Published in final edited form as:

Criminology. 2010 November 1; 48(4): 1133–1169. doi:10.1111/j.1745-9125.2010.00214.x.

Scope and Conceptual Issues in Testing the Race-Crime Invariance Thesis: Black, White, and Hispanic Comparisons*

Darrell Steffensmeier,

The Pennsylvania State University, Department of Sociology and Crime, Law, and Justice, 211 Oswald Tower, University Park, PA 16802

Jeffrey T. Ulmer,

The Pennsylvania State University, Department of Sociology and Crime, Law, and Justice, 211 Oswald Tower, University Park, PA 16802

Ben Feldmeyer, and

University of Tennessee – Knoxville, Department of Sociology, 916 McClung Tower, Knoxville, TN 37996-0490

Casey T. Harris

The Pennsylvania State University, Department of Sociology and Crime, Law, and Justice, 211 Oswald Tower, University Park, PA 16802

Darrell Steffensmeier: d4s@psu.edu; Jeffrey T. Ulmer: jtu100@psu.edu; Ben Feldmeyer: bfeldmey@utk.edu; Casey T. Harris: cth131@psu.edu

Abstract

Our goal in this article is to contribute conceptually and empirically to assessments of the racial invariance hypothesis, which posits that structural disadvantage predicts violent crime in the same way for all racial and ethnic groups. Conceptually, we elucidate the scope of the racial invariance hypothesis and clarify the criteria used for evaluating it. Empirically, we use 1999–2001 averaged arrest data from California and New York to extend analyses of the invariance hypothesis within the context of the scope and definitional issues raised in our conceptual framing – most notably, by including Hispanic comparisons with blacks and whites, by examining the invariance assumption for homicide as well as the violent crime index, by using discrete as well as composite disadvantage measures, and by using census place localities as the study unit. The mixed findings we report from our comparisons (across whites, blacks, and Hispanics; offense types; type of disadvantage) suggest caution and uncertainty about the notion that structural sources of violence affect racial/ethnic groups in uniform ways. We conclude that the hypothesis should be regarded as provisional and its scope remains to be established as to whether it applies only under narrow conditions or is a principle of general applicability.

Keywords

racial invariance; Hispanics; homicide; violence

It has been nearly a quarter century since the publication of William Julius Wilson's seminal work, *The Truly Disadvantaged*, in which Wilson called for more research on the race-crime relationship and argued that race differences in crime are rooted in the different community circumstances of whites and blacks. This position has coalesced into the *racial invariance hypothesis*: that structural conditions and particularly structural disadvantage indicators predict (violent) crime in the same way for all racial and ethnic groups. Since then, there has been a virtual explosion in research on race and crime. Particularly significant has been the growth in macro-social or community-level studies analyzing race-specific outcomes and explanatory variables. These studies have made substantial empirical and conceptual advances, but there remain large gaps in the empirical literature on racial disparities in crime and the structural sources of those disparities. As several careful reviews show (e.g., see Ousey 2000; Hannon, Knapp, and DeFina 2005; Parker 2008), the findings are inconclusive about racial invariance in the effects of predictors of crime. The "assumption of racial similarity" in the fundamental causes of violence or crime is far from settled.

A central goal in this paper is to draw from these reviews and our own assessment of the current state of knowledge for purposes of identifying key scope and conceptual issues which limit this body of research from establishing firm conclusions about racial differences in the effects of structural factors on crime and violence rates; and, then, to implement empirical tests that provide more meaningful assessments of the invariance hypothesis within the context of the scope and definitional issues raised in our conceptual framing. The five areas of ambiguity we identify concern: 1) dependent variables, 2) independent variables, 3) spatial units, 4) the scope of the concept, "race", and 5) strict versus lenient tests.

As we spell out below, differing definitions and approaches to racial invariance lead to more strict or lenient interpretations, and "weaker" or "stronger" versions/tests of racial invariance claims. Sorting this out is crucial for advancing our understanding of race and crime, and setting the stage for more meaningful tests of racial invariance claims. While it is beyond the scope of this paper to definitively settle every aspect of what is a complex and nuanced racial invariance debate, we draw upon our discussion of these unresolved issues to conduct analyses that go considerably beyond prior research on the racial invariance issue and can serve as a template for theory and future research.

Empirically, we utilize 1999–2001 averaged arrest data from California (CA) and New York (NY) to provide a more meaningful test of the racial invariance hypothesis. CA and NY data are notably strategic because they classify arrestees into white, black, and Hispanic groups. We can therefore go beyond black-white comparisons to include Hispanic comparisons, and do so across measures of homicide and overall violent crime.¹ The data can also be linked to

¹The California and New York arrest data treat "Hispanic" ethnicity as a distinct category from "white," "black," and other race/ethnic groups but do not separate Hispanics into more refined racial/ethnic categories, such as "white-Hispanics," "black-Hispanics," or the various subgroups of "Hispanics" (e.g., Mexican, Puerto Rican, Cuban). The CA and NY data use the term "Hispanic," whereas US Census data and much prior research on race/ethnicity and crime use the terms "Hispanic" and "Latino" interchangeably to refer to individuals with origins from Spanish-speaking countries of Central and South America and the Caribbean (e.g., Dominican Republic, Cuba) or those individuals who self identify as "Latino," "Hispanic," "Hispanic-American," "Spanish," etc. (US Census Bureau 2008). Following practices of prior research and the designations provided in arrest and population data, we use the term "Hispanic" to identify men and women with origins from these countries.

census places as a unit of analysis, which has distinct advantages and offers a relatively untapped geographic spatial unit for assessing racial invariance assumptions. Specifically, census places include a diverse set of non-overlapping geographic areas tracked by the US Census Bureau that vary widely in size (ranging from small towns to mid-sized and large cities), structural characteristics, and rates of violence.

The inclusion of Hispanics in our analysis is perhaps most noteworthy. First, most studies are limited to black-white comparisons, and little is known about how the racial invariance hypothesis applies to the largest and fastest growing minority group in the US – Hispanics. Second, this oversight is particularly concerning in light of theoretical positions suggesting that the predictors of Hispanic violence are unique compared to those of whites and blacks – so much so that they reflect a “Latino Paradox,” in which Hispanic populations experience surprisingly low levels of violence in the face of extreme disadvantage levels (Feldmeyer and Steffensmeier 2009; Sampson 2008). Notably, this paradox brings to the forefront the matter of “culture” as an alternative thesis rather than relying solely on structural disadvantage as an explanation of race differences in violence.

Earlier challenges to the notion that race/ethnic differences in violence are due solely to structural features like poverty or inequality, but rather also involve long-standing cultural differences in acceptance or tolerance of violence, come from Lane (1986) and Harer and Steffensmeier (1992). They echoed themes raised earlier by Edwin Sutherland who saw perspectives that only spoke of poverty and social disorganization as inadequate to explain class and race differences in crime, including high rates of black violence. Rather, he looked to associations that foster criminality and normative frameworks that supported it (organization in favor of violence versus organization against violence). Other scholars, too, have drawn attention to the role of culture, and especially the interplay of structure and culture, in producing race differences in violence (e.g., Anderson 1999; Bellair, Roscigno, and McNulty 2003; Matsueda, Drakulich, and Kubrin 2006; Steffensmeier and Ulmer 2006). We return to the interplay of structure and culture later.

SCOPE AND CONCEPTUAL ISSUES

The racial invariance thesis can be traced to early researchers from the “Chicago School” who sought to explain aggregate-level variations in crime and delinquency rates (e.g., Shaw and McKay 1942). Most notable is their finding that crime rates remained high in certain structurally disadvantaged areas in Chicago regardless of which racial or ethnic group predominantly occupied those areas. The Chicago sociologists explained this finding from a social disorganization perspective, but it is consistent with a number of distinct social-ecological theories that fall within the structural tradition of criminology (e.g., anomie/strain perspectives). As Ousey (1999: 407) points out, all these theories share two central propositions: 1) that community socioeconomic deprivation is positively related to community crime rates; and 2) that the positive association between socioeconomic deprivation and crime is invariant across racial categories.

Both propositions have generated a sizable body of literature that has relevance for the racial invariance proposition. This literature can be partitioned into two groups (see Ousey 1999

for this distinction). The first group generally focuses on the first proposition above, and includes many of the early studies of general crime rates (mostly homicide). These studies did not employ race-specific data to measure crime and its structural predictors. The evidence from these studies offers strong support for the expected positive relationship between indicators of socioeconomic deprivation and crime. Social malaise (e.g., joblessness, poverty, disrupted families) at the community level – especially the concentration of socioeconomic disadvantage – is a robust predictor of overall rates of crime and violence across studies. This conclusion is confirmed in Land, McCall, and Cohen's (1990) assessment of pre-1980 studies, in Ousey's (2000) comprehensive review, and in Pratt and Cullen's (2005) recent meta-analysis. Though the results of these studies can be viewed as providing some evidence for the racial invariance hypothesis, the studies do not directly test the proposition that the effects of structural factors are the same for all racial groups and thus offer little specific knowledge about how the effects of structural factors vary by race.

A second and more recent group of studies makes a major advance by specifically addressing the second proposition above, racial invariance, by analyzing race-specific outcomes and explanatory variables. The central focus of most race-specific analyses is whether structural conditions matter for violence in the same way for blacks and whites (see reviews in Peterson and Krivo 2005; Parker 2008). Generally, the analyses incorporate and focus on measures of disadvantage and inequality (e.g., poverty, joblessness) and also include indicators of population turnover, racial segregation, and residential density. The bulk of studies examine homicide, but some analyses explore additional types of offenses (e.g., robbery, aggravated assault) or use an overall measure of violence (e.g., Violent Crime Index) (e.g., Harer and Steffensmeier 1992; McNulty 2001). The largest body of research studies cities or counties, but other units are also represented such as census tracts, local neighborhood areas, metropolitan areas, and national time series.

Several comprehensive reviews of this literature exist. Though some reviewers argue that the preponderance of evidence supports the racial invariance thesis (e.g., Krivo and Peterson 2000; Peterson and Krivo 2005), other reviewers see the results as much more mixed and inconclusive and thus view the racial invariance issue as largely unsettled (Ousey 1999; Parker 2008; Phillips 2002). For economy of space, we do not examine in detail the many studies that have investigated the racial invariance hypothesis. Rather, drawing from these reviews and our own assessment of the current state of knowledge, we identify five unresolved issues that limit this body of research from establishing firm conclusions about racial differences in the effects of structural factors on crime and violence rates and further establish that the racial invariance debate is not a “settled” issue.

WHAT IS THE DEPENDENT VARIABLE?

The racial invariance literature has used different types of crime as a dependent variable and there is ambiguity about the scope of the hypothesis. Many authors/studies have limited the racial invariance claim to homicide (Ousey 1999) whereas others extend it to violent crime more generally. For example, Sampson and Wilson (1995: 41) say that “...sources of violent crime [are] remarkably invariant.” Still others extend the invariance claim to include

“serious crime and index crime” (Shihadeh and Shrum 2004), “street crime” (Sampson and Bean 2006), and crime in general (Miethe and Meier 1994; Sampson and Bean 2006). The criminal landscape is vast and there obviously is considerable stretch in terms of what is meant by “crime.” It is widely recognized, for example, that at least some types of crime (many corporate crimes) are influenced by explanatory factors quite distinct from those contributing to higher rates of street crime, especially violent crimes. Furthermore, the extent to which the racial invariance hypothesis applies, or should apply, to street-level property crimes such as burglary and theft is unclear.

WHAT ARE THE KEY PREDICTORS OF EXPLANATORY IMPORTANCE?

Prior research has complicated the racial invariance claim by providing different identifications of the relevant explanatory variables. Some studies focus on single, specific disadvantage measures as the main predictor, or compare the effect sizes of one deprivation measure to another as a basis for testing absolute (poverty) versus relative deprivation (income equality) theories of crime (e.g., Harer and Steffensmeier 1992). Other studies may use a configuration or an index of structural variables, reasoning that what is important is the racial similarity in the effects of an underlying structural disadvantage dimension, rather than a specific indicator or variable (e.g., Lee 2000; Sampson and Bean 2006). This latter position is central to Peterson and Krivo’s assessment (2005: 337) that the invariance finding is “resilient to the exact configuration of factors representing disadvantage, e.g., differing combinations of poverty, income, family disruption, and joblessness/unemployment.”

In addition, some studies not only include the traditional structural disadvantage measures (such as poverty, income inequality, deprivation indices) but also incorporate social disorganization variables (e.g., population turnover, residential density, housing vacancy rates) in assessing racial invariance in effects of structural predictors (Ousey 1999). Still others have broadened the structural variables to include segregation measures, affluence (e.g., the percentage of the labor force in managerial or professional occupations), and others (Velez 2006). From a theory standpoint, findings showing racial differences in structural predictors “imply that deprivation-based theories of crime need revision to provide a substantive rationale for the differential impact of socioeconomic conditions on crime rates” (Ousey 1999: 409). This has been the traditional position regardless of whether the structural indicator is a specific variable or an index, or whether the indicator represents “deprivation” or “disorganization.”

WHAT IS THE SPATIAL UNIT OF ANALYSIS?

Third, the racial invariance literature is complicated by use of diverse units of analysis and by differing interpretations of the merit of one as compared to another. Sampson and Wilson (1995: 41) have argued that the “sources of violent crime appear to be remarkably invariant across race and rooted instead in structural differences among *communities, cities, and states* [emphasis added],” thus implying that the type of study unit should have little bearing on the racial invariance hypothesis. The largest portion of the research on racial invariance has been conducted for cities/MSAs, with most of these studies demonstrating a mix of similar and dissimilar effects across racial groups (Phillips 2002; Ousey 1999). Neighborhood

studies, though relatively scarce, tend to offer more support for racial invariance than do other study units (Krivo and Peterson 1996; McNulty 2001). While some researchers advocate for cities as a preferred study unit, others favor neighborhoods on grounds that tests of racial invariance using cities (and other large units) may be confounded by a relatively high level of aggregation and their internal heterogeneity.²

WHAT IS THE MEANING OF “RACE” IN RACIAL INVARIANCE?

Fourth, most of the previous racially disaggregated crime studies have focused on comparisons between blacks and whites. But the racial invariance claim is that “structural variables predict [violent] crime in the same way for *all racial and ethnic groups* [emphasis added]” (Peterson and Krivo 2005:338). Therefore, the scarcity of studies that include “ethnicity,” most notably, Hispanics, is a glaring gap in the literature because (1) Hispanics are the largest and fastest growing racial/ethnic minority in the US and (2) as we describe below, comparing Hispanic predictors of violence to those of whites and blacks has important implications for racial invariance and criminological theories related to race/ethnicity and crime.

The lack of inclusion of Hispanics in racial-ethnic comparisons of violence is largely attributable to limitations in the data used for these purposes. Both today and historically, a major limitation of such data has been the lack of reliable measures of ethnicity. Existing studies have been handicapped by reliance mainly on arrest data (e.g., from the FBI’s *Uniform Crime Reports*), which lack a separate identifier for coding Hispanic arrestees and instead include them either in the “white” or “black” category (about 95% apparently are coded as white).

Moreover, the few studies conducted on Hispanics have focused on only one or a few localities, such as Miami (Martinez 2002), Chicago (Sampson, Morenoff, and Raudenbush 2005; Velez 2006), and Seattle (Matsueda, Drakulich, and Kurbin 2006) (for a notable exception, see Phillips 2002).³ Overall findings from these studies are inconclusive regarding the invariance issue. One finding, however, appears to consistently stand out: Hispanic communities tend to have similar levels of disadvantage as blacks, yet crime and violence rates in Hispanic communities are much lower. This finding combined with the observation that black rates are higher than one would predict based only on disadvantage suggests that structural disadvantage may not be the only factor that explains black-white and especially black-Hispanic differences in violence – namely, that cultural differences may be at play as well (an issue we return to in our conclusion).

²Peterson and Krivo (2005) also contend that neighborhoods are more likely to provide spatial units that take into account structural similarity. In their review, they were able to identify only two studies (Krivo and Peterson 1996; McNulty 2001) that examined violence in black and white neighborhoods where the distributions of structural disadvantage by race were fairly similar. Though results from both studies were generally consistent with the racial invariance thesis, McNulty (2001) concluded that there were too few structurally similar black and white neighborhoods (block groups) in Atlanta to conduct a viable test of the hypothesis. In McNulty’s data, only one out of 107 predominantly white block groups had levels of disadvantage that were one or more standard deviations above the mean, whereas 152 of 245 black block groups were one or more standard deviations above the mean.

³Note also that McNulty and Bellair (2003) examine both individual and ecological factors (e.g., poverty, unemployment, etc.) on race/ethnic differences in violence using NELS data. Violence is measured as a single item (“have you been involved in a fight”). Their key finding is that individual and community factors largely explain race/ethnic differences in this item.

STRICT VERSUS LENIENT TESTS

Taken together, these ambiguities in the macro-level crime literature highlight the key theoretical and analytic complexities surrounding the racial invariance issue. They also reflect alternative windows through which to assess the validity of the proposition that the effects of structural factors on crime or violence are racially invariant. An important implication of our review is that stricter versus more lenient tests of the racial invariance thesis are possible, depending on how one conceptualizes “racial,” “invariance,” and the scope of explanatory and dependent variables. For example, the strictest interpretation of the invariance position would require that the sources of violence were identical: 1) in both direction and size of effects, 2) across all distinct structural predictors – including poverty, population size, residential mobility and not just limited to effects of disadvantage indices, 3) for all race/ethnic groups (not just black-white comparisons), and 4) for all violent offenses (not just homicide). More lenient interpretations of the racial invariance thesis might propose that some configuration of disadvantage indicators should predict violence or other crime across race/ethnic groups; or perhaps only require that disadvantage have crime-generating effects that were in the same direction or of roughly similar size, but not necessarily statistically equal across comparisons for all offenses and groups.

THE CURRENT STUDY

Using race/ethnic disaggregated data from California and New York averaged over the 1999–2001 period, the present study employs a design that addresses in several important ways these scope and analytic issues that have interfered with drawing firm conclusions about racial invariance claims. First, we extend the scope of racial invariance inquiry by including Hispanic comparisons with blacks and whites as well as black-white comparisons. Second, we focus squarely on the major question that has preoccupied prior research – whether there is racial similarity in the effects of structural disadvantage indicators on violence. We test the effects of both specific disadvantage indicators such as poverty, and also overall disadvantage indices that include other predictors. Furthermore, we conduct formal statistical tests of the equality of disadvantage effects across groups. Third, we examine the racial invariance question for homicide and for the violent crime index (which combines homicide, forcible rape, aggravated assault, robbery). Fourth, we use incorporated census places as the ecological unit of analysis, which as we describe below, has certain advantages.

Census places include non-overlapping geographic units (cities, villages, towns, boroughs) tracked by the US Census bureau, offering a unique and relatively untapped ecological unit of analysis for studying the racial invariance thesis (US Census Bureau 1994). Census places are well-suited for our analysis because they provide a diverse set of spatial units that vary widely in size, in structural characteristics, and rates of violence and because they also provide large enough numbers of each race/ethnic group for meaningful statistical analysis. Census places are smaller and more spatially homogeneous units compared to higher levels of aggregation, such as states, SMSAs, or counties. Yet, compared to neighborhoods, they are large enough to exhibit wide variation in violence and predictor variables (especially when variables are racially disaggregated). Census places are also advantageous because, as

our descriptive statistics show, they provide comparatively more overlap than neighborhoods in structural conditions across race/ethnic groups, and better allow us to compare similarly situated race/ethnic groups in tests of racial invariance claims. Additionally, we use 1999–2001 data, which provide a more timely reflection not only of contemporary racial-ethnic differences in violence but also in the association between contemporary structural conditions and rates of violence.

We include only those census places that have a total population of 10,000 or above in the year 2000 and have at least 1,000 residents of the race/ethnic group under consideration, yielding 232 places. We use these selection criteria in order to provide reliable measures of violence and structural characteristics disaggregated by race/ethnicity across census places. As we show later, these categories of census places overlap heavily, so that almost all of the places with viable numbers of Hispanics and the places with viable numbers of blacks are included in the group of places with viable numbers of whites.

DATA

We use data from two main sources. First, information on race-disaggregated homicide and index-violence arrests is drawn from California's and New York's crime reporting programs for the years 1999 through 2001. Second, 2000 US Census Summary files 1 and 4 are used to generate information about social and economic characteristics of the white, black, and Hispanic populations in California and New York.

A key advantage of using arrest data from California and New York is that they classify arrestees into "White" "Black" and "Hispanic" groups (as well as "American Indian" and "Asian"), thus allowing us to examine white, black, *and Hispanic* differences in the effects of structural predictors on both homicide and violent offending. A second advantage is that their populations are (a) large – together are home to more than 27 million whites, 5 million blacks, and 14 million Hispanics, and account for about 14 percent of all whites, 16 percent of all blacks, and 40 percent of all Hispanics living in US (US Census Bureau 2008); (b) diverse and representative of white, black, and Hispanic populations for the nation as a whole.⁴ A third advantage of the California and New York data is that arrests for Violent Index crimes in these two states make up a sizable share (about 40%) of all arrests for violent crime in the nation as a whole.

DEPENDENT VARIABLES

The dependent variables in this study are census-place black, white, and Hispanic homicide offending rates per 100,000 at-risk persons and Index-Violent offending rates (sum of arrests

⁴For the year 2000, the overall racial/ethnic composition for the United States was roughly 69% white, 12% black, and 13% Hispanic. The racial/ethnic composition of the combination of California and New York is roughly 52% white, 9% black, and 26% Hispanic. Though California and New York Hispanic populations generally parallel the US Hispanic population composition, it is important to note that these data may not be as generalizable to states with different Hispanic profiles (e.g., Florida) or in states that are not traditional immigrant gateways (e.g., North Carolina). For the year 2000 the Hispanic population in California is mostly of Mexican descent (nearly 80%), while New York has a more diverse Hispanic population (i.e., 37% Puerto Rican, 16% Dominican, 9% Mexican). However, the combined Hispanic population for California and New York (63% Mexican, 9% Puerto Rican, 1% Cuban, and 3% Dominican) approximates closely the US Hispanic population composition (59% Mexican, 10% Puerto Rican, 3% Cuban, and 2% Dominican) (US Census Bureau 2008).

for homicide, aggravated assault, forcible rape, robbery) averaged across the 1999–2001 period.

Arrest data are subject to many well-known criticisms, but homicide is viewed as the most serious of index crimes and is the most likely to be reported to the police and result in an arrest, whereas Violent Index crimes are defined as more serious than (most) other crimes and have a high likelihood of being reported to the police. Though they overlap, homicide (lethal violence) and the Violent-Index (mostly non-lethal) are typically seen as two substantively different measures of violence and represent two widely used yardsticks for assessing patterns of violent offending in criminological research (Mosher, Miethe, and Phillips 2002). Both violence measures are calculated using 3-year averaged arrest figures for 1999–2001 to add stability to the rates and also ensure adequate arrest counts for statistically rare offenses (homicide). Because the offending rates have skewed distributions with some census places having particularly high rates, the rates are square root transformed to normalize their distributions and account for any non-linearity in the relationships between our predictors and crime outcomes.⁵

PRIMARY INDEPENDENT VARIABLES

We focus on four disadvantage indicators – poverty, unemployment, education, and female headship – that have emerged as important structural factors in criminological theory and previous research on the racial invariance thesis. These disadvantage indicators are disaggregated by race/ethnicity (white, black, Hispanic), as are several important control variables. *Poverty* is measured as the percentage of census-place residents below the poverty line. *Unemployment* is measured as the percentage of the civilian labor force between the ages of 16 and 59 that is unemployed. *Female headship* is measured as the percentage of families with children under 18 years old that are headed by a female. *Education* is measured as percentage of residents over 25 years old with less than a high school education (or equivalent). In addition, because of their demonstrated relevance in previous studies, we include as controls: *population density* (residents per square mile) and overall *population size* of a census place; *residential instability* (percentage of black, white, or Hispanic households that experience housing turnover during the 1995–2000 period); *entropy* as measure of racial/ethnic heterogeneity;⁶ *young male population* (the percentage of the black, white, or Hispanic population aged 15–24 and male); last, we include *police per capita* as a control for variations across census places in law enforcement activity.

Because poverty, unemployment, education levels, and female-headed families tend to be highly correlated in aggregate data, estimating their unique effects, and race/ethnic differences in those effects, can be problematic due to multicollinearity.⁷ We address the risk of multicollinearity in two ways. First, we examined the effects of each disadvantage

⁵We square-root transform our homicide and Violent Index rates for each race/ethnic group for two reasons. First, both outcomes are highly skewed and the square-root transformation induced normality more effectively than taking the natural log of homicide and Violent Index rates (supplemental analysis reveals virtually identical substantive results using a log transformation). Second, we ran models using both non-transformed independent and dependent variables which assumes a linear relationship between homicide and Violent Index rates. These models provided invalid fitted values (e.g., predicted rates less than zero) and indicated that the assumption of linearity did not fit the data. Thus, following other research exploring structural effects on race-specific crime rates (Phillips 2002), we transform all of our crime rates by taking their square roots.

measure separately (net of controls). Second, based on standard principal components methods (see Land, McCall, and Cohen 1990), we extracted race-specific *disadvantage index* factors based on the four race-specific disadvantage measures (i.e., one structural disadvantage factor represents the combined influence of poverty, unemployment, education, and female headship for each group). Not only does this address potential multicollinearity, but it is consistent with our goal of clarifying the scope and relative importance of key disadvantage variables germane to the racial invariance argument using both the distinct disadvantage measures and the disadvantage index to test the invariance hypothesis.

ANALYTIC METHODS

Our basic models examine homicide and violence index offending rates disaggregated by race/ethnicity as a function of structural disadvantage. We use seemingly unrelated regression (SUR) to estimate separate models of homicide and of violence index rates for blacks, whites, and Hispanics. Seemingly unrelated regression is more appropriate than ordinary least-squares (OLS) procedures for testing the equality of regression coefficients across groups because it takes into account that the race/ethnic comparisons are based on data for the same census places and therefore that black, white, and Hispanic models have not been estimated from independent samples (see Moody and Marvell 2009, Ousey 1999, and Schwartz 2006 for details and similar applications of SUR). Though prior studies frequently have not done so, it is also important to formally test for differences in magnitude and significance of disadvantage-predictor effects when testing the racial invariance hypothesis. For this, we conduct z-tests to specifically compare coefficients across the race/ethnicity-specific models.⁸

Two approaches were used to deal with those census places with values of zero for homicide rates (low frequency or zero values are not problematic for index violent offending, since almost all places are likely to report at least one violent crime). For the homicide SUR models, we assigned a value of 0.1 to the rates in those census places not reporting any homicides over the three-year period, before they were square root-transformed (see Moody

⁶Our entropy measure is a 3-group (black, white, and Hispanic) index score calculated for each census place (Reardon and Firebaugh 2002). The entropy index (E) is a multi-group measure of the diversity of a geographic area, calculated as:

$$E = \sum_{m=1}^M \pi_m \ln(1/\pi_m)$$

where, π_m is the proportion of people in race/ethnicity m (e.g., proportion black) and M is the total number of racial/ethnic groups. E has a minimum value of 0 when a census place has no diversity and is composed entirely of one racial/ethnic group and a maximum value of 1 when blacks, whites, and Hispanics are equally represented. Racial/ethnic heterogeneity scores were divided by their maximum values (1.099) to impose a range of 0 to 1 for E .

⁷Correlations among the disadvantage items varied considerably – ranging from .71 between Hispanic female-headed families and Hispanic poverty and .66 for black female-headed families and black poverty to as low as -.03 between Hispanic family structure and Hispanic education – indicating some to moderate collinearity (correlation matrices available from authors).

⁸In contrast to models exploring only black-white differences, F-tests are inappropriate given our goal of comparing the effect of different measures across white, black, and Hispanic models since these statistics simply test whether the effect of a structural trait varies across any of the three equations. As such, we rely on Z-tests to explore white-black, white-Hispanic, and black-Hispanic differences in effects. However, because we are making so many comparisons, the statistical significance of these differences at $\alpha=.05$ should be treated as a liberal estimate (i.e., inflated α). This is somewhat mitigated in our findings since most of the key differences are significantly different at the .01 level or lower.

and Marvell 2009; Schwartz 2006; Steffensmeier and Haynie 2000). We next replicated the results using negative binomial methods, a strategy that is appropriate when a relatively large number of zero values exist across aggregate units (as is the case for homicide). The results from the negative binomial regressions (which are available from the authors) closely parallel those derived from the SUR models reported below.⁹

RESULTS

Table 1 shows the means and standard deviations for the independent and dependent variables for the white, black, and Hispanic groups.

A notable feature of Table 1 is the striking differences in violent offending statistics across the three groups; particularly the disproportionate representation of blacks in violent offending. Across our sample of census places, the average black homicide rate per 100,000 (15.8) is 5–6 times that of whites (2.9) and 2–3 times that of Hispanics (6.4). For overall or Violent Index rates, the differences are smaller but still quite substantial. White (331.5) and Hispanic (505.6) violence rates are comparable, whereas the black rate (1311.5) is about 2–3 times larger than Hispanic rate and 4 times larger than the white rate.

Table 1 also reveals large disparities in socioeconomic wellbeing across the groups. Overall, the Hispanic and black populations fare worse regarding socioeconomic status, though the four specific indicators of disadvantage show some deviations from the overall pattern. The black and Hispanic levels of poverty are similar with nearly 19% of all black and Hispanic residents falling below the official poverty line, compared with roughly 9% of white residents. Moreover, the percentage of blacks who are unemployed (10.8%) is greater than the percentage of whites (5.5%) or Hispanics (9.3%) who are jobless. In terms of education, 13.2% of white census place residents have less than a high school diploma, as compared to 18.3% of black residents and 42.2% of Hispanic residents. Last, the descriptive statistics for female headship show that black households are much more likely to be headed by a female with children under 18 (24.6%) than are Hispanic households (15.1%) and especially white households (8.2%).

These racial differences conform in particular to Wilson's depiction of the black urban underclass. Nonetheless, black communities are far from homogeneous (as also Hispanic and white communities are not homogeneous). While blacks do fare worse than the total census-place population, there is wide variation among black communities in socioeconomic disadvantage levels and in rates of homicide/violence. Compared to predominantly white and Hispanic places, for example, predominantly black places show greater variation in poverty levels and female headship (as indicated by the racially-disaggregated standard deviations in Table 1).

⁹Additional population size-disaggregated models and state-specific models (New York vs. California) were estimated to explore (1) whether the inclusion and equal weighting of small and large census places in the same sample might be compromising our findings and (2) whether the effect of our disadvantage index is dependent upon a census place being in a particular state. The effects of our disadvantage indices remained consistent across size-disaggregated samples of small (less than 30,000), medium (30,000–75,000), and large (over 75,000) census places and when models were replicated separately for New York and California places. Also, interaction terms between state and the disadvantage indices were not statistically significant ($p < .05$) in any of the models. Thus, these supplementary analyses do not change our substantive results (details available from authors).

As noted earlier, a problem hampering previous research has been the racially dissimilar distribution of disadvantage in predominantly black vs. predominantly white areas (Peterson and Krivo 2005). However, as indicated by the descriptive statistics in Table 1 and the graphical illustration presented in Appendix A (Figures A1 and A2), our sample of census places provides a fair amount of overlap in the distributions of white, black, and Hispanic disadvantage. Specifically, Figures A1 and A2 illustrate that Hispanic disadvantage levels (e.g., poverty, unemployment) intersect closely with census place distributions of white and black disadvantage, while white-black comparisons provide some overlap but relatively fewer similarities in structural circumstances. In particular, there is considerable Hispanic-black overlap in distributions of disadvantage. In light of these structural similarities, our sample of census places and our analysis of racial invariance should be less susceptible to problems of “structural dissimilarity” and different distributions of disadvantage across race/ethnicity – particularly when comparing Hispanic disadvantage effects on violence with white and black effects.

In general, the correlations (available from authors) between the disadvantage indicators (discrete and index) and each race/ethnic homicide or violence rate is in the expected direction and significant. That is, violent offending rates are higher in census places where residents face greater structural disadvantage, and this pattern mostly holds across all three race/ethnic groups. The multivariate analyses that follow examine whether these patterns hold up when controlling for other important predictors.

MULTIVARIATE ANALYSES

We begin by presenting the results of SUR models examining the effects of the discrete disadvantage measures on homicide and overall violence rates disaggregated by race/ethnicity and then present formal tests for the equality of the discrete disadvantage coefficients. Next, we present the results for models that include the structural disadvantage index instead of the four separate disadvantage indicators, and test for the equality of structural disadvantage index coefficients on white, black, and Hispanic homicide and violence rates.

Discrete Disadvantage Variables—Table 2 displays the effects of the separate disadvantage measures on homicide and violence rates. All models include the control variables (e.g., population density, residential mobility, police per capita, age structure, and entropy). Panel A of Table 2 presents results from equations estimating the impact of the discrete disadvantage measures, net of controls, on homicide offending rates, and panel B presents the results for Violent Index rates.

For homicide (panel A), the key finding is that offending rates of each racial group tend to be higher in census places with high levels of structural disadvantage. The coefficients are in the expected directions, and all but three effects on homicide are significant across the disadvantage indicators ($p < .05$). Poverty and educational deficits contribute to significantly greater homicide rates for whites, blacks, and Hispanics. Unemployment contributes to increased Hispanic homicide (and contributes weakly to white and black homicide). Additionally, female headship is significantly linked to higher black and Hispanic homicide

rates. Also, the standardized Betas vary in magnitude, ranging from a low of .04 (the non-significant effect of female headship on white homicide) to a high of .39 (poverty on Hispanic homicide).

We turn next to the Violent Index because it addresses a key issue about the scope of invariance thesis – whether it is limited to homicide or extends to other kinds of violence. The Violent Index (panel B) presents a similar picture, indicating that disadvantage indicators generally increase rates of index violence for nine of the twelve effects examined. Several of the standardized coefficients are impressive, such as the effects of poverty on white and black violence rates (both about .36), and the effects of unemployment and education deficits on white violence (.37 and .38, respectively). The effect of female headship on black violence (Beta = .28) is also noteworthy.

The top panels of Table 3 present z-tests for the equality of coefficients for the separate disadvantage indicators between equations for black, white, and Hispanic homicide and violence rates, estimated from the SUR procedure. *The z-test results address what is the central issue in the invariance hypothesis* – whether the effects of structural disadvantage on violent offending are of similar magnitude across white, black, and Hispanic comparisons. As noted earlier, relatively few studies formally test for effect differences in key predictor variables (i.e., specific disadvantage variables or disadvantage indices) between racial groups, so that it is often unclear whether structural disadvantage is a weaker predictor or a stronger predictor of crime for blacks versus whites or Hispanics.

For homicide, one comparison is significant at the traditional significance levels ($p < .05$), although one other comparison is marginally significant ($p < .10$). Poverty has a significantly greater effect on black homicide (Beta = .28) than it does on white homicide rates (Beta = .16). Poverty also has a larger impact on Hispanic (Beta = .39) than white homicide rates, though the z-test comparison approaches, but does not attain significance.

In contrast, the Violent Index models reveal many racial/ethnic differences in disadvantage effects on violence. Poverty has a significant and substantially greater effect on black and white violence rates than on Hispanic violence rates. In other words, poverty is associated with greater increases in black and white index violence rates (Betas of .359 and .357 respectively) than on Hispanic violence (Beta = .238). Unemployment produces much larger increases in white violence rates than on black or Hispanic rates – the Beta for the unemployment effect on white violence is .37, greater than the unemployment effects for blacks (Beta = .251) and Hispanics (Beta = .268). Education deficits also contribute substantially more to white violence rates (Beta = .384) than to black (Beta = .035) or Hispanic violence (Beta = .057). Put another way, the presence of greater percentages of white residents without a high school education aggravates the white violence rate significantly more than is true for blacks and Hispanics. Finally, female headship has a substantially greater effect on white and black rates of violence than on Hispanic rates.

In sum, the separate disadvantage indicators, for the most part, significantly predict greater white, black, and Hispanic homicide and index violence. We observed few, if any race/ethnic differences in the effects of the disadvantage variables on race- and ethnic-specific

homicide rates. However, we uncovered evidence of notable race/ethnic differences in the effects of several disadvantage variables on the Violent Index. In fact, our z-tests in Table 3 suggest that there is *more difference than similarity* in the effects of specific disadvantage indicators on black, white, and Hispanic violence rates. Additionally, we find that discrete measures of disadvantage are less closely tied to overall violence for Hispanics compared to their effects on black and especially white violence.

Structural Disadvantage Index—We turn next to the effects of the structural disadvantage index on homicide and violence, shown in Table 4. According to some scholars, rather than focusing on the effect of a specific variable or indicator of disadvantage, what is important for the racial invariance thesis is similarity across groups in the effect of an underlying concept or dimension such as “concentrated disadvantage” (Lee 2000; Peterson and Krivo 2005; Sampson and Bean 2006) or the “tangle of pathology” as Moynihan (1965) put it. It is the effect of a configuration or combination of factors representing disadvantage (e.g., as characterizes our index of poverty, unemployment, low education, and female headship) that constitutes the most discerning test of the assumption of racial invariance.

Panel A of Table 4 shows SUR results regressing racially and ethnically disaggregated homicide rates on the structural disadvantage index and control variables. In line with structural explanations, the results suggest that structural disadvantage consistently has a significant positive association with white, black, and Hispanic homicide rates. Thus, the association between structural disadvantage and homicide appears to cut across race/ethnic lines as white, black, and Hispanic homicide rates all increase with increases in the disadvantage index. Panel B shows SUR results from identical models for the Violent Index. Here too, structural disadvantage is significantly and positively associated with black, white, and Hispanic violence rates. Thus, the structural disadvantage index predicts increased violence among whites, blacks, and Hispanics. Together, these findings support structural theories that anticipate an impact of structural conditions on crime, irrespective of racial or ethnic group.

More crucially for the racial invariance issue, however, is the finding that the sizes of disadvantage index effects on homicide and violence vary by race/ethnicity. A comparison of the disadvantage coefficients in the three homicide models in Table 4 reveals, first, that the standardized coefficient for white homicide (.17) is significantly smaller than those for black (.26) and Hispanics (.37) homicide. Moreover, the bottom of Table 3 (Panel A) reveals that the white disadvantage effect is significantly smaller than that for blacks and Hispanics. The index of disadvantage increases black and Hispanic homicide more strongly than white homicide.

Race/ethnic differences are also apparent in the disadvantage index effects on index violence rates. In Table 4, the white disadvantage Beta coefficient (.46) is larger than that for blacks (.39) and Hispanics (.30). Moreover, the difference between white-black disadvantage effects shown in the bottom of Table 3 (Panel B) is significant ($p < .01$) and the black disadvantage effect on violence is significantly greater than the Hispanic disadvantage effect

($p < .01$). In other words, the disadvantage index is more strongly associated with increases in black violence compared to Hispanic violence.¹⁰

Regarding the control variables in the analysis, several findings in Table 4 are noteworthy. First, we find that other structural variables such as residential instability and the entropy measure, which measures census place race/ethnic heterogeneity, mostly have small to moderate effects on violent offending rates of each race/ethnic group. Residential instability is not significantly related to white or black violent offending, and is negatively related to Hispanic homicide and violence.¹¹ The entropy measure indicates that race/ethnic heterogeneity significantly increases white and Hispanic homicide, and especially increases white and Hispanic violence rates. In fact, the effect of racial-ethnic diversity on white Violent Index offending approaches the size of the structural disadvantage effect on white violence rates. However, the effect of the entropy measure on black homicide is marginally significant, and is comparatively smaller in absolute size. Police per capita also tends to significantly impact homicide and violence rates, with the effect on black homicide being especially strong compared to whites and blacks. That police per capita is distinctively associated with higher black homicide rates probably reflects the reactive stance in policing to target high crime or violence localities, as is more likely to characterize segregated black neighborhoods (Maltz 1994).

Especially noteworthy here are the effects of those control variables – entropy, residential instability, and population density – that are often used as “social disorganization” indicators and that some analysts suggest may also have racially invariant effects on violence levels (Phillips 2002). According to the bottom of Table 3, one-third (6 of 18) of the white-black-Hispanic comparisons for these effects are statistically significant for homicide and the Violent Index. Some of the comparisons yield especially notable differences. The effect of entropy on white violence rates is especially greater than that for blacks, while residential instability has a particularly strong effect on Hispanic homicides compared to whites and blacks. Taken together, these findings parallel the disadvantage effects on violence which also reveal some differences in the structural predictors of violence across race/ethnicity.

CONCLUSIONS AND FUTURE DIRECTIONS

The phrase “racial invariance in the fundamental causes of crime” (Sampson and Bean 2006: 8) has now become commonplace in criminological discussions, but its meaning remains unclear. Our aims have been to conceptually advance research on racial invariance (and race/ethnicity-crime research more generally) by identifying unresolved issues in the invariance literature and spelling out ways to evaluate the invariance thesis with greater

¹⁰It is worth noting that R^2 values show sizable differences in the amount of variance explained across offense and race/ethnic groups. Our multivariate models (Table 4) account for a greater degree of black homicide variation ($R^2 = .272$) compared to white or Hispanic models but explain variance in white Violent Index offending ($R^2 = .422$) to a greater degree than black or Hispanic violence. These statistics support our other multivariate findings, indicating that there is some variation in the ability of structural predictors to account for violence across race/ethnicity. However, we are hesitant to place too much emphasis on the R^2 values and are cautious in drawing conclusions from these statistics given that some scholars (McElroy 1977) question their validity in SUR models.

¹¹Rather than destabilizing communities and increasing violence, as social disorganization theory would predict, Hispanic residential instability may simply reflect in-migration of new residents that also import low rates of violence and protective community resources (Feldmeyer and Steffensmeier 2009; Martinez 2002). We thank the anonymous reviewers for this suggestion.

clarity and specificity of scope and criteria. Empirically, we used CA and NY arrest data disaggregated by race and ethnicity to extend previous research on the invariance issue in several ways – by using both homicide and Violent Index offending as dependent variables, examining the effects of different dimensions of structural disadvantage both individually and jointly as an overall index, conducting formal tests of racial similarity in the effects of disadvantage indicators on violence, using census places as a new ecological unit of analysis that provides distinct advantages for testing the racial invariance hypothesis, and including Hispanic comparisons with blacks and whites.

Including Hispanic populations in our analysis is notably important for testing the racial invariance thesis and assessing its analytic scope. Also, including Hispanics helps us address the issue of restricted distributions of disadvantage between race/ethnic groups (McNulty 2001), since there is greater overlap in levels of disadvantage between black and Hispanic (and between Hispanic and white) populations compared to black-white comparisons. There is an unfortunate shortage of datasets that allow the disaggregation of Hispanic vs. white and black arrest rates. Thus, we have presented data from two large, contextually diverse states which account for sizable portions of US black and Hispanic populations, and which provide some of the best available information on racially- and ethnically-disaggregated arrest rates.

Key findings from our analysis are summarized in Table 5. In addition to disadvantage indicators that have occupied a central place in empirical tests of the race-crime relationship, the table depicts the findings for other structural characteristics, such as residential instability and race/ethnic heterogeneity, which are sometimes included in treatments of racial invariance. We draw two main conclusions.

First, structural disadvantage has directionally consistent and fairly robust effects on violent offending rates across all three racial groups. Despite considerable differences in mean rates of offending between blacks, Hispanics, and whites – all of the discrete structural disadvantage variables (i.e., poverty, joblessness, low education, female headship) as well as the disadvantage index increase rates of homicide and overall violence for each group. Notably, our overall structural disadvantage index significantly increases white, black, and Hispanic homicide rates, and the effect sizes range from moderate to relatively strong. These results are consistent with traditional macro-level perspectives (e.g., anomie-strain, conflict, social disorganization) that structural disadvantage – adverse economic conditions and conditions of social disorganization produce crime among black, white, and Hispanic populations.

Second, although the directions of the effects are similar for rates of offending across the racial groups, differences emerge in terms of the magnitude of the effects – indicating that structural disadvantage measures are *more strongly associated* with homicide or violence for one racial group than another. However, these findings vary substantially across offense type and provide much greater support for racial invariance positions in homicide models than in models predicting overall violence. Specifically, homicide models produced only four (out of fifteen) significant or near significant differences in the effects of disadvantage across whites, blacks, and Hispanics. Thus, the effects of disadvantage on homicide appear to display more racial invariance than variance.

On the other hand, Violent Index offending presents a much clearer picture of between group variation in the effects of disadvantage and its specific indicators. Ten out of fifteen group comparisons of the effects of disadvantage variables were significantly different. In particular, the effects of the overall structural disadvantage index on violent offending differed significantly across race/ethnicity; disadvantage had significantly weaker effects on Hispanic violence than on black or white violence. This same pattern was reflected also in the effects of poverty on white, black, and Hispanic violence. In addition, each of the other specific disadvantage indicators (unemployment, low education, and female headship) showed significant between group differences. From these findings, we conclude that there is more difference than similarity in the effects of structural disadvantage on white, black, and Hispanic overall violence.

This finding, that there appears to be more racial invariance for homicide than the Violent Index, can be interpreted in alternative ways. First, it can be argued that homicide may show invariance in structural effects to a greater extent than overall violence because homicide is more reliably measured; namely, it represents the ultimate violent act and is more likely to be reported (i.e., there is usually a body to be explained and intensive police investigation). This view would imply that the findings for homicide should be given greater weight and, hence, might be interpreted as offering stronger support for the invariance hypothesis. Second, it also is plausible that the invariance assumption applies only or mainly to very serious forms of violence (like homicide) and so its scope is quite limited. This interpretation is consistent with prior research showing that socioeconomic disadvantage and anomie/disorganization are more predictive of more serious forms of violence than less serious forms like aggravated assault which in fact account for large portion of arrest counts in overall violence (Blumstein 2000; Schwartz 2006; Mosher, Miethe, and Phillips 2002). Also, it may be the case that the general broadness of offenses included within the Violent Index (heavily weighted by assault arrests) and the expanded definitions of what constitutes a physical attack or its threat have impacted minorities to a greater extent than whites (Blumstein 2000). Especially since definitions of what constitutes a physical attack or its threat have been stretched in recent decades, aggravated assault is a broad offense category that includes a wide range of physically or verbally threatening behaviors that vary in seriousness and that also appear to be fairly diffuse throughout the population (more so than homicide). Also, of course, the lesser seriousness and greater ambiguity in assault classification opens the door for more discretionary enforcement practices as noted above in discussing reliability. Regardless of the reasons, the results lead to same quandary about just what is the scope of the invariance hypothesis regarding offense types.¹²

Our results also contain implications for the scope of *independent* variables to be considered under the rubric of “disadvantage” or structural predictors, and the degree to which their

¹²On grounds that homicide arrest rates are likely to be more reflective of actual criminal behavior, it is arguable that our findings do generally support the racial invariance thesis (as one reviewer pointed out and as we note in our discussion). The validity of this argument notwithstanding, criminologists are still faced with the prospect that the thesis is quite limited in scope – that is, to homicide or to a very small portion of the measureable criminal landscape. It is worth noting, however, that (a) some of the strongest claims for viability of the invariance hypothesis are based on neighborhoods as study units that rely on measures of overall violence or on less “serious” forms of violence due to the rare nature of homicide; (b) many of the scope arguments for the hypothesis extend beyond homicide (and also rely on arrest data), indicating that tests of racial invariance should also include non-lethal measures of violence or perhaps even serious property crimes (e.g., burglary).

effects vary by race/ethnic groups. We restricted the scope of our focus on disadvantage to poverty, unemployment, low education, and family structure. However, as we noted earlier, some scholars (e.g., Phillips 2002; Pratt and Cullen 2005) have included other structural/social organizational variables in their treatments of the racial invariance issue, such as residential instability and racial/ethnic heterogeneity. Here, we treated these latter variables as controls. It is worth noting, however, that if we adopted a more expansive definition of structural disadvantage to include residential instability, racial heterogeneity (entropy), and population density we would still conclude that there is nearly as much racial-ethnic difference as similarity in the effects of these variables, especially in terms of the Violent Index. In particular, the effect of racial heterogeneity (entropy) was markedly different for white and Hispanic violence compared to black violence. Residential instability also appeared to have distinctive effects on Hispanic violence (see footnote 11).

Thus, our results are mixed about whether structural disadvantage indicators (or other structural characteristics) have the same effects on violence and offending rates of blacks, whites, and Hispanics. The effects are as noteworthy for their differences as for their similarities. This takes us back to the scope and definitional issues we raised in our conceptual treatment of racial invariance. If the criterion for supporting the hypothesis is more lenient and asks simply whether structural disadvantage predicts greater homicide and violence for blacks, whites, and Hispanics, then our findings certainly support racial invariance. If, however, the racial invariance hypothesis is held to a stricter standard whereby disadvantage should exhibit no statistically significant variation in its effects on homicide or violence, then racial invariance clearly fails this test in our analyses. In terms of scope, invariance seems to characterize homicide more than overall violence. In addition, our inclusion of Hispanic comparisons seems to yield a picture of greater variation in the effects of disadvantage than would emerge when limiting the comparisons to blacks and whites.

Our findings suggest that strong claims about racial invariance should be tempered. We find evidence that disadvantage is clearly linked to violence for each group, and we find that these effects are sometimes statistically similar, especially for homicide. However, key differences in disadvantage effects should not be glossed over—our evidence clearly suggests that disadvantage and its specific dimensions often affect these three groups in distinctive ways.

The danger of continued imprecision in defining “invariance” and the scope of the hypothesis relative to outcome, study unit and so forth is that the racial invariance hypothesis will be a moving target, making definitive empirical conclusions about the viability of the hypothesis difficult. It is difficult to draw conclusions about the degree of support for the racial invariance thesis when there are few agreed-upon yardsticks to assess that support. Such a situation, in turn, will hamper our understanding of race, ethnicity, and crime. At a minimum, future research should spell out the specific criteria for assessing invariance in disadvantage effects, and be explicit about what structural predictors and dependent variables are and are not being encompassed in the racial invariance argument.

It is worth recalling from the plots in Appendix A that most of the higher violent crime places are predominantly black, even at more moderate levels of disadvantage, and that even the higher disadvantage predominantly white and Hispanic places tend to fall lower in the violence rate distribution. This pattern, along with the differences we found in the effects of disadvantage on violence suggests that racial/ethnic disparities in levels of disadvantage are only part of the story regarding race/ethnic differences in violent offending. Evidence of racial/ethnic differences in the effects of disadvantage and other structural predictors on violence question structural explanations of crime which suggest the violence-generating processes are universal or consistent across race/ethnicity. As Ousey suggests, the race/ethnic-specific effects displayed here “imply that deprivation-based theories of crime need revision to provide a substantive rationale for the differential impact of socioeconomic conditions on crime rates” (Ousey 1999: 409). One possibility is that cultural differences between structurally similarly-situated residents might result in sharply different crime/violence patterns and condition effects of social structure on violence, as several writers/scholars have recently suggested.

Proponents of the racial invariance perspective may need to expand its reach to include cultural factors and to frame it as a structural-cultural approach similar perhaps to Wilson’s (2009) treatment of the racial inequality/crime relationship (see also Steffensmeier and Ulmer 2006). After all, Blumer (1990) argued that large scale structural factors such as industrialization have a definite but *indeterminate* causal impact on social life at local levels, depending on the specific ways that the structural factor in question interacts with local features of social organization and culture. By analogy, it seems reasonable to expect that structural disadvantage would be likely to foster violence as a general rule, but the exact nature of the impact of structural disadvantage on violence would depend on the history, organization, and culture of particular groups. Thus, Hispanics, with their different history, culture and social organization than blacks, would likely display different rates of violence than blacks, and structural disadvantage might affect Hispanic violence differently than black violence.

As mentioned earlier, some writers have argued that Hispanics have lower rates of violence due to several ways in which their culture and social organization contrasts with that of African-Americans (Martinez 2002; Velez 2006; Tienda and Mitchell 2005). Hispanics have experienced lesser and qualitatively different levels of discrimination (Portes and Rumbaut 2006). Certain Hispanic groups such as Mexican Americans have maintained close ties with family and friends at home, and have maintained their cultural identities, heritage, and values (Massey 2009). The shared values and heritage, in turn, provide the basis for group cohesion, unity, social organization, and work/business opportunities (Feldmeyer and Steffensmeier 2009; Light and Gold 2000). The more communal culture of Hispanics is also seen as a source for their lower crime rates and as a potential buffer that (partly) insulates Hispanics from the effects of disadvantage on crime and other social problems (Martinez 2002).

Notably, groups differ in their cultural norms for settling dominance disputes (Athens 1998). Wilson (1987, 2009) and especially Anderson (1999) argue that racial segregation, concentrated disadvantage, and social isolation have fueled sub-cultural adaptations in

which violence is tolerated and expected as a daily part of life in black underclass neighborhoods (see also Harer and Steffensmeier 1992). Also, according to Butterfield (1996), contemporary black violence reflects a tradition of “honor” acquired from white southern violence whereby the need for respect has turned into a cultural mandate that can provoke retaliation at even a slight insult and also function as a defense posture to forestall violent intimidation. So too, Lane (1986) documents high rates of black violence in much earlier periods of US history, and links it to subcultural adaptations fostered by long-term structural disadvantage, the legacy of slavery, and Southern culture. All of this suggests that structural disadvantage may not be the only factor that explains white, black, and Hispanic differences in violence.

Alternatively, recent applications of Bourdieu’s concept of cultural capital offer a promising framework for exploring the interrelationship between crime, structural disadvantage and cultural “toolkits” of knowledge and practice (Swidler 1986). Steffensmeier and Ulmer (2006; Ulmer and Steffensmeier 2006), for example, show how race and ethnicity-linked differences in cultural capital relevant to “entrepreneurship” both directly and indirectly shape opportunities for “success” in both legal and criminal enterprise (see also Light 1977). Therefore, race- and ethnicity-linked differences in cultural capital might be mutually related to both structural disadvantage and violence. In addition, Vaisey (2009) has described how culture provides both justifications and motivations for action. By extension, it may be that similarly structurally disadvantaged groups differ in their cultural justifications and motivations for committing or avoiding violence.

Future research might extend the analysis presented here in several ways. First, a need exists for more studies that go beyond black-white comparisons to allow for Hispanic comparisons, and perhaps include other groups like Asians and Native Americans. Second, a need exists for race/ethnic-disaggregated analyses across different ecological units, particularly neighborhoods, because they often provide the networks of association in which individuals are embedded. Unfortunately, many direct indicators of key structural variables used in our analysis are not readily available, and reliability problems involving rate or low frequency counts of more serious forms of offending at the neighborhood level greatly limit the feasibility of race/ethnic-specific comparisons. Further work is also needed to address a key limitation of the present study. Our analysis was limited to only two states, and thus we cannot make claims that generalize to the nation as a whole.

Third, analyses comparing the effects of macro-social forces on rates of white or black or Hispanic offending could expand our list of structural variables, because our models have not incorporated all potentially relevant factors. We have documented the effects of structural characteristics, including key structural disadvantage indicators, that occupy a central place in macro-social analyses of the race-crime relationship and that are generally viewed as having the strongest and most invariant effects.

Fourth, cultural measures should be included in assessments of the racial invariance thesis. Future data collection efforts should seek to find race and ethnic-specific measures of culture, which would serve as a means for testing cultural effects and perhaps contribute to a more comprehensive explanation of race differences in crime/violence (as an example, see

Matsueda, Drakulich, and Kubrin 2006). This might necessitate collecting and integrating ecological-level survey measures of cultural norms with racially-disaggregated structural and crime measures.

Fifth, the racial invariance question has multiple facets, and future research needs to assess more of these facets in order to advance our understanding of race, ethnicity, and violence. At least three distinct research questions are implied in the literature: a) asking whether disadvantage (or other structural factors) have similar effects on race/ethnicity disaggregated violence or crime rates; b) asking whether structural disadvantage (or a broader configuration of structural variables) renders spurious the effects of local racial composition (i.e., % black, % Hispanic) on overall rates of violence or crime, and c) asking the extent to which disadvantage and/or structural factors explain the racial-ethnic gap in violence/crime rates (see Velez, Krivo, and Peterson 2003). We have addressed the first question here, but future research needs to address the other two as well and do so within the context of including Hispanic comparisons.

Taken together, our conceptualization and empirical assessment go considerably beyond prior research on the racial invariance issue, and can serve as template for theory and future research. The racial invariance thesis has identified a set of structural factors or processes that help explain variation in offending rates across racial groups. However, the mixed findings we report from our comparison across whites, blacks, and Hispanics, suggest skepticism that structural sources of violence always affect racial/ethnic groups in uniform ways. We propose that the scope of the invariance assumption remains to be established, and that the inclusion of Hispanics (and other race/ethnic groups) into future tests of the hypothesis is crucial for determining whether it applies only under narrow conditions or is a general principle.

Acknowledgments

Research made possible by National Science Foundation Grant SES-0719648

We acknowledge the helpful comments on earlier drafts of this article by Miles Harer and statistical advice by Wayne Osgood, as well as the constructive suggestions of the reviewers.

References

- Anderson, Elijah. *Code of the Street: Decency, Violence, and the Moral Life of the Inner City*. New York: W. W. Norton; 1999.
- Athens, Lonnie. Dominance, Ghettos, and Violent Crime. *The Sociological Quarterly*. 1998; 39:673–691.
- Bellair, Paul; Roscigno, Vincent; McNulty, Thomas. Linking Local Labor Market Opportunity to Violent Adolescent Delinquency. *Journal of Research in Crime and Delinquency*. 2003; 40:6–34.
- Blumstein, Alfred. Disaggregating the Violence Trends. In: Blumstein, A.; Wallman, J., editors. *The Crime Drop in America*. Cambridge University Press; 2000. p. 13–44.
- Blumer, Herbert. Industrialization as an Agent of Social Change. Maines, D.; Morriane, T., editors. New York: Aldine de Gruyter; 1990.
- Butterfield, Fox. *All God's Children: The Bosket Family and the American Tradition of Violence*. New York: Avon; 1996.

- Feldmeyer, Ben; Steffensmeier, Darrell. Immigration Effects on Homicide Offending for Total and Race/Ethnicity-Disaggregated Populations (White, Black, and Latino). *Homicide Studies*. 2009; 13:211–226.
- Hannon, Lance; Knapp, Peter; DeFina, Robert. Racial Similarity in the Relationship Between Poverty and Homicide Rates: Comparing Retransformed Coefficients. *Social Science Research*. 2005; 34:893–914.
- Harer, Miles; Steffensmeier, Darrell. The Differing Effects of Economic Inequality on Black and White Rates of Violence. *Social Forces*. 1992; 70:1035–1054.
- Krivo, Lauren; Peterson, Ruth. Extremely Disadvantaged Neighborhoods and Urban Crime. *Social Forces*. 1996; 75:619–650.
- Krivo, Lauren; Peterson, Ruth. The Structural Context of Homicide: Accounting for Racial Differences in Process. *American Sociological Review*. 2000; 65:547–559.
- Land, Kenneth; McCall, Patricia; Cohen, Lawrence. Structural Covariates of Homicide Rates: Are There Any Invariances Across Time and Social Space? *American Journal of Sociology*. 1990; 95:922–963.
- Lane, Roger. *Roots of Violence in Black Philadelphia, 1860–1900*. Cambridge: Harvard University Press; 1986.
- Lee, Matthew. Concentrated Poverty, Race, and Homicide. *Sociological Quarterly*. 2000; 41:189–206.
- Light, Ivan. The Ethnic Vice Industry, 1980–1944. *American Sociological Review*. 1977; 42:464–79.
- Light, Ivan; Gold, Steven. *Ethnic Economies*. San Diego: Academic Press; 2000.
- Maltz, Michael. Deviating from the Mean: The Declining Significance of Significance. *Journal of Research in Crime and Delinquency*. 1994; 31:434–463.
- Martinez, Ramiro, Jr. *Latino Homicide: Immigration, Violence, and Community*. New York: Routledge; 2002.
- Massey, Douglas. Racial Formation in Theory and Practice: The Case of Mexicans in the United States. *Race and Social Problems*. 2009; 1(1):27–35.
- Matsueda, Ross; Drakulich, Kevin; Kubrin, Charis. Race and Neighborhood Codes of Violence. In: Peterson, RD.; Krivo, LJ.; Hagan, J., editors. *The Many Colors of Crime*. New York: New York University; 2006. p. 334–356.
- McElroy, Marjorie B. Goodness of Fit for Seemingly Unrelated Regression: Glahn's R^2 and Hooper's R^2 . *Journal of Econometrics*. 1977; 6:381–387.
- McNulty, Thomas. Assessing the Race-Violence Relationship at the Macro Level: The Assumption of Racial Invariance and the Problem of Restricted Distributions. *Criminology*. 2001; 39:467–489.
- McNulty, Thomas; Bellair, Paul. Explaining Racial and Ethnic Differences in Serious Adolescent Violent Behavior. *Criminology*. 2003; 41:709–747.
- Miethe, Terance; Meier, Robert. *Crime and its Social Context*. Albany: State University of New York; 1994.
- Moody, Carlisle; Marvell, Thomas. The Debate on Shall Issue Laws, Continued. *Econ Journal Watch*. 2009; 6:203–217.
- Mosher, Clayton; Miethe, Terrance; Phillips, Dretha. *The Mismeasure of Crime*. Thousand Oaks: Sage Press; 2002.
- Moynihan, Daniel. *The Negro Family: The Case for National Action*. Office of Policy Planning Research; Washington, D.C: US Department of Labor; 1965.
- Ousey, Graham. Homicide, Structural Factors, and the Racial Invariance Hypothesis. *Criminology*. 1999; 37:405–426.
- Ousey, Graham. Explaining Regional and Urban Variation in Crime: A Review of Research. *Criminal Justice*. 2000; 1:261–308.
- Parker, Karen. *Unequal Crime Decline: Theorizing Race, Urban Inequality and Criminal Violence*. New York: New York University Press; 2008.
- Peterson, Ruth; Krivo, Lauren. Macrostructural Analyses of Race, Ethnicity, and Violent Crime: Recent Lessons and New Directions for Research. *Annual Review of Sociology*. 2005; 31:331–56.
- Phillips, Julie. White, Black, and Latino Homicide Rates: Why the Difference? *Social Problems*. 2002; 49:349–373.

- Portes, Alejandro; Rumbaut, Ruben. *Immigrant America: A Portrait*. Berkeley: University of California Press; 2006.
- Pratt, Travis; Cullen, Frances. Assessing Macro-Level Predictors and Theories of Crime: A Meta-Analysis. In: Tonry, M., editor. *Crime and Justice: A Review of Research*. Chicago: University of Chicago Press; 2005. p. 373-450.
- Reardon, Sean F.; Firebaugh, Glenn. Measures of Multigroup Segregation. *Sociological Methodology*. 2002; 32:33-67.
- Sampson, Robert; Wilson, William J. Toward a Theory of Race, Crime, and Urban Inequality. In: Hagan, J.; Peterson, R., editors. *Crime and Inequality*. Stanford: Stanford University Press; 1995. p. 177-187.
- Sampson, Robert; Morenoff, Jeffrey; Raudenbush, Stephen. Social Anatomy of Racial and Ethnic Disparities in Violence. *American Journal of Public Health*. 2005; 95:224-32. [PubMed: 15671454]
- Sampson, Robert; Bean, Lydia. Cultural Mechanisms and Killing Fields: A Revised Theory of Community-Level Racial Inequality. In: Peterson, RD.; Krivo, LJ.; Hagan, J., editors. *The Many Colors of Crime*. New York University Press; 2006. p. 8-36.
- Sampson, Robert. Rethinking Crime and Immigration. *Contexts*. 2008; 7:28-33.
- Schwartz, Jennifer. Effects of Diverse Forms of Family Structure on Female and Male Homicide. *Journal of Marriage and Family*. 2006; 68:1291-1312.
- Shaw, Clifford; McKay, Henry. *Juvenile Delinquency and Urban Areas*. Chicago: University of Chicago Press; 1942.
- Shihadeh, Edward; Shrum, Wesley. Serious Crime in Urban Neighborhoods: Is There a Race Effect? *Sociological Spectrum*. 2004; 24:507-533.
- Steffensmeier, Darrell; Ulmer, Jeffery T. Black and White Control of Numbers Gambling: A Cultural Assets Social Capital View. *American Sociological Review*. 2006; 71:123-156.
- Steffensmeier, Darrell; Haynie, Dana. Gender, Structural Disadvantage, and Urban Crime: Do Macrosocial Variables Also Explain Female Offending Rates. *Criminology*. 2000; 38:403-438.
- Tienda, Marta; Mitchell, Faith. *Multiple Origins, Uncertain Destinies: Hispanics and the American Future*. Washington, DC: National Academies Press; 2005.
- Ulmer, Jeffery T.; Steffensmeier, Darrell. Reply to Lee: Is there No Place for Culture in a Sociology of Illegal Enterprise? *American Sociological Review*. 2006; 71:162-166.
- US Census Bureau. *Geographic Areas Reference Manual*. Washington, DC: US Department of Commerce, Economic, and Statistics Administration; 1994.
- US Census Bureau. *Annual Estimates of the Population by Race, Sex, and Hispanic Origin for the United States, 2000-2007*. Washington, DC: US Department of Commerce, Economic, and Statistics Administration; 2008.
- Velez, Maria; Krivo, Lauren; Peterson, Ruth. Structural Inequality and Homicide: An Assessment of the Black-White Gap in Killings. *Criminology*. 2003; 41:645-672.
- Velez, Maria. Toward an Understanding of the Lower Rates of Homicide in Latino Versus Black Neighborhoods: A Look at Chicago. In: Peterson, R.; Krivo, L.; Hagan, J., editors. *The Many Colors of Crime*. New York: New York University Press; 2006. p. 91-107.
- Wilson, William J. *The Truly Disadvantaged*. Chicago: University of Chicago Press; 1987.
- Wilson, William J. Toward a Framework for Understanding Forces that Contribute to or Reinforce Racial Inequality. *Race and Social Problems*. 2009; 1(1):12-26. [PubMed: 20814590]

Appendix A1.

Plot of Transformed Violent Index Rates by Poverty for Black, White, and Hispanic Census Places (N=232)

Appendix A2.

Plot of Transformed Violent Index Rates by Unemployment for Black, White, and Hispanic Census Places (N=232)

Table 1

Means and Standard Deviations for Key Variables by Race/Ethnicity (N = 232)

	Mean			Std. Dev.		
	Whites	Blacks	Hispanics	Whites	Blacks	Hispanics
<i>Dependent Variables:</i>						
Homicide rate	2.85	15.81	6.39	5.43	26.75	8.94
Square-root of homicide rate	1.32	2.71	1.95	1.06	2.91	1.61
Violent index rate	331.52	1311.48	505.63	221.66	818.36	334.68
Square-root of violent index rate	17.26	34.29	20.86	5.82	11.66	8.40
<i>Key Independent Variables:</i>						
Disadvantage Index	.00	.00	.00	1.00	1.00	1.00
Poverty	8.65	18.62	18.93	4.89	10.39	9.89
Unemployment	5.46	10.82	9.28	2.80	6.26	5.08
Education	13.16	18.33	42.24	6.54	10.92	13.94
Female headship	8.19	24.57	15.08	3.45	10.95	8.21
Young male population	5.86	7.97	9.71	2.50	3.83	3.06
Residential instability	44.32	56.62	56.43	9.39	12.31	8.72

Table 2

Seemingly Unrelated Regression of Homicide and Violent Index Crime on Poverty, Unemployment, Education, and Family Structure (N = 232)

Model	(A) Homicide						(B) Violent Index											
	Whites			Blacks			Hispanics			Whites			Blacks			Hispanics		
	b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	B
(1) Controls only			.099		.217		.113		.243		.064							.140
(2) Poverty	.034 *	(.016)	.155	.077***	(.018)	.275	.064***	(.012)	.392	.424***	(.066)	.357	.402***	(.063)	.359	.202***	(.057)	.238
			.118		.281		.217		.357		.217							.195
(3) Unemployment	.043 [†]	(.024)	.114	.051 [†]	(.028)	.110	.065**	(.021)	.204	.769***	(.091)	.370	.467***	(.092)	.251	.443***	(.092)	.268
			.115		.233		.155		.404		.175							.230
(4) Education	.031**	(.011)	.191	.047**	(.017)	.176	.025**	(.008)	.212	.341***	(.038)	.384	.037 (.059)	.035	.034 (.035)			.057
			.138		.240		.152		.407		.075							.155
(5) Female headship	.011 (.022)		.037	.035* (.018)		.132	.044**	(.016)	.226	.377***	(.086)	.224	.297***	(.060)	.279	.069 (.069)		.067
			.102		.237		.149		.295		.150							.144

Note: Each model is estimated with only one structural disadvantage factor at a time, net of controls; standard errors in parentheses

[†] p<.10,

* p<.05,

** p<.01,

*** p<.001 (two-tailed)

Table 3

Z-Test Comparisons of Racial/Ethnic Effects for Homicide and Violent Index Models

Discrete Models	(A) Homicide			(B) Violent Index		
	White vs. Black	White vs. Hispanic	Black vs. Hispanic	White vs. Black	White vs. Hispanic	Black vs. Hispanic
Poverty ^a	-1.79 *	-1.50 †	0.60	0.24	2.55 **	2.35 **
Unemployment ^a	-0.22	-0.69	-0.40	2.33 **	2.52 **	0.18
Education ^a	-0.79	0.44	1.17	4.33 ***	5.94 ***	0.04
Female headship ^a	-0.84	-1.21	-0.37	0.76	2.79 **	2.49 **

Disadvantage Index Model	(A) Homicide			(B) Violent Index		
	White vs. Black	White vs. Hispanic	Black vs. Hispanic	White vs. Black	White vs. Hispanic	Black vs. Hispanic
Disadvantage Index ^a	-2.81 **	-2.99 **	0.68	-2.59 **	0.32	2.38 **
Population Size	-1.41 †	-1.41 †	0.00	-1.41 †	-1.41 †	0.00
Population density	1.41 †	0.00	-1.41 †	0.00	0.00	0.00
Entropy	-0.39	-0.50	0.06	2.75 **	0.44	-2.12 *
Res. instability ^a	-0.94	2.48 **	2.73 **	-0.14	2.29 *	2.05 *
Young-male pop. ^a	1.66 *	1.26	-0.59	1.85 *	0.23	-1.40 †
Police per capita	-3.75 ***	1.98 *	4.65 ***	-0.46	2.49 **	2.07 *

^a Race-specific measure

† p<.10,

* p<.05,

** p<.01,

*** p<.001 (two-tailed)

Table 4

Seemingly Unrelated Regression of 4-Component Structural Disadvantage and Other Factors on White, Black, and Hispanic Transformed Homicide and Violent Index Rates (N=232)

Variable	(A) Homicide						(B) Violent Index					
	Whites		Blacks		Hispanics		Whites		Blacks		Hispanics	
	b		b		b		b		b		b	
Disadvantage Index ^a	.176* (.072)	.167	.749*** (.191)	.257	.595*** (.120)	.369	2.675*** (.268)	.460	4.497*** (.649)	.386	2.478*** (.544)	.295
Population Size	-.001 (.001)	-.005	.001 (.001)	.026	.001 (.001)	.084	-.001 (.001)	-.041	.001 (.001)	.068	.001 (.001)	.104
Population density	.001 (.001)	.078	-.001 (.001)	-.015	.001 (.001)	.036	.001 (.001)	.049	.001 (.001)	.076	.001 (.001)	.027
Entropy	1.266** (.392)	.213	1.680 [†] (.979)	.102	1.609** (.569)	.177	11.972*** (1.714)	.365	-.218 (4.086)	-.003	10.475*** (2.948)	.221
Res. instability ^a	-.005 (.008)	-.047	.011 (.015)	.048	-.045** (.014)	-.245	.029 (.028)	.047	.037 (.050)	.039	-.125* (.061)	-.129
Young-male pop. ^a	.037 (.030)	.088	-.053 (.045)	-.070	-.020 (.034)	-.038	-.109 (.108)	-.047	-.449** (.149)	-.147	-.152 (.151)	-.055
Police per capita	.061 (.078)	.059	.905*** (.211)	.314	-.223 [†] (.120)	-.140	-.1148*** (.339)	-.200	-.723 (.850)	-.063	-2.888*** (.612)	-.347
Constant	.283 (.470)		.041 (1.240)		3.783*** (.951)		9.602*** (1.840)		35.832*** (4.512)		25.505*** (4.341)	
R ²		.125		.272		.208		.422		.188		.203
Breusch-Pagan		X ² = 10.233, p<.05						X ² = 209.768, p<.001				

Note: Standard errors in parentheses

^aRace-specific measure

[†]p<.10,

* p<.05,

** p<.01,

*** p<.001 (two-tailed)

Table 5
Summary of Relationships by Direction and Significant Differences (Z-tests) by Race/Ethnicity

	Homicide					Violent Index						
	Direction ^a			Between-Race Differences ^b		Direction ^a			Between-Race Differences ^b			
	White	Black	Hispanic	W-B	W-H	B-H	White	Black	Hispanic	W-B	W-H	B-H
<i>Disadvantage Measures:</i>												
Disadvantage Index ^c	+	+	+	*	*	ns	+	+	+	*	ns	*
Poverty ^c	+	+	+	*	*	ns	+	+	+	ns	*	*
Unemployment ^c	+	+	+	ns	ns	ns	+	+	+	*	*	ns
Education ^c	+	+	+	ns	ns	ns	+	ns	ns	*	*	ns
Female headship ^c	ns	+	+	ns	ns	ns	+	+	ns	ns	*	*
<i>Key Structural Characteristics:</i>												
Population density	ns	ns	ns	*	ns	*	ns	ns	ns	ns	ns	ns
Entropy	+	+	+	ns	ns	ns	+	ns	+	*	ns	*
Residential instability ^c	ns	ns	—	ns	*	*	ns	ns	—	ns	*	*

^a + indicates measure increases violence (pos. effect); – indicates measure decreases violence (neg. effect); ns indicates a non-significant effect.

^b * represents a statistically significant z-score test for differences (p<.10) and ns represents a non-significant z-score test for differences between groups (NS = support for racial invariance hypothesis; * = lack of support for racial invariance hypothesis)

^c Race-specific measure