



Jury Pool Underrepresentation in the Modern Era: Evidence from Federal Courts

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Despite a constitutional mandate that jury pools in the United States be representative of their communities, almost no datasets exist that can describe typical levels and patterns of jury representation. We present data from federal courts on the composition of jury pools in 52 areas, representing 764 counties. We also compare current composition estimates to those available 20 years ago from published sources. Results show that, by far, some amount of underrepresentation in jury pools is the norm, and levels of attrition fail all but one proposed method for calculating and defining “not fair and reasonable” amounts of underrepresentation. On average, expected losses range between one and three members of each minority group from jury venires of 40 to 60 people. We find no evidence that the impact of attrition on Latino communities is greater than on African-American communities and, unlike Latinos, no indicators of African-American representation levels show improvement over time. We discuss the challenges of addressing racial/ethnic attrition in jury pools, which is evident but, given the repeated small-group sampling of venires, may be small in effect in any single case.

I. INTRODUCTION

The racial profile of juries holds powerful significance in the United States, particularly when verdict outcomes are controversial (e.g., Bobo 2013; CBS News 2014). References to an “all-white jury” are common in news reports (see discussion in *Georgia v. McCollum* 1992), and this phrase currently has its own Wikipedia entry (http://en.wikipedia.org/wiki/All-white_jury). In interviews, judges express concerns about representativeness of jury venires (Clair & Winter 2016), and both survey and experimental data reveal that citizens view trials as less fair and verdicts as less legitimate if they come from juries that are racially homogenous (Ellis & Diamond 2003; Fukurai & Davies 1997).

Despite such powerful symbolism, when we speak of litigants’ right to juries that represent a “fair cross-section” of the community, or if a party charges an equal protection violation regarding underrepresentation, these claims do not concern the final *petit*

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jury. Instead, rights in this area refer to representative “jury wheels, pools of names, panels, or venires from which juries are drawn” (*Taylor v. Louisiana* 1975:538; see also *Berghuis v. Smith* 2010; *Hoyt v. Florida* 1961; *Lockhart v. McCree* 1986). Thus, although states and court systems are responsible for ensuring representative juries, their duties primarily concern these larger-sized bodies (which we summarize as “pools”) from which the final petit jury is eventually selected.¹ Therefore, if we are to ask questions about the state of jury representativeness and whether legal challenges will likely redress disparities in representation, jury pools are the critical site for scholarly analysis.

Remarkably, in the current legal and social science literature, we lack quality answers to even the most basic social science questions about jury pools: How often do disparities occur and how large are they? Are disparities larger for some groups than for others? How often are disparities likely to be deemed “not fair and reasonable” under any one of the available legal tests of underrepresentation? The existing literature offers few answers to these questions, primarily because nearly all existing studies of jury representation provide data from one or a few counties to highlight particular issues and outcomes via the case-study approach. We instead need detailed multijurisdictional data, something that, as we will describe below, is quite challenging to acquire from most court systems.

We fill gaps in the jury representation literature by presenting original data based on surveys of federal court cases as well as direct requests for federal records. We also compare our results to published studies, including matching specific jurisdictions in our data with those studied previously, to examine trends over time. We focus on the representation of African Americans and Latinos because these are the two largest minority groups in the United States, and they are, by far, the groups most likely to be the subject of court challenges concerning representation.²

We begin by reviewing the law and standards in this area, focusing on the different descriptive questions one could ask about the make-up of a pool and the different ways to assess whether any lack of representation is “not fair and reasonable,” the standard of existing law (*Duren v. Missouri* 1979). We review patterns emerging from case studies of underrepresentation, which point to several additional research questions. We then describe our data and rationales for focusing on federal courts. Our results show that underrepresentation of the Latino and African-American populations is ubiquitous, occurring in nearly all federal districts and divisions we surveyed. The patterns we

¹Litigants are also protected from the discriminatory use of peremptory challenges (e.g., *Batson v. Kentucky* 1986), although policing these challenges is extremely difficult (Sommers & Norton 2007). Further, although peremptory challenges can radically warp the composition of any single jury (see, e.g., Rose 1999), multiple studies suggest that, excepting capital cases, peremptories only negligibly affect whether, on average (i.e., across a set of cases), juries tend to represent their communities (e.g., Diamond et al. 2009; Gau 2015; Rose 1999; Rose et al. 2012).

²Although women were the subject of early fair cross-section cases, such as *Taylor v. Louisiana* (1975) and *Duren v. Missouri* (1979), there is little evidence that women continue to be systematically underrepresented on juries today, and they are sometimes slightly overrepresented (see, e.g., Eigenberg et al. 2012; Rose 1999; *U.S. v. Taylor* 2009).

observe were also evident in data from decades ago, although by some indicators, disparities in the Latino communities are improving. At the same time, very few currently employed tests of disparities would deem observed disparities to be legally problematic. We conclude by considering the implications for future research in this area, and we emphasize the importance of courts using multiple tests to evaluate the existence and impact of underrepresentation.

II. CONCEPTUALIZING UNDERREPRESENTATION: STANDARDS AND REFERENCES POINTS

To prove a Sixth Amendment fair cross-section violation, *Duren v. Missouri* (1979) outlined a multiprong test that asks, first, if the underrepresented population constitutes a “distinctive group.” Characteristics typically regarded as immutable, such as race, ethnicity, or gender, qualify as “distinctive” (Hannaford-Agor 2010), whereas categories that are more susceptible to change across the life course (e.g., income or age) may not, depending on the jurisdiction (e.g., Chernoff & Kadane 2012). Second, a party challenging a pool must show that the amount of underrepresentation is “not fair and reasonable in relation to the number of such persons in the community” (*Duren v. Missouri* 1979:364). *Duren’s* third prong asks about whether the cause of underrepresentation is “systematic exclusion,” that is, it must be inherent in the process itself (see Chernoff 2011), which requires proof about what factor or factors explain attrition (for a discussion of how challenging it is to prove systematic exclusion empirically, see Rose & Abramson 2011).³ The focus of our analysis concerns the second prong, that is, we explore how much group-based attrition exists, which can be assessed in a wide variety of ways (*Berghuis v. Smith* 2010).

A. Measuring Levels of Underrepresentation

One indicator of underrepresentation is the “absolute disparity” (AD), which is the simple difference between the proportion of a distinctive group in the population and the proportion observed on the jury wheel or in the venire. For example, if a group is 10 percent of a population but just 5 percent of the jury pool, this is an AD of 5 percent. Closely related, the “absolute impact” (Detre 1994) or “substantial impact” (Bueker 1997) uses the AD and asks how many, if any, members of a given group—in raw numbers—are effectively missing from a particular venire. With an AD of 5 percent, two fewer members of a group are expected to be present in a venire of size 40—that is, two people are “missing.” If the venire were larger—for example, 60 people—a 5 percent AD means that three people would be missing. The absolute impact test conveys the predicted practical effect of the AD on the venire at issue.

³Although *Duren* is a fair cross-section case, the criteria do not strongly differ from those required to prove an equal protection violation, although the latter usually requires a showing of intentional discrimination rather than racially disparate impacts of policies (see Chernoff 2011; Chernoff & Kadane 2012; Hannaford-Agor & Waters 2011).

Although designed to signal underrepresentation, both the AD and the absolute impact say little about a given community's level of representation in jury pools. Does a 5 percent AD mean there are no members of that group in the pool (i.e., the group was only 5 percent of the population to begin with), or does a group nonetheless continue to make up a substantial proportion of the pool (i.e., the group constituted 55 percent of the population but 50 percent of the jury pool)? To assess this, the "comparative disparity" (CD) uses the affected community, rather than the venire, as the crucial reference point. The CD measure takes the AD and divides that value by the group's proportion in the community. A 5 percent AD in a distinctive group that is 5 percent of the population is a 100 percent CD, whereas the same 5 percent AD in a group that is 55 percent of the community produces only a 9 percent CD ($0.05/0.55$). In general, social scientists and legal scholars (e.g., "Brief for Social Scientists" 2009; Kairys et al. 1977) have favored the CD as the best way to convey underrepresentation "in relation to the number of such persons in the community" (*Duren v. Missouri* 1979:364).⁴

A typical criticism of the CD standard is that even small ADs can produce large CDs in small populations (e.g., 1 percent AD for a community that is 2 percent of the population produces a 50 percent CD) (see, e.g., Beale 1983; *Berghuis v. Smith* 2010). Absent data, we currently know little about the merits of this critique. If concerns about the CD standard are valid—that is, if CDs typically exaggerate small differences—then we should see that the highest CD values are disproportionately a product of low ADs occurring in communities with small minority populations. Despite the scholarly support the CD test enjoys, we are aware of no investigations to either support or refute concerns that CD's exaggerate levels of underrepresentation.

B. What is "Not Fair and Reasonable"? Thresholds for Tests

The above measures describe the quantitative level of underrepresentation. For any given disparity, courts must also decide how much attrition is "not fair and reasonable" (*Duren v. Missouri* 1979). One common standard across federal circuits and some states is the so-called 10 percent rule, in which ADs in the jury pool must exceed 10 percent in order to be deemed "not fair and reasonable" (for a review of the use and history of this standard, see *U.S. v. Green* 2005). Commentators have noted that this standard logically and problematically countenances the entire absence of racial or ethnic groups that constitute less than 10 percent of the community, a circumstance that exists in the majority of counties in the United States (see "Brief for Social Scientists" 2009; Hannaford-Agor & Waters 2011). But even in communities with higher proportions of

⁴Scholars (e.g., Van Dyke 1977) have used a close cousin of the CD, the selection ratio (SR), which describes the ratio between the probability of selection in the observed jury pools and the probability of selection in a pool that reflects the actual population, demarcated as $[p/(1-p)]/[\pi/(1-\pi)]$, where p is the proportion of the target group (e.g., African Americans) in the pool, and π is the proportion of the target group in the population (Gastwirth & Pan 2011). When conceptualized as a deviation from equal likelihood ($1 - SR$), the numerical result will typically be close in magnitude to the disparity described by the CD (and always was so in our data). Therefore, we focus on the simpler CD.

minority groups, it is not clear how frequently disparities reach this level, even as history offers stark anecdotes (e.g., *Swain v. Alabama* 1965). Some circuits have developed somewhat lower thresholds (e.g., *U.S. v. Rodriguez-Lara* 2005, discussing a 7.7 percent benchmark) but, again, we know little about how often typical disparities in jury pools cross bright-line AD thresholds at any level.

There have been fewer proposed thresholds for the CD. Courts sometimes draw on precedent or rulings from other areas (e.g., *State v. Kennedy* 2002, citing *Ramseur v. Beyer* 1992:38, which deemed a CD of 40 percent as “borderline”). In the scholarly literature, Hannaford-Agor and Waters (2011) discuss one conceivable cutoff: a CD of 50 percent, which corresponds to legal standards of “preponderance of the evidence” and “more likely than not” (for a different application of this standard to jury disparity, see Re 2011). By contrast, Kairys and colleagues (1977) proposed a “maximum [allowable] comparative disparity” of 15 percent, although they did not detail that figure’s rationale. To address the concern that “harmless error” CDs can arise in areas with small minority populations, Kairys et al. noted the possibility of different standards for communities of different sizes. For example, in counties in which a distinctive group is more than 10 percent of the community, they suggested a 15 percent CD be considered not fair and reasonable; when minority communities are less than 10 percent of the area, an actionable CD could be higher, at 25 percent or greater (hereafter we refer to this as the “15/25 test”). A scholars’ recent brief mimicked this approach in its recommendation to the Supreme Court (“Brief for Social Scientists” 2009).

A final commonly discussed standard of reasonableness is the SDT, an acronym that has referred to both “statistical decision theory” (Detre 1994) and to the “standard deviation test” (e.g., *Berghuis v. Smith* 2010; *Castaneda v. Partida* 1977). The standard reflects p value practices in social science, defining underrepresentation as anything that exceeds, under the null hypothesis, a two standard deviation difference between the population and the jury pool. That is, a “not reasonable” difference is a “statistically significant” difference, as the disparity is unlikely to be attributable to the vagaries of sampling error (Finkelstein 1966). This approach is used infrequently in court opinions, in part because it requires judges to understand and apply statistical significance and probability theory, which can appear quite abstract to even highly elite judges (see, e.g., Re 2011).

Apart from complexity, a key weakness of the SDT approach is its relationship to the size of the jury pool being examined (e.g., “Brief for Social Scientists” 2009). Conceptualizing the “pool” as the “venire” is problematic because only the largest disparities, in groups of, for example, 30 to 60 people, would convincingly rule out sampling error (Gastwirth & Pan 2011). One could instead ask about the representation on the “qualified juror wheel” (QJW), which is the source list of those sampled in the community and deemed eligible and qualified to serve (e.g., U.S. citizens, residents of the area, nonfelons, proficient in English). Courts maintain the QJW for a set period (e.g., two years) and use it to generate the panels and samples for trials during that period. The QJW captures a substantial source of bias in selection: who is sent, who receives, and who responds to a court notice (see Gau 2015; Hannaford-Agor 2010; Rose et al. 2012). Examining the QJW has the opposite problem of studying venires. Because QJWs contain thousands of names (e.g., in some federal districts, more than

50,000 names) (Rose & Abramson 2011), any level of disparity, no matter how small, risks testing as statistically significant (see, e.g., “Brief for Social Scientists” 2009).

Between these extremes of very small or very large pool sizes, scholars and litigants have sometimes conceptualized the jury pool as time-delimited subsets, or panels, of the QJW, such as six months’ (*Berghuis v. Smith* 2010; Gastwirth & Pan 2011) or one year’s (Hannaford-Agor & Waters 2011) worth of summoned jurors from a given area. Effects may still be difficult to detect under this definition of jury pool, owing to small numbers of minority groups in many areas of the United States (Hannaford-Agor & Waters 2011). However, with multijurisdictional data on actual levels of underrepresentation, particularly from places that have more than negligible minority populations, it is possible to investigate how often various legal standards would deem disparities “not fair and reasonable,” including how large a jury pool would typically need to be in order to detect a significant effect.

III. TRENDS IN EXISTING STUDIES, THE DATA CHALLENGE, AND THE CURRENT STUDY

A. *Case-Study Patterns*

As noted, most existing studies of jury representation amount to snapshots from different areas and time periods. Despite this serious limitation, patterns across existing studies point to some possible trends in minority representation. For example, only a few studies find disparities as high as 10 percent for African Americans (see Hannaford-Agor 2010; Leviense 2004, both reporting on the Detroit area) or for Latinos (Gau 2015, from a “southeastern state”; Walters & Curriden 2004, from Dallas, Texas), which supports the idea that a bright-line 10 percent rule protects most areas from fair cross-section violations. At the same time, we cannot rule out the possibility that other areas also experience high attrition but have not been the subject of a case study.

Second, a number of studies suggest that, in the modern era, representation levels for Latinos might be worse than those for African Americans. With few exceptions (Berner et al. 2016; Randall et al. 2008), the handful of studies that have examined representation of both groups in a single area have reported not only higher ADs for Latinos—which could simply reflect larger population size—but also higher CDs (Fukurai et al. 1993; Gau 2015; Rose & Brinkman 2008; Walters & Curriden 2004). The latter indicates more substantial jury pool underrepresentation at the community level of Latinos compared to African Americans. Indeed, fully six post-*Duven* case studies find that African Americans participated in jury pools at rates that were similar to their proportion in the population (Dunham et al. 1986, Dade County, Florida; Fukurai et al. 1993, Sacramento result; Gau 2015, “Ocean County” result; Neeley 2011, Lincoln, Nebraska; Rose & Brinkman 2008, Austin, Texas; Walters & Curriden 2004, Dallas, Texas), whereas no study has produced that result for Latinos. If true, this is consistent with patterns in other civic participation studies that have found greater voter registration disparities between eligible whites and eligible Latinos than between whites and eligible African Americans (e.g., Logan et al. 2012). Greater disparities for Latinos is a

particularly plausible outcome for federal courts, which are required under the Jury Service and Selection Act to use voter rolls as a source list, which nearly all do (Bueker 1997; see *U.S. v. Green* 2005 for a different approach).

Although intriguing, excepting Bueker (1997) and Van Dyke (1977), these conclusions come from case studies, which differ from one another in terms of legal regime, time period studied, and the characteristics of the specific communities examined. All such factors limit comparative conclusions and the overall generalizability of studies.

B. Data Limitations

One reason for the spotty knowledge about jury representation is that access to data is exceedingly difficult. The challenges vary across state and federal jurisdictions. In some states, systematic data on racial representation are absent entirely because juror questionnaires do not always include race and ethnicity questions (Chernoff 2016; Hannaford-Agor & Munsterman 2006). Even when such information is recorded for a specific case, states may not hold onto the material for additional systematic analyses (e.g., Committee on Racial and Gender Bias in the Justice System 2003; see generally Crespo 2016).

By contrast, federal law (28 U.S.C. § 1869(h)) requires federal courts to gather records about the racial, Hispanic origin, and gender profile of jury wheels—both the master and qualified wheels—recording them on so-called AO12 forms. In theory, these records and reports are to be maintained “for four years” and “available for public inspection for the purpose of determining the validity of the selection of any jury” (28 U.S.C. § 1868). Although the phrase “public inspection” seems promising, districts do not uniformly interpret the law. Specifically, courts may restrict AO12 information to parties who are investigating or pursuing a *legal challenge* to the jury; such parties hold clear rights to the information (28 U.S.C. § 1867(f); Chernoff & Kadane 2012; *Test v. U.S.* 1981), whereas scholars or other interested members of the public do not (see Section IV).

Apart from access, available data may be limited in other ways. In the federal system, courts typically observe the race or ethnicity of a juror through responses provided on the initial qualification questionnaire.⁵ A case study of three federal areas showed that existing data based on these questionnaires suffer from high levels of missing data on race/ethnicity (Rose & Abramson 2011). Those authors found a particularly pronounced problem of missing data about Latinos in jury pools, likely due to a faulty questionnaire design in AO12s. In federal districts, questionnaires often asked first about race (asking if the individual is black/African American, Asian, American Indian, white, Native Hawaiian, or other) and then about Hispanic ethnicity (“Are you Hispanic or Latino?”). The U.S. Census Bureau revised forms that contained that question order because a disproportionate number of people were skipping the Hispanic ethnicity

⁵Some places, such as Florida, know race/ethnicity through other public records, usually responses people give about their race/ethnicity when they register to vote (likely an artifact of being covered by the Voting Rights Act) (Rose & Abramson 2011). Otherwise, courts typically know the racial and ethnic identities of people on their master or qualified wheels only via self-reports on the qualification questionnaire.

question; scholars reasoned that many people treat Hispanic identity as a race and therefore likely viewed the second (Hispanic) question as redundant (see Bates et al. 1995; Martin 2002).

C. The Current Study

Despite these challenges, our aim is to analyze jury representativeness outcomes just as scholars would assess any social phenomenon: by asking what is descriptively typical based on a sample of jury pools in the modern United States. Drawing on the above literature review, we pose the following research questions:

- What is the average level of disparity between the proportion of minorities in a community’s population and that group’s representation in jury pools (average “absolute disparity” or AD)? Likewise, what proportion of minority communities, on average, are omitted from jury pools (average “comparative disparity” or CD)?
- Are patterns in disparities the same for African Americans as they are for Latinos?
- How often would a given test deem disparities to be “not fair and reasonable”? How often do the results meet commonly used (e.g., the 10 percent rule) or proposed legal thresholds (e.g., CD-based rules)? To what extent are disparities statistically significant and how large must jury pools be before statistical significance is evident?
- How stable have disparities been across time, particularly with increases in minority populations?

For several reasons, we turn to federal courts to answer these questions. Federal jurisdictions can vary in their practices (see Bueker 1997; Rose & Abramson 2011). However, compared to differences across state courts (see Mize et al. 2007), practices and legal regulations will be more similar across federal courts, which promotes comparability of observations. More importantly, as noted, federal courts must record and keep race and Hispanic ethnicity data. Studying federal courts is not the same as studying state courts. The federal system holds fewer jury trials and its districts and divisions cross multiple counties, which lowers the proportion of minorities compared to, for example, state courts in urban areas (Hannaford-Agor & Waters 2011). This also increases the distances people have to travel to serve, which could affect their responsiveness to summons and qualification questionnaires. We consider issues of generalizability in more detail in Section IV.

To gather data, we wrote to all federal district courts to ask them for their AO12 forms. To counteract a concern that only areas with the most representative jury pools might respond to our AO12 request, we also reviewed 10 years’ worth of federal cases to identify instances in which defendants challenged the composition of their jury pools and the judge’s opinion reported the data that supported the challenge. Compared to the AO12 dataset, these court cases have an opposing bias because parties will typically litigate only the most egregious disparities, which can inflate the size of average

disparities. The two datasets therefore provide a check on results of each source and enable examination of whether and how results differ across sources. Finally, we draw on results from a small number of published studies of federal courts to compare current estimates to those from roughly 20 years ago.

IV. METHOD

A. Data

1. AO12 Sample

Excluding federal territories outside the U.S. borders (Puerto Rico, Virgin Islands, Guam, and Northern Mariana Islands), there are 90 federal districts within the 12 circuits in the U.S. court system that hold jury trials (the 13th, the Federal Circuit, does not use juries). Some federal districts are subdivided into divisions that have their own courthouse (e.g., there is a Houston division in the Southern District of Texas). To maximize the chances of reaching any clerk(s) who have a responsibility for maintaining records on jury pools, we sent letters to federal courthouses in all areas, addressed to the attention of the Clerk of the Court. In the letter, we described our interest in understanding the racial and ethnic composition of modern U.S. federal jury pools. We noted the provision in federal law (described above) that allows for public inspection, and we asked if they would send any forms still in their possession, either via an enclosed self-addressed stamped envelope, an emailed pdf, or fax.

We heard back from 23 districts (25 percent response rate). Fourteen districts, covering 39 divisions, sent their AO12 forms (or they sent the internal reports used to produce the AO12 form, called “JS12” reports). Another nine areas responded but did not provide information: six wrote to inform us that we had read the law on “public inspection” incorrectly and that they did not have to provide the data (interestingly, three districts that provided the data also explained the same, but stated that they were choosing to make it available to us); one required a court order, which we requested but to which we received no response; and two others stated that they had no forms in their possession. There was no particular geographical pattern to responses. For example, both the districts of Northern Illinois and Northern Indiana provided data, but the districts of Southern Illinois and Southern Indiana refused. We excluded one AO12 form from Montana because neither the African-American nor the Latino population exceeded 1.5 percent of jury-eligible adults in the area, which meant that on even fully representative 60-person venires, it would be atypical to have even a single African-American or Latino individual. This would limit our ability to examine absolute impact and statistical significance (see Hannaford-Agor & Waters 2011). A second form from Eastern Wisconsin had over two-thirds (69 – 77%) of the race and ethnicity data listed as missing. Although other areas also sent AO12 forms that had missing data (see below), the Wisconsin figures were outliers and too large to qualify as usable data.

Typically, federal courts refill master and qualified jury wheels every two years. The forms we received reflected wheels formed between 2005 ($n = 1$ or 1.7 percent of

divisions) and 2013 ($n = 2$ or 3.4 percent of divisions), with most from 2009 (74 percent of divisions) and 2011 (21 percent of divisions). Although a few districts ($n = 5$) sent data on multiple years, we used the most recent year for descriptive statistics so that all areas were measured with the same precision. All analyses of AO12 data concern the qualified jury wheel (QJW), although the districts of Central California and Colorado stated that they had sent information on the “master” jury wheel, which usually refers to a wheel that includes both qualified jurors and those who end up claiming exemptions or who are disqualified.⁶

AO12 forms contain a section that lists population estimates for the area. However, courts use decennial census estimates for this section, which can render information less precise and outdated, particularly for the 2009 forms that dominate our sample. To obtain division-specific information, we used American Community Survey (ACS) five-year (2009–2013) estimates for the 502 counties covered by the regions in our AO12 data. We identified the over-18 population of the counties that make up each district/division, and we excluded non-U.S. citizens, who would be jury ineligible.

2. Court Case Sample

To gather court cases, we looked for jury representation cases that would include useful empirical information. In an initial search, we used the search terms “absolute disparity” and “jury” in the LexisNexis database of federal cases bounded by January 2003 and January 2013. This returned 93 federal district cases (one additional case did not concern jury representativeness) and 20 appellate court cases. Of these, only 46 opinions reported empirical estimates about the population of the area and the jury pool (either the master wheel, the qualified wheel, or the venire). Excluding habeas appeals from state courts ($n = 24$), we had 22 cases emanating from federal district trial courts for analysis. A second broader search (“jury” and “*Duren*” and “fair cross”) yielded over 300 cases, but produced only an additional seven federal (non-habeas) court cases not already identified through the first search.

Of the combined 29 cases from the two searches, we eliminated six: two concerned groups other than Latinos or African Americans (one mounted its challenge on an intersectionality claim, the underrepresentation of black men, and another was about the underrepresentation of Native Americans). Two others came from areas also covered

⁶Central California did not wish to share its AO12 form (it was one of the areas that provided data but also wrote to comment on our interpretation of federal law); however, it sent an internally generated demographic analysis of what it described as the “all persons summoned for jury duty from the 2009, 2010, and 2011 master jury wheels who returned the juror qualification form” (text taken from the cover letter to the report sent to us). Thus, Central California’s analysis appears not to have removed those disqualified. Colorado also stated that it had sent information on the “master” wheel. A follow-up email clarified that the data concerned the “first draw” from the wheel. We treat this as information from a QJW, since draws typically come from qualified wheels. Even if these observations were from the master wheel, we do not expect a strong effect on results. We examined the profile of both the master and qualified wheels in other locations that provided information on both and found that the percentages across the two sources were fairly consistent. This could imply that disqualifications from service fail to exact a heavy toll on jury representativeness. However, both the master and qualified wheels reflect the same biases in the original population source list (e.g., registered voters) and, in most places, depend on someone returning the qualification questionnaire (for an exception, see Florida data in Rose & Abramson 2011). The presence of similar selection effects will tend to minimize differences across the master and qualified lists.

in the AO12 database and were therefore duplicative. An additional two, one from the District of Vermont and one from the District of North Dakota, reported on minority populations of less than 1.5 percent. In the court case data, we used the population estimates reported in the opinion, which the court treated as fact. In four cases, the judge discussed numbers besides those presented by the defendant. In three of these, we used the defendant's figures.⁷

Together the AO12 data and the court case file reflected 52 areas, generating 47 separate observations on African-American representation and 39 estimates for Latinos. The population profile of our data, together with a raw list of the ADs for each area, appears in two tables in the Appendix, one for African Americans and one for Latinos, presented by federal circuit of the districts. In all, the two datasets cover 764 counties. This reflects jury pools from districts in 21 states, with observations from nearly one-third of all the eligible federal districts (28 of 90). As the Appendix details, there is at least one observation from 12 of the 13 federal circuits that hold jury trials. African Americans make up about 11 percent of the communities in our data (mean = 10.98) but this was highly variable ($SD = 8.3$). Latinos constituted an average 20 percent of the populations in the data, also subject to high variability (mean = 20.1, $SD = 19.5$).

3. Data Across Time: Estimates from Published Sources

We drew on published data from federal courts to gauge levels of representation from, typically, the 1990s with one study reporting data from 2000 (Lievence 2004). Bueker's analysis of supplementing voter rolls with drivers' license records contributed the most observations (52 divisions from 18 districts) (1997:416–17). Several of these estimates came from areas with less than 1.5 percent population of Latinos or of African Americans, which we omitted for reasons described above. Three case studies provided data: Lievence (2004, examining Eastern Michigan, Detroit Division); Newman (1995, examining Northern Illinois, Eastern and Western Divisions); and Schreckhise and Sheldon (1998–1999, examining Eastern Washington, Spokane Division). (We omit one other published study because all the districts examined were part of our court case dataset [Rose & Abramson 2011].)

In all, the four published sources generated 46 estimates for African Americans and 35 estimates for Latinos. Of these, 16 estimates for African Americans and 15 estimates for Latinos in the published sources dataset were from the same areas observed in the data we collected, allowing for more precise over-time comparisons.

⁷The reasons for different estimates varied, but in choosing which estimates to use, we sought those closest to those in our AO12 dataset. In one case, the court discussed the population in terms of the 2000 Census, which vastly undercounted the 2009 population of Hispanics; in that same case, the government used the defendant's more correct population estimates, but it eliminated cases missing on ethnicity for jury pool estimates (see discussion of missing data in Section V). In a second case, the judge discussed figures besides those from an AO12 form (e.g., results for jury venires from different time periods) and offered a less conservative estimate of the jury pool composition based on an internal report. One case differed on whether to use data concerning the whole district, or as the defendant requested, just the division. Finally, we used the court's figure for one case because the defendant failed to adjust for jury eligibility (e.g., citizenship) in estimating the population.

V. RESULTS

A. *Descriptive Results*

Across all data points, the average absolute disparity (AD) for African Americans was 3.9 percent, but this value was highly variable, with a standard deviation of 2.9 percent. The median AD was 3.1 percent. Viewed as comparative disparities, on average just over 40 percent of African Americans in these communities were not part of their jury pools ($M = 40.7$, $SD = 19.5$), with a median of 42.1. To calculate an estimated absolute impact, representatives of several federal courts provided plausible sizes of a typical venire in a federal case, producing estimates between 40 and 60.⁸ Multiplying the hypothetical venire size (either 40 or 60) by the median AD indicates the number of distinctive group members likely to be omitted. Under this approach, one African American is expected to be omitted from a pool of 40 ($0.031 \times 40 = 1.24$, rounded to 1) and about two from a pool of 60 ($0.031 \times 60 = 1.86$).

The average AD for Latinos was higher than that for African Americans, 4.7 percent ($SD = 3.7$), with a median of 4.2 percent. This median value corresponds to an expected absolute impact of around two jurors on a venire of 40 ($AI = 1.68$) and closer to three ($AI = 2.52$) on a venire of 60. At the same time, likely because of their larger population size in many areas, the underrepresentation of the community was lower than that for African Americans, with an average CD for Latinos of 30.7 percent ($SD = 21.1$; median = 32 percent).

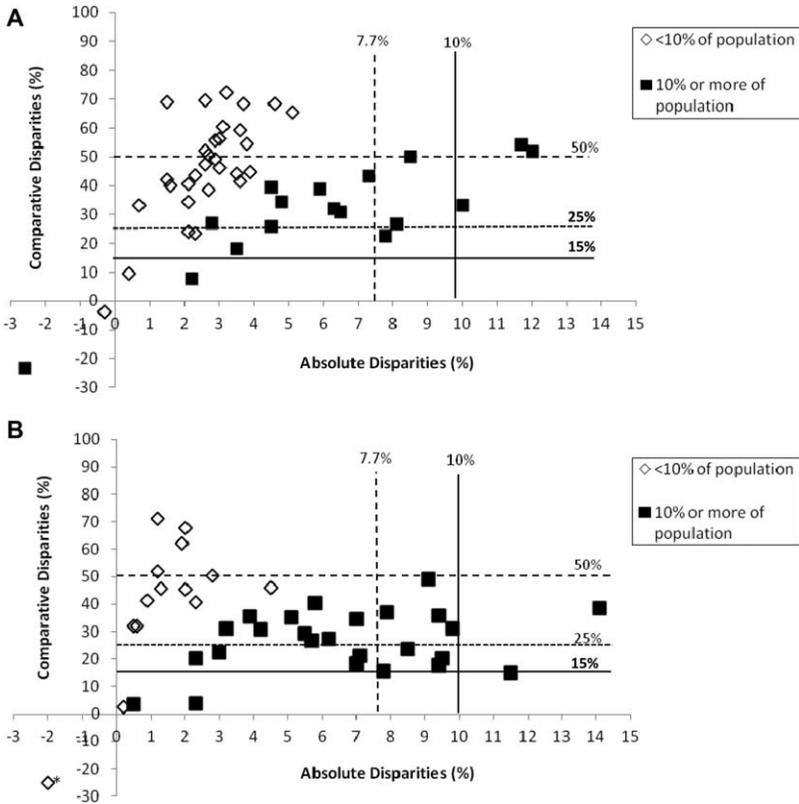
Of note, although we characterized the two datasets as having opposing biases, results largely converged. The mean AD for African Americans in the AO12 data was 3.66 ($SD = 2.4$), with a median of 3; in the court case file, the median AD was similar (3.35), but the mean was higher (4.5), which is due largely to a single AD (from Eastern Michigan) of 11.7 percent. Without that observation, the court case observations had a mean of 3.92 and a median of 3.1, very similar to the AO12 data. The means for the CDs were similar in both files, at just above 40 percent. There were just six observations from court cases for Latinos, but the average AD was similar whether it came from the AO12 file (mean = 4.77) or the court case file (mean = 4.57), with medians of 4.2 in each. The average CD for Latinos in the court case and AO12 files, respectively, were 27 percent and 31.5 percent.

B. *Relationships with Population Sizes*

To better visualize the variability in the data, the relationship between the ADs and the CDs, and to see the implications of various rules for determining fair and reasonable,

⁸A clerk from a Texas district court said that they typically bring in 45 people for voir dire in a routine, noncapital case; an attorney from a California district said it was similar in her area, perhaps a little lower. An attorney from a district near Chicago said that because their judges tend to be generous with hardship excuses, they pull together panels of about 60 (see also *U.S. v. Jenkins* 1974 for reference to a disparity's absolute impact on a panel of 50–60 persons). Examples from a manual on federal selection procedures indicate these are consistent with, if slightly larger than, venires in some areas ([http://www.fjc.gov/public/pdf.nsf/lookup/jurselpro.pdf/\\$file/jurselpro.pdf](http://www.fjc.gov/public/pdf.nsf/lookup/jurselpro.pdf/$file/jurselpro.pdf)). These estimates are also somewhat higher than, but broadly consistent with, venire sizes in routine state courts (e.g., Rose 1999, reporting venires of between 30 and 40).

Figure 1: Scatterplots of absolute and comparative disparities for African Americans (Panel A) and Latinos (Panel B), presented by population size, with markers for different legal standards: combined AO12 and court case data.



*To allow the axes of the two panels to better correspond to one another, the CD for this single observation has been truncated (see South Bend observation in the Appendix, Table A2).

we plotted all data points in Figure 1, with ADs along the X-axis and CDs on the Y-axis. We split the data into two series, reflecting results from communities below and above 10 percent of an area’s population, consistent with the two-tiered 15/25 approach (“Brief for Social Scientists” 2009; Kairys et al. 1977), which distinguishes between disparities in communities of 10 percent or more versus less than 10 percent. This 10 percent population dichotomy was just above a median split on population size for African-American areas in the data (7 percent) and just below the median for Latinos (13.7 percent).

According to Figure 1, underrepresentation is ubiquitous. In a random series, about as many cases would be above and below disparities of zero. However, in both the African-American and Latino panels, there are very few instances of overrepresentation in these data (negative values), and only a few observations near zero. Such an outcome

would be expected if we had sampled only court case data (in which overrepresentations are unlikely to be litigated), but consistent with the similarities across datasets, some amount of underrepresentation was also the modal pattern in the official AO12 records.

CD values were sensitive to population size. The highest CD values came from the under 10 percent communities (the diamond shapes in Figure 1) for both African Americans and Latinos. We tested the average CD in African-American communities that were less than 10 percent of an area (46.7 percent) against the CD in areas of 10 percent or more (30.2 percent), and the difference was significant ($p < 0.01$). This comparison also held for Latinos (40.3 percent vs. 26.5 percent, $p < 0.05$). Notably, the high-CD observations for African Americans had ADs ranging between 2 and 5 percent. For Latinos, the high CDs almost uniformly stemmed from very low ADs (< 2 percent) in small communities, which would generate low levels of absolute impact on venire. In other words, African Americans in these data experienced higher CDs and, unlike Latinos, the highest community attrition was more likely to produce material losses on specific venires.

C. Implications for Legal Standards

Figure 1 is particularly useful for demonstrating the effect of existing or proposed bright-line rules, which we demarcate with lines extending from either the X-axis (for the 10 percent rule, and for the lower benchmark the Ninth Circuit has discussed; *U.S. v. Rodriguez-Lara* 2005) or the Y-axis (cutoffs for a 50 percent CD or for a 15/25 CD test). First, Figure 1 vividly conveys the extreme conservatism of the precedential 10 percent rule. In these data, ADs almost never reached that level: there were just three instances for African Americans and two for Latinos. A lower benchmark of 7.7 percent would deem a total of six disparities for African Americans not fair and reasonable and almost twice that for Latinos ($n = 11$).

For CD-based rules, one proposed standard proved highly restrictive while the other was liberal. Consistent with the above discussion of community results, CDs above 50 percent occurred almost entirely in communities with smaller proportions of minority groups, that is, those in which African Americans or Latinos made up less than 10 percent of an area. Therefore, a 50 percent bright-line rule for CDs would mean that legal remedies for these disparities are available primarily in areas with fewer minorities. For larger communities (the squares in Figure 1), there were only three instances of 50 percent CDs for African Americans, and none for Latinos (one was just shy of the cutoff, at 49 percent).

On the other hand, the proposed two-tiered 15/25 CD test would adjudicate nearly every instance of underrepresentation in Figure 1 to be “not fair and reasonable.” For African Americans, just four observations (from the Western and Eastern Divisions of Central California, Denver, and the Charleston Division of South Carolina; see Appendix) failed that standard—three in small-sized communities, and one (Charleston) in a community of 10 percent or more. (In addition, two values were below zero, suggesting slight overrepresentation of African Americans.) For Latinos, only three instances of underrepresentation (from the Denver and Grand Junction Divisions in Colorado, and the El Paso Division in Western Texas) failed the 15/25 test, all of which had ADs of less than 2.5 percent, which means low levels of impact on the venires.

D. Statistical Significance and Sample Size

We used SDT to calculate the standard deviation difference that a given absolute disparity represents by using the following formula:

$$[(\pi * N) - (p * N)] / [\text{square root of } (N * \pi * (1 - \pi))],$$

where p is the proportion of the target group in the pool, and π references the target group in the population; N is the size of the jury pool. We varied N from a low of 40 and 60 (representing venires), then increased the size, beginning at 100, and increasing N by 50 thereafter, all the way up to a high value of 750.⁹ We observed for what size N a given disparity would produce a value greater than 2.0 (a two standard deviation difference), and therefore test as statistically significant. Figure 2 shows the percentage of observations in the African-American and Latino datasets that passed the two standard deviation test as we increased the theoretical size of the jury pool.

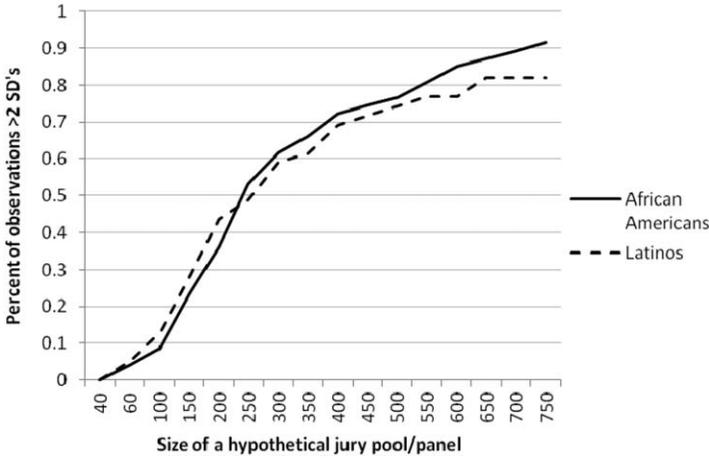
No disparity exceeded two standard deviations if we assumed a venire of size 40. In venires composed of 60 people, only the few disparities that fully crossed the 10 percent AD mark produced statistically significant effects. These null SDT conclusions are, nonetheless, a product of jury pool size. As Figure 2 shows, about half the observations for both groups would test as statistically significant with a pool of just 250 (53 percent of observations for African Americans, 49 percent for Latinos), and about three-quarters would require a pool of as few as 500 people (77 percent for African Americans, 74 percent for Latinos). By size 750, all but four observations of African Americans passed the two standard deviation mark, and all but seven of Latino estimates. (Eight of these 11 nonsignificant estimates had ADs of less than 1 percent.) Thus, the disparities we observed were substantial enough that pool sizes of several hundred jurors yielded significant results at $p < 0.05$.

E. Missing Data

Consistent with previous studies (Rose & Abramson 2011), rates of missing values in the AO12 data were high, particularly for Latinos (mean percent missing on AO12 forms = 22, compared to a 3 percent missing rate on the race question). Imputation methods are not available, so the decision is whether to include or exclude missing cases. The results just reported include all data and treat missing values on race and ethnicity questions as emanating only from people outside the target group—that is, none of the missing values on the Hispanic ethnicity item came from Latinos; none of the missing values on the race question came from African Americans. Under this assumption, observations with missing data appear in the denominator of the total population but

⁹According to Hannaford-Agor and Waters (2011), the median value for the number of summonses sent in state courts in a year period is 750 (yielding a pool of 630). Owing to lower demand, federal pools are likely to be smaller than state courts (Hannaford-Agor & Waters 2011:789). Therefore, by falling within the bottom half of observed state court distributions, we believe our hypothetical panel sizes (ranging from 40 to 750) constitute plausible values for our analysis of statistical significance.

Figure 2: Cumulative distribution of disparities producing a two standard deviation (SD) significance test, by size of body and racial/ethnic group.



not in the numerator (i.e., those in the target group). This approach generates underrepresentation levels that are at their maximum.

An alternative approach excludes missing observations all together. This also depends on an assumption, namely, that data are missing at random (i.e., the target population and all others were equally likely to skip the race or ethnicity question). We view the missing at random assumption as problematic, particularly for Latino estimates, which have more missing data. If questionnaire design explains the patterns, then data would not be missing at random, since *non-Latinos* would be disproportionately likely to skip the Hispanic/Latino item, as research supports (Martin 2002). Nonetheless, given the high levels of missing data, we consider how results differ when we assume data on race/ethnicity were missing at random.

Results changed for African Americans just slightly. The average AD in the AO12 data with missing data omitted was 3.2 percent ($SD = 2.2$), with a median of 2.8 percent (cf. a mean of 3.9 percent and a median of 3.1 percent in data that include observations with missing data). The CD fell to 35 percent from 40.7 percent ($SD = 0.20$; median = 38 percent). Substantively, this changed legal determinations only slightly: Under the 15/25 test, all but six (rather than four) instances of underrepresentation would be deemed “not fair and reasonable”; under the 10 percent rule, one fewer observation (from the Dallas Division of Northern Texas) crossed the 10 percent threshold because its AD dropped to 8.7 percent.

The story was very different for Latinos. With missing data omitted, fully six of the 32 AO12 observations for Latinos indicated *overrepresentation*, and another 12 had ADs of 1.5 percent or lower, suggesting close representation to the population. Strikingly, the average AD for Latinos in the AO12 data dropped from 4.7 percent to just 1.3 percent (median = 1.3 percent, down from 4.2 percent). The upper value of the range reached only 6.1 percent, meaning that no value surpassed either the 10 percent rule or a more

Table 1: Population Prevalence and Jury Pool Disparities Observed in 1990s Era Data and in Current Data for African Americans and Latinos

	African Americans		Latinos	
	1990s Data ^a	Current Data	1990s Data ^a	Current Data
Target group’s median proportion of total population	5.6	7.0	7.4	13.7
Absolute Disparity				
Mean disparity (<i>SD</i>)	2.6 (2.3)	3.9 (2.9)	4.1 (3.5)	4.7 (3.7)
Median disparity	2.4	3.1	2.9	4.2
Comparative Disparity				
Mean disparity (<i>SD</i>)	42 (28.1)	40.7 (19.5)	45.3 (20.6)	30.7 (21.1)
Median disparity	44	42.1	47.4	32.0

^aData obtained from published sources including Bueker (1997), Lievens (2004), Newman (1995), and Schreckhise and Sheldon (1998–1999).

liberal 7.7 percent threshold. The average CD was cut in half, to 16.2 percent, and with missing data excluded, only a minority of divisions ($n = 12$) would exceed the 15/25 standard and be deemed “not fair and reasonable.”

The fact that the differing approaches to missing values changed results so drastically only for Latinos makes us highly suspicious that data are, in fact, missing at random, particularly given the likely problem with questionnaire design and order effects. At the same time, we reiterate that results described in the initial analysis above, particularly for Latinos, are maximum values.

F. Change Across Time

The data from previously published studies of jury pools provided 46 observations for African-American representation, and 35 for Latinos. We took the mean and median of these values to consider whether the average disparities reported above (from our data) indicate improvements over disparities reported on about 20 years ago. Results appear in Table 1.¹⁰ Not surprisingly, in the published sources, both African Americans and Latinos made up smaller proportions of their communities (e.g., African Americans were 5.6 percent of the population in published studies, but 7 percent in current data). At the same time, particularly for African Americans, jury pool representation levels have been static. The average AD for African Americans was slightly smaller 20 years ago (2.6 percent) but, as in the current data, results across studies demonstrate high variability ($SD = 2.3$). The average comparative disparity for African Americans has remained largely unchanged (42 percent vs. 40.7 percent). For Latinos, the average AD in the published data was similar to what appeared in current data (mean = 4.1, compared to 4.7), albeit the median value has increased over time. Unlike African Americans, comparative disparities have lessened over time, with a drop of about 14 percentage points between the 1990s era and current

¹⁰Bueker (1997) did not report how he dealt with missing data, but based on the patterns in his data compared to ours, he appears to have included observations with missing race/ethnicity data in the denominator as we have done.

Table 2: Jury Representation Outcomes for Federal District Divisions Appearing in Earlier (1990s) and Current Datasets

<i>District</i>	<i>Division</i>	<i>African Americans</i>					<i>Latinos</i>				
		<i>1990s^a</i>		<i>Current</i>		Δ <i>CD</i>	<i>1990s^a</i>		<i>Current</i>		Δ <i>CD</i>
		<i>Pop</i>	<i>AD</i>	<i>Pop</i>	<i>AD</i>		<i>Pop</i>	<i>AD</i>	<i>Pop</i>	<i>AD</i>	
Northern Illinois	Eastern	18.0	1.5	19.7	6.3	23.6	5.2	1.9	13.2	3.0	-13.8
	Western	3.4	1.5	5.3	3.0	12.5	1.6	0.7	5.6	2.8	6.3
Northern Texas	Abilene	4.2	2.0	6.7	4.6	21.0	13.6	6.3	18.7	5.5	-16.9
	Amarillo	3.3	1.8	5.2	2.9	1.2	14.1	8.3	21.3	7.9	-21.6
	Dallas	16.7	7.6	23.1	12.0	6.4	13.5	8.2	18.5	9.1	-11.6
	Fort Worth	9.5	3.7	14.0	4.8	-4.7	9.7	5.3	14.6	5.1	-19.7
	Lubbock	5.5	3.1	6.1	3.6	2.7	24.0	11.6	31.4	9.8	-17.1
	San Angelo	3.1	1.7	3.5	1.5	-12.0	20.0	9.1	26.2	9.4	-9.6
	Wichita Falls	6.0	3.4	7.7	5.1	9.6	6.8	2.8	10.9	3.9	-5.4
Central California	South/Eastern	4.3	0.3	5.4	1.4	18.9	13.8	2.8	28.7	7.1	4.4
	Western	12.1	-2.0	9.8	2.3	40.0	19.0	5.0	33.8	7.1	-5.3
Southern California		5.7	-0.3	5.2	2.1	45.6	19.2	9.2	22.5	6.2	-20.4
Eastern California	Sacramento	5.6	2.0	6.5	3.0	10.4	11.4	5.4	10.3	3.2	-16.3
Southern Florida	Miami	—	—	—	—	—	50.6	6.5	49.8	7.8	2.8
Northern New York	All	3.9	2.9	5.4	3.7	-5.8	2.0	1.3	3.0	2.0	1.7
Eastern Michigan	Detroit	19.8	10.6	21.6	11.7	0.6	—	—	—	—	—
Western Michigan	Grand Rapids	4.6	2.4	4.9	2.6	0.9	—	—	—	—	—
Averages		8.4	2.6	9.4	4.4	15.9	14.2	5.3	20.6	6.0	-9.5

^aData obtained from published sources including Bueker (1997), Lievens (2004), Newman (1995), and Schreckhise and Sheldon (1998–1999). These are a subset of the data from Table 1 that reflect areas also covered in the current study.

NOTES: Δ CD equals the CD in the current data (AD divided by the population, or “pop”) minus the CD for the 1990s data.

data. In other words, whereas the population of Latinos in areas studied has nearly doubled (from 7.4 percent to 13.7 percent), levels of absolute underrepresentation have remained fairly constant, creating a lower community-level impact.

To gain a stronger picture of jury representation across time by doing a strictly apples-to-apples comparison, Table 2 presents a comparison of the subset of divisions that appeared in both our current data and the published data ($n = 16$ observations for African Americans, 15 for Latinos). We report the population proportion of the area for both datasets, the ADs in each, and the amount of change in CDs over time (labeled “ Δ CD”),¹¹ with positive values indicating that CDs have increased over time. This more detailed comparison supports the patterns just described. For African Americans, a modest gain in population in these areas (from 8.4 percent to 9.4 percent of the population, a 12 percent change) accompanies a stark rise in ADs (from 2.6 percent to

¹¹We present these three pieces of information to maximize limited space in the table. The change in ADs over time can be obtained by subtracting the value for the 1990s era column from that for the current data. Likewise, the specific CD values in each era that created the Δ CD result are available from the AD and population values presented (see note to Table 2).

4.5 percent, a 73 percent increase); this change in ADs is statistically significant (paired t test $p < 0.001$). Likewise, the change in this group's CD has been positive—meaning that for most areas, there is a larger CD in the current data than was true for the 1990s data. By contrast, Latinos have experienced greater population growth (14.2 percent to 20.6 percent in these areas, a 45 percent rise), but only small, nonsignificant ($p < 0.46$) increases in the overall ADs (5.3 percent to 6.0 percent, a 13 percent increase). Concomitantly, the change in CDs has trended negative, with CDs for Latinos in most areas lower in the current data than they were in the 1990s era.

VI. DISCUSSION

Scholars have long argued that minority underrepresentation on juries is systematic and begins early in the selection process, particularly as court administrators form jury wheels and venires (e.g., Van Dyke 1977; Fukurai et al. 1993; Kairys et al. 1977). Unfortunately, it has been hard to draw many conclusions about underrepresentation as research has usually depended on data from just one or two areas. Although the legal literature offers many ways to define underrepresentation, social science scholars have been unable to answer even the most basic questions about this important area of law: What is typical? How often do disparities meet various standards of “not fair and reasonable”? Do results resemble the voting literature, in which Latinos are more likely than African Americans to be absent from polls, or does some other pattern emerge? How much progress have we seen over time? We set out to build a multijurisdictional dataset—sampled from one court system and delimited in time—to answer these questions.

A. An Empirical Account of Disparities in Two Populations

We found that underrepresentation in federal jury wheels is, by far, the norm rather than the exception and that most disparities would test as significant in pools of just a few hundred jurors. The average African-American AD in our data was just under 4 percent, with a median value of 3 percent. Thus, at least half the federal districts sampled here can expect to lose at least one African-American community member from venires of 40 and at least two from venires of 60. Particularly in communities with smaller proportions of African Americans, this could mean the difference between having some or no African Americans in venires. According to some research, such a difference can affect how prosecutors approach selection decisions and conceivably could change verdict outcomes (see Anwar et al. 2012). An additional few minority group members also makes it harder for attorneys to use peremptory challenges to eliminate entire groups from juries.

Viewed as reductions in representation of the community, attrition for African Americans was substantial. Mean and median comparative disparity values hovered around 40 percent, with some observations reaching as high as 70 percent. Levels of community losses depended on community size. CDs were most acute in areas in which African Americans made up less than 10 percent of the community, most of which had CDs of 40 percent or more. However, even in communities with African-American populations of 10 percent or more, CDs were commonly above 25 percent. Furthermore,

African-American attrition from juries remained largely unchanged even with increases in their proportion of the population in areas studied. Indeed, looking at areas that appeared in both the old and new data, the typical pattern was an increase in ADs and CDs for African Americans over time.

For Latinos, the absolute losses (ADs, venire impacts) were higher than those of African Americans, with average ADs just under 5 percent. This translated into an expected loss of between two and three jurors on venires sized between 40 and 60. At the same time, because their communities are larger than African Americans', this attrition level corresponded to smaller proportional losses (average CD = 32 percent). In other words, these higher absolute impacts were less likely to result in a near-total absence of Latinos in jury pools, particularly where Latinos made up more than 10 percent of the community. According to comparisons across time, even as Latino populations have grown, community-level disparities have decreased. Mindful of the limitations of our data (discussed further below), these results lead us to resist firm conclusions that representation outcomes are worse for Latinos than for African Americans.

Notably, these results are at odds with the patterns observed in state court case studies, particularly those from Texas urban areas (Austin and from Dallas), which usually show that Latinos fare worse (e.g., Rose & Brinkman 2008; Walters & Curriden 2004), patterns that are consistent with studies of voting (Logan et al. 2012). This complexity means that this issue warrants more and better attention. Quite plausibly, local/area norms, hardship circumstances, felon disenfranchisement, and residential mobility, as well as levels of alienation from courts will have differential effects on different communities. This will create different likelihoods of responding to a summons or qualification questionnaire and being willing to serve, even across federal versus state jurisdictions. Stated willingness to serve is particularly low among African Americans, for reasons that are not yet well understood (Musick et al. 2015), but willingness varies greatly across neighborhoods even within the same city (Taylor et al. 2007).

B. Underrepresentation as a Legal Matter

According to our data, disparities would be hard to redress through court findings and orders to remedy. Numerous standards for "not fair and reasonable" are possible (e.g., *Berghuis v. Smith* 2010; Detre 1994), but we find that the most common tests would fail to deem our results legally problematic. Just five observations in our data had disparities that met or crossed the 10 percent rule threshold, and only then if we retained missing data. Notably, this outcome reflects more than just the fact that small-population areas will always fail to pass this test ("Brief for Social Scientists" 2009; Hannaford-Agor & Waters 2011). Even when groups were at least 10 percent in an area, the typical disparity simply did not reach that level very often; areas with that level should recognize how much of an outlier they are. A threshold of just under 8 percent, discussed in Ninth Circuit cases, would recognize a few more ADs as not fair and reasonable, but the vast majority of the remaining instances of underrepresentation still failed that test, particularly in the African-American dataset. Thus, if

jurisdictions, through precedent, continue their attachment to the 10 percent rule, despite permission to consider multiple tests (*Berghuis v. Smith* 2010), then challenges to representation levels will likely fail in all but the most extreme cases. Likewise, should a court gravitate toward a 50 percent bright-line CD value—akin to the preponderance of the evidence (“more likely than not”) standard—then only smaller-sized communities will meet that standard. This is a particular problem for assessments of Latino underrepresentation, which had lower CDs overall.

As others have argued, whether a result is “statistically significant” depends a great deal on how one defines the jury pool (Gastwirth & Pan 2011). Disparities would need to be far larger than any we observed in order to test as different from zero in a venire of 40, and only areas that had ADs of about 10 percent or greater experienced statistically significant losses to venires of 60. This reflects the repeated small-group sampling process that creates venires, which will inevitably be subject to high rates of error. As we just detailed, in absolute numbers, the expected loss on most venires will be a handful of Latino jurors and an even smaller handful of African-American jurors. At the same time, we needed to increase the jury pool size to just 250 for half the observations to test as significant, to just 500 for three-quarters of them to do so, and all but the smallest ADs tested as significant with an increase to 750—a value that reflects the mere median of total summons sent in a year in state courts (Hannaford-Agor & Waters 2011). Courts should therefore see venire-based tests as underpowered, and scholars should move toward determining a standard-sized hypothetical jury pool that would permit a fair test of whether a given disparity meets the SDT criteria.

By contrast, the proposed 15/25 test would deem most all the observed disparities as “not fair and reasonable.” As we have shown, the average CD easily exceeds the proposed threshold and has done so across decades. Although average CD values were higher in areas with smaller minority communities, CDs in most areas exceeded the thresholds of the 15/25 test. Within the African-American data, the standard need not have been two tiered: a threshold of 25 percent for a community of any size would not have changed the test’s conclusions; that was not the case for Latinos, who have larger communities and lower CDs. If used as a sole bright-line test, the liberal 15/25 approach does occasionally deem small departures in small populations “not fair and reasonable.” The San Angelo Division of the Northern District of Texas, for example, had a 3.5 percent African-American population with a 1.5 percent AD, resulting in a 42 percent CD (SR = 0.56), a good example of the need to attend to multiple tests (*Berghuis v. Smith* 2010). Yet of all the normative approaches proffered or commonly utilized, only this community-based approach reflects the *empirical* reality that the typical gaps in minority representation in jury pools are evident but not always glaring.

This latter point sums up the clear challenge for assessing and addressing minority representation on juries. Even as minority attrition has a ubiquitous, systemic quality to it, its practical effects are not yet clear. Some legal scholars (e.g., Re 2011) have argued that the focus should always be on the likely effect of underrepresentation on actual petit juries. In this view, the question is whether there was a substantial “disparity of risk” (Detre 1994) between how many distinctive group members might have been seated on a jury in a fully representative pool and how many are likely to be seated given the AD.

Because the expected absolute impact on venire most often amounts to fewer than five people in a pool of 60, it would be daunting to prove that any particular 12-person jury lost tangible minority representation. It also seems logically problematic to dismiss underrepresentation in pools (which are constitutionally protected) because of effects on juries (which are not). Further, if venire composition has indirect effects on jury selection—for example, by changing attorneys’ selection behavior (Anwar et al. 2012) or by absenting whole groups—underrepresentation at the levels we observed here could be influential without strongly changing the likelihood of a particular jury’s composition. Underrepresentation levels are small in absolute terms but are not de minimis.

C. Limitations

Limitations in our data include high levels of missing data on race and ethnicity measures, particularly for Latinos; data from a subset of judicial districts; and a focus on only federal courts and particular minority groups. Rates of missing data were far higher for Latinos than for African Americans. Our main estimates made liberal assumptions about missing data, creating estimates that are maximum values. Note, however, that presence of missing data changes none of the conclusions that compared African Americans to Latinos: African Americans still exhibit a higher—indeed, far higher—CD with missing data excluded. Nor do missing data alter our conclusion that most existing legal standards of representation would fail to find the disparities “not fair and reasonable,” and representativeness for Latinos shows improvement over time no matter how we handle missing values. Indeed, under the assumption that data are missing at random, Latinos appear to be currently well-represented in jury pools. Although at this time we cannot definitively disprove this possibility, the missing at random assumption produces results for Latinos that fly in the face of every other published case study in this area.

Cooperation rates with our AO12 outreach also limit results. The number of responses Bueker (1997) obtained from his survey of federal courts was not far from ours. This suggests that future efforts should look beyond direct requests for forms, and perhaps partner with key court players or administrative offices (the Administrative Office of the Courts, the Federal Judicial Center) to create a more comprehensive dataset, particularly by including areas surrounding major metropolitan areas that neither Bueker nor we observed (e.g., Atlanta, Seattle, Washington, DC). Although this approach would be ideal, we were able to supplement our sample with court cases. Court cases tend to reflect more extreme situations; even so, values were remarkably comparable across both sources of data and increase our confidence in the general patterns.

Bias emerging from using federal data, rather than state data, is more complicated. Underrepresentation of African Americans in Detroit was substantial (above a 10 percent AD) in both a state court study (Hannaford-Agor 2010) and in the current one. Other effects reversed across jurisdictions. Rose and Brinkman (2008) studied the Austin-area state court in Texas and found a near-zero AD for African Americans and between a 5 percent and 9 percent AD for Latinos; the Austin Division in the current data performed slightly worse for African Americans (3.5 percent AD) but comparably for Latinos (7

percent AD). Results in current data from Dallas were far worse for African Americans (12 percent AD) than in a state court analysis (which found almost no disparity) (Walters & Curriden 2004), whereas the opposite pattern was true for Latinos. Given the high levels of variability in estimates in both our data and the amalgamation of state court studies, we resist firm conclusions about generalizability beyond the federal system. Ideally, state court systems would keep rigorous track of their jury pool composition and both federal and state systems would make those data available to the public (Chernoff 2016).

D. Future Directions

The substantial variability in estimates means there is much to learn about factors that shape attrition outcomes. A truly comprehensive look at jury representativeness would include studies of other minority groups, using regional analyses from areas that have large populations of, for example, Native Americans and Asian Americans. For any group, additional research should track attrition carefully across all stages, up to the final jury selection decision. Although the legal standards for representativeness apply to pools and not specific juries, the impact on the actual decision-making body retains potent symbolism (e.g., Bobo 2013). Data on jury outcomes would also help shed light on some curious patterns surrounding jury selection. For example, some population-level work finds that neither race nor Latino ethnicity explains people's individual jury-service histories, that is, whether they say they have ever been selected (Rose et al. 2012). Reconciling our findings (which show routine underrepresentation on pools) with those (which minimize the practical effect of these disparities)—if they can be—requires much more detailed knowledge about what factors might offset underrepresentation on qualified wheels and venires so that, on average, minorities and whites end up equally likely to have served on at least one case. If disparities in jury wheels are fairly small, then even slight deviations in later processes (e.g., exemption seeking) (Fukurai & Butler 1991) or peremptory use (Baldus et al. 2001; Diamond et al. 2009; Gau 2015; Rose 1999) could change the odds of people making it onto juries.

Future work should also identify what contributes to stagnation in representation levels, particularly for African Americans. We suspect that aggressive policing and mass incarceration, both of which disproportionately affect African Americans (e.g., Alexander 2010), could play a role. These factors reduce the jury-eligible population by creating more felons, and the concomitant strained relationships between police, courts, and the community can increase legal cynicism (see, e.g., Kirk & Papachristos 2011) among nonfelons. Given substantial variations across neighborhoods in both barriers and relevant attitudes, there is far more to learn about people's and communities' understanding of jury participation.

For now, our data demonstrate the ubiquity of underrepresentation in jury pools in the federal system, and document the distressing fact that underrepresentation is entrenched and has been over the last two decades. Underrepresentation profiles as systemic in the sense of its being reliably likely to occur both across the system and across time. At the same time, the impact and practical effect of routine levels of underrepresentation are hard to detect in final venires. This therefore draws attention to the importance of understanding and controlling any racially-biased selection decisions at

the final stage, including either peremptory or cause-challenge decisions. By definition, minority communities are numerically small in these pools. We should not only strive to make their representation levels better match the size of their populations, but we should also ensure that we do not needlessly remove from service even a few more citizens who have made themselves available to become jurors.

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APPENDIX

Table A1: Federal Circuits and African-American Populations: AO12 and Federal Court Case Datasets

<i>Circuit</i> <i>State/District (Division)</i>	<i>Percent</i>		<i>Circuit</i> <i>State/District (Division)</i>	<i>Percent</i>	
	<i>Population</i>	<i>AD</i>		<i>Population</i>	<i>AD</i>
1st, 2d, and 3d Circuits			6th, 7th, and 8th Circuits		
Massachusetts*	7.0	3.8	Western Kentucky (Bowling Green)	5.3	2.3
New York			(Louisville)	15.1	5.9
Southern*	10.2	2.8	(Owensboro)	5.2	2.7
Northern	5.4	3.7	(Paducah)	8.8	3.9
Delaware (Wilmington)	21.2	6.5	Michigan		
Eastern Pennsylvania*	16.8	8.5	Western (Southern)*	4.9	2.6
			Eastern (Southern)*	21.6	11.7
			Eastern Tennessee*	2.1	1.5
4th Circuit			Illinois		
South Carolina			Northern (Eastern)	19.7	6.0
Charleston	28.8	2.2	Northern (Western)	5.3	3.0
Columbia	34.6	7.8	No. Indiana (South Bend)	6.9	-0.3
Greenville	19.2	3.5	Missouri		
			Eastern (Eastern)	17.4	4.5
5th and 11th Circuits			Eastern (Southeastern)	6.3	2.1
No. Mississippi (Eastern)*	30.0	10.0	Eastern (Northern)	3.7	2.6
Texas					
Southern (Houston)*	11.0	-2.6	9th and 10th Circuits		
Northern (Abilene)	6.7	4.6	Alaska*	5.2	3.1
Northern (Amarillo)	5.2	2.9	California		
Northern (Dallas)	23.1	12.0	Southern*	5.2	2.1
Northern (Ft. Worth)	14.0	4.8	Eastern* (Sacramento)	8.6	3.0
Northern (Lubbock)	6.1	3.6	Central (Eastern)	8.7	2.1
Northern (San Angelo)	3.5	1.5	Central (Western)	9.8	2.3
Northern (Wichita Falls)	7.7	5.1	Central (Southern)	2.1	0.7
Western (Austin)	7.9	3.5	Colorado		
Western (Del Rio)	—	—	Denver	4.4	0.4
Western (El Paso)	4.0	1.6	Durango	—	—
Western (Pecos)	4.4	3.2	Grand Junction	—	—
Western (San Antonio)	6.9	2.7	Kansas	5.8	2.9
Western (Waco)	16.9	7.3	New Mexico*	—	—
Western (Midland)	5.5	2.6	Western Oklahoma*	8.6	3.6
Middle Alabama (Northern)*	30.3	8.1			
Florida					
Middle (Orlando)*	11.4	4.5			
Southern (Miami)*	—	—			

NOTES: An asterisk indicates data from the court case file. Dashes (—) indicate that a group either was not part of a court case or comprises less than 1.5 percent of an area's population.

Table A2: Federal Circuits and Latino Populations: AO12 and Federal Court Case Datasets

<i>State/District (Division)</i>	<i>Percent</i>		<i>State/District (Division)</i>	<i>Percent</i>	
	<i>Population</i>	<i>AD</i>		<i>Population</i>	<i>AD</i>
1st, 2d, and 3d Circuits			6th, 7th, and 8th Circuits		
Massachusetts*	—	—	Western Kentucky	—	—
New York			Bowling Green	—	—
Southern*	11.2	2.3	Louisville	1.8	0.6
Northern	3.0	2.0	Owensboro	—	—
Delaware (Wilmington)	4.5	2.0	Paducah	1.7	1.2
Eastern Pennsylvania*	—	—	Michigan		
			Western (Southern)*	—	—
4th Circuit			Eastern (Southern)*	—	—
South Carolina			Eastern Tennessee*	—	—
Charleston	2.3	0.9	Illinois		
Columbia	2.3	1.2	Northern (Eastern)	13.2	3.0
Greenville	2.9	1.9	Northern (Western)	5.6	2.8
			No. Indiana (South Bend)	3.7	-2.0
5th and 11th Circuits			Missouri		
No. Mississippi (Eastern)*	—	—	Eastern (Eastern)	1.5	0.5
Texas			Eastern (Southeastern)	—	—
Southern (Houston)*	—	—	Eastern (Northern)	—	—
Northern (Abilene)	18.7	5.5			
Northern (Amarillo)	21.3	7.9	9th and 10th Circuits		
Northern (Dallas)	18.5	9.1	Alaska*	—	—
Northern (Ft. Worth)	14.6	5.1	California		
Northern (Lubbock)	31.4	9.8	Southern*	22.5	6.2
Northern (San Angelo)	26.2	9.4	Eastern* (Sacramento)	10.3	3.2
Northern (Wichita Falls)	10.9	3.9	Central (Eastern)	36.0	8.5
Western (Austin)	20.3	7.0	Central (Western)	33.8	7.1
Western (Del Rio)	77.2	11.5	Central (Southern)	21.4	5.7
Western (El Paso)	75.5	2.3	Colorado		
Western (Pecos)	53.1	9.4	Denver	13.4	0.5
Western (San Antonio)	47.1	9.5	Durango	9.8	4.5
Western (Waco)	14.5	5.8	Grand Junction	8.8	0.2
Western (Midland)	36.5	14.1	Kansas	5.5	2.3
Middle Alabama (Northern)*	—	—	New Mexico*	38.0	7.0
Florida			Western Oklahoma*	2.7	1.3
Middle (Orlando)*	13.7	4.2			
Southern (Miami)*	49.8	7.8			

NOTES: An asterisk indicates data from the court case file. Dashes (—) indicate that a group either was not part of a court case or comprises less than 1.5 percent of an area's population.