that breadth of search is associated
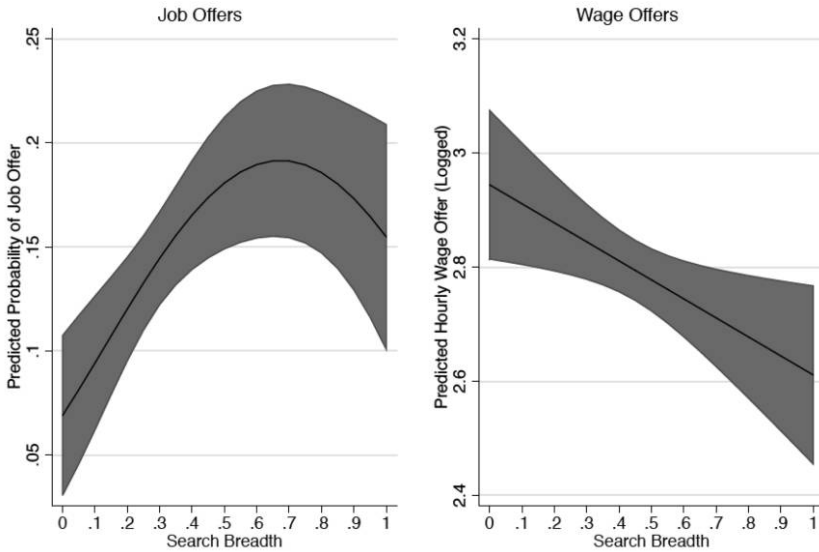
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F<small>IG</small>. F1.—All analyses conducted at the 23-category level of aggregation. Data come from the National Study of Job Search.

with a statistically significant higher probability of receiving a job offer.[47] While the relationship between search breadth and the probability of a job offer declines somewhat among high-breadth searchers, for the majority of the distribution we see a strong positive association between search breadth and the probability of receiving a job offer. With respect to the basic goal of getting a job, then, it appears that there may be good reason for job seekers to cast a wide net in their search process. While we find no racial differences in the impact of search breadth on the likelihood of receiving an offer, black job seekers presumably benefit from this strategy as a result of the greater average breadth of their search.

Search breadth may have positive consequences for the reemployment of job seekers, providing some justification for this strategy. At the same time, there may be potential costs associated with a broad search strategy. A second important component to success in job search is the wage associated with new employment. We consider the consequence of search breadth for this indicator of employment quality by modeling as our dependent variable the highest hourly wage an individual was offered during the course of the survey, logged to account for skew. Using the CEM sample matched on race

[47] In fig. F1, search breadth is measured at the 23-category level of occupational aggregation. The findings are substantively consistent at the 96-category level of occupational aggregation.

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and the full set of control variables used in the main analyses, we find that search breadth is negatively associated with wage offers. The right panel in figure F1 plots predicted wage offers by levels of search breadth, with all other covariates held at their mean. Our results indicate that average wage offers fall steadily with increasing search breadth.[48]

Overall, then, job seekers appear to pay a price for adopting a broad search strategy, with those who are successful in finding work winding up with significantly lower wages.[49] Of course, there may be some concerns about endogeneity here. Those who anticipate difficulties finding work may adopt a broad strategy and be destined for lower wages, but for reasons unrelated to search breadth. We attempt to control for worker quality by including an extensive range of controls—including prior earnings, prior occupation and industry, and duration of unemployment. These variables likely assist in accounting for a number of unobserved respondent characteristics, such as family background and quality of schooling. At the same time, it is possible that some unmeasured characteristics may remain. We view these findings as a first attempt to explore the consequences of search breadth for job seekers' labor market outcomes, and we encourage future research along these lines.

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[48] Tests for nonlinearities in the association between search breadth and wages were not statistically significant.

[49] These results may help to explain the racial wage gap. However, they are less consistent with the wage gap by gender (given that women search narrowly, but also receive lower wages than their male counterparts). We suspect this has to do with the pairing of narrow search and lower paying occupations for female job seekers. While women generally target their search among lower paying occupations, blacks do not cluster applications in lower paying occupations, but instead appear to pay a penalty for broad search.

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