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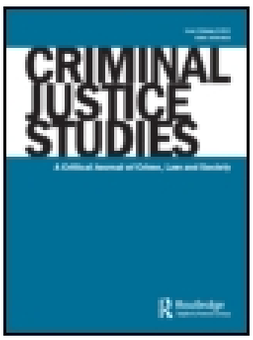

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ARTICLE

The methodological struggles of racial profiling research: a causal question that automobile stop data has yet to answer

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ABSTRACT

Automobile stop research finds that citizen race influences officer decision-making. Researchers, however, report methodological issues inhibiting them from drawing causal inferences about the existence of racial profiling. The purpose of this study is to deconstruct this field of inquiry through a causal lens to inform the next generation of scholarship. Through an analysis of automobile stop data, temporal ordering issues are exposed. Relating to association, most studies find that racial minorities are more likely to be searched, however, spuriousness issues continue to plague racial profiling studies as researchers rarely estimate departmental, passenger, vehicle, and temporal variables. To confront these issues, researchers are encouraged to engage in primary data collection and explore recent statistical innovations in their analytical strategies.

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Introduction

As the gatekeepers to the criminal justice system, police officers have a unique role in the administration of justice. Their enforcement practices have a ripple effect throughout the criminal justice system. Recently, however, confidence in law enforcement has been shaken in the wake of national incidents involving police use of force against racial[1] minorities in the United States of America (Newport, 2016). In the last three decades, depictions of potential racial animus have prompted data explorations of law enforcement practices. Departmental transparency, according to the President's Task Force on twenty-first Century Policing (2015), is critical to citizen assessments of public trust and legitimacy; these analyses, therefore, are highly consequential to law enforcement (Tyler & Wakslak, 2004). Unfortunately, studies examining the differential treatment of racial minorities during automobile stops tend to find that citizen race influences officer decision-making. Researchers, notwithstanding, have reported a host of methodological issues that have inhibited them from drawing reliable causal inferences about the existence of racial profiling. Even researchers employing quantitative syntheses of this literature, such as meta-analyses, recognize that the explanatory limits of their findings are confined by the quality of available studies. Consequently, the etiology of the 'driving while Black' phenomenon, as it is also known, remains elusive and a well of skepticism has perpetuated a divide among police and the communities they serve.

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The purpose of the current study is to deconstruct this field of inquiry through a causal lens so that researchers are conscious of the methodological issues that must be contended with going forward. The topics presented in this manuscript are reoccurring issues discussed in individual racial profiling studies, but by evaluating the logical consistency of automobile stop events, assessing the relationship between citizen race and the search disposition, and observing how researchers control for exogenous influences, the current study seeks to present a succinct accounting of the causal issues that have plagued racial profiling research. In doing so, the discussion focuses on how to bridge persistent methodological gaps and advance our understandings of officer decision-making. To set the stage for this discussion, this manuscript begins by contextualizing the causal question of racial profiling among potential data sources and describing the officer decision-making process in automobile stops.

The causal question for potential data sources

Racial profiling inquiries are a causal question at their root. It hypothesizes that if law enforcement harbor implicit or explicit animus toward racial minorities, it will manifest in discriminatory outcomes. As a counterfactual model, racial profiling research asks if automobile stop outcomes would differ if officers acted absent racial animus. While the most direct measure of this causal model would seem to be officer self-reports, there are serious ethical and methodological concerns that are difficult, if not impossible, for researchers to overcome with this type of data. Racial animus, therefore, is often explored with aggregates of police-citizen encounters. In these studies, researchers must construct what constitutes equitable treatment in their analyses (Reitzel & Piquero, 2006). The selections researchers make represent statistical, rather than behavioral, differentiations; thus, *disparity*, rather than *animus*, is the preferred nomenclature in this body of literature. While the causal model for observing disparity is similar to animus, readers of this research should avoid the assumption that what is true of the whole must be true of the parts. Aggregating police-citizen encounters has allowed researchers to generalize their results among neighborhood, city, state, highway, and national samples. Unfortunately, pooled data are removed from the individualized nature of police–citizen encounters. Readers, therefore, should be cautious in making generalizations to specific officers.

The officer decision-making process in automobile stops

To further elaborate on the causal model found in racial profiling studies, researchers have deconstructed the officer decision-making process of automobile stop encounters. Officer-initiated decision-making points are of particular interest to racial profiling researchers because they provide measurable aspects to the 'cognitive processes that underlie [officer] discretion' (Miller, 2008, p. 127). Researchers have, therefore, strategically focused on more discretionary automobile stop outcomes in which racial disparity is most likely to be pronounced. With this in mind, there are three prominent opportunities to observe officer use of discretion within automobile stop data, including the decision to (1) initiate a stop, (2) conduct a search, and (3) apply a sanction (Schafer, Carter, Katz-Bannister, & Wells, 2006).

The decision to initiate a stop precedes all other decision-making points and researchers of this disposition typically consider the likelihood of racial minorities to be stopped by law enforcement. Researchers in these studies would ideally compare those who are stopped against the population that is not stopped to determine if there is a disparity in officer decision-making. Unfortunately, automobile stop data only reflect the former, which has forced researchers to put forth proximate, non-exact measures for the driving and/or traffic offending population. Benchmarks, as they are more commonly known, offer a solution to what has been called the 'denominator problem' (Schafer et al., 2006, p. 187). Prior research has utilized, for example, population-based and accident rate estimates, field observations, and internal benchmarks built on the pool of motorist's stopped as the denominator. Identifying an appropriate benchmark has become a hotly contested debate in the racial profiling literature, due to the transient nature of the population attempting to be measured and methodological implications for each benchmark (Tillyer, Engel, & Cherauskas, 2009). Unfortunately, side-by-side comparisons of benchmark outcomes have yet to be explored in the extant literature, inhibiting discussions about their empirical strengths and weaknesses.

The second officer-initiated decision-making point occurs post-stop and is concerned with an officer's decision to search the driver, vehicle, passengers, or a combination of some or all three entities. Most research in this area asks if racial minorities are disproportionately searched by law enforcement. More discriminate efforts disaggregate searches by types and tend to focus on more discretionary search types within the search disposition (e.g. Pickerill, Mosher, & Pratt, 2009). This allows researchers to collapse similarly situated instances of officer discretion into more generalizable results with greater statistical power but does not compromise the granularity of the analyses.

The final officer-initiated decision-making point also occurs post-stop and is concerned with the sanctions issued to the citizen by the officer. The bulk of this research evaluates who is arrested by law enforcement; however, citations are the most common occurrence at this decision-making point (Langton & Durose, 2013). Other sanction-related analyses have considered more punitive or coercive outcomes, including instances of physical and verbal resistance and officer use of non-deadly and deadly force (Withrow, 2006).

Demonstrating causality in automobile stops

Regardless of which disposition is being observed, establishing a causal relationship between citizen race and officer decision-making in automobile stop data hinges on three critical factors: temporal order, association, and spuriousness (Kraska & Neuman, 2012). In the sections that follow, racial profiling research is discussed among each of these factors. The current study begins by describing and assessing the logical consistency of an automobile stop's timing. The associative relationship between citizen race and the search disposition is then evaluated among systematically identified studies. An analysis of the control variables employed in each of these studies follows. Finally, the manuscript concludes by drawing attention to inherent issues in racial profiling analytical strategies and automobile stop data.

Temporal order

Temporal order refers to the arrangement of events in time. It necessitates that a causal factor is preceded in time by the outcome. Two temporal ordering issues are prominent

in the racial profiling literature. First, establishing temporal order in automobile stop data is relatively easy for post-stop dispositions. For post-stop decision-making points, officers have an opportunity to observe the race of the citizen prior to searching and sanctioning; however, establishing temporal order in stop initiation research is more difficult. Alpert, Dunham, and Smith (2007), for example, found that officers of the Miami-Dade (Florida) Police Department 'could only determine the race of the driver prior to the stop approximately 30% of the time' (p. 48). If an officer does not know the race of the driver prior to making a stop, then it cannot be the reason for the stop. In any case, stops with racial bias may be diluted by the overwhelming majority of encounters in which the citizen's race could not be determined prior to the stop.

The second temporal ordering issue affects post-stop dispositions. A stop's initiation will always be the first decision-making point in the temporal chain of events of an automobile stop because without which there cannot be subsequent officer dispositions. Unfortunately, the temporal ordering of searches and sanctions are often not specified in automobile stop data (Withrow, 2006). This is problematic for researchers who seek to understand the larger cognitive processes that tie decision-making points together. More specifically, the temporal ordering of post-stop dispositions tells researchers something about the conditions in which the officer acted. If, for example, a suspect was arrested then searched, it suggests a less discretionary search occurred and *vice versa*. An inability to disentangle the temporal ordering of searches and sanctions has relegated racial profiling research to measure automobile stop data cross-sectionally, which is inconsistent with the processes that underlie officer decision-making.

Association

Once the temporal order is established, an association must be made between the hypothesized cause and effect. The cause (i.e. citizen race) and effect (i.e. disparate outcomes) in racial profiling research is fairly overt because this relationship, as was noted previously, is often on display in news media. Incidents involving the deaths of Walter Scott and Philando Castile during automobile stops have brought racial profiling to the forefront of the nation's consciousness. In fact, attitudinal research finds that minorities are more critical of police behavior and often report feelings of harassment and discrimination (Reitzel & Piquero, 2006).

Unfortunately, news media and attitudinal research only provide anecdotal associative evidence. Likewise, attitudinal research assumes that citizen feelings are a direct reflection of their contacts with law enforcement. Rather, in any given year, only about a quarter (26.6%) of the eligible driving population will encounter a police officer according to the Bureau of Justice Statistics (Langan & Durose, 2013). Though racial minorities are disproportionately found among these contacts, indirect experiences are often more salient in shaping perceptions of police. As Rosenbaum, Schuck, Costello, Hawkins, and Ring (2005) reported, vicarious knowledge is the most important predictor of citizen attitudes of law enforcement. Negative police-citizen encounters, they noted, are likely to reverberate among family, friends, and communities; thus, attitudinal research is likely to overestimate the presence of actual racial animus.[2]

The current study's selection criteria

To better estimate the associative relationship between citizen race and officer decision-making, several studies have employed quantitative analyses of police-citizen encounters. To identify relevant research, the current study utilizes the sample of studies reviewed by Bolger (2014). In his meta-analysis of officer decision-making correlates, 60 potential studies were identified in a thorough exploration of the literature. Bolger (2014) first searched computerized databases utilizing the following boolean search terms: (police OR law enforcement OR officer) AND (search OR force). The computerized databases included in his search were 'Academic Search Complete, Academic Search Premier, Criminal Justice Abstracts, Proquest Criminal Justice, Proquest Dissertation and Theses, Proquest Research Library, Psychology and Behavioral Science Collection, Psyc INFO, Psyc INFO Historic, Soc Index, and Social Sciences Citations' (p. 50). Second, the reference sections from prominent literature reviews in policing, including Sherman (1980), Riksheim and Chermak (1993), and the National Research Council (2004), were also included into the pool of potential studies. Third, the reference sections from each of the aforementioned studies were sourced. Finally, in an attempt to overcome the 'File Drawer Problem' that inflates effect sizes from publication bias against null findings, he also included unpublished manuscripts by searching the American Society of Criminology and Academy of Criminal Justice Sciences annual convention programs and contacting the authors of potential studies.

To hone in on applicable studies, he excluded research (1) published before 1960 and after 2013, (2) drawn on non-patrol officer samples, (3) analyzed at the macro-level, (4) that employed only univariate and/or bivariate analytical strategies, and (5) without sufficient statistical information to calculate effect sizes. Bolger (2014) also focused on the search disposition. Unlike stops and sanctions, searches operate with the least visibility to external and internal forms of scrutiny (Fallik & Novak, 2012). Documented sanctions, for example, are only applied in search encounters where contraband is discovered. Consequently, if racial profiling exists in automobile stops, it will be most noticeable in the search disposition. Substantively, Bolger's (2014) sample represents the most exhaustive search of automobile stop studies that aligns with the purpose of these analyses.

Association results

The associative results from the 12 studies reviewed by Bolger (2014) and explored in the current study are presented in Figure 1.[3] When looking at the figure in its totality, the bulk of the studies (n = 9, 75%) found that racial minorities are more likely to be searched during their encounters with law enforcement.[4] Although this is consistent with the prior research, studies published in the last five years appear to be less consistent with this finding. The appearance of racial disparity and its somewhat recent dissipating effects may be attributable to the final and often most difficult to prove causal issue: spuriousness.

Spuriousness

A spurious relationship exists when two factors are associated but the relationship is non-causal because a third and unobserved factor, often referred to as a confounding factor, is responsible for the association. To establish that a relationship is nonspurious, researchers

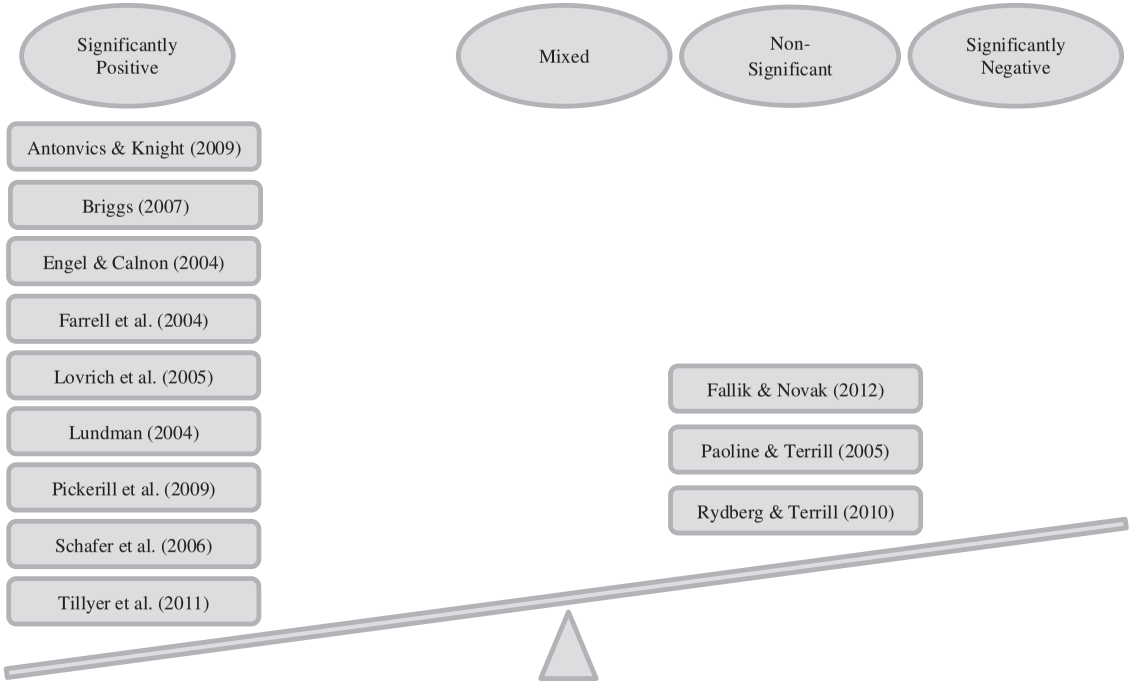

Figure 1. Associative research results on racial minority likelihood of being searched.

must eliminate rival explanations and/or hypotheses. Engaging in falsification, as it is also known, is a difficult task because officer decision-making is not unidimensional. In an attempt to disentangle these effects, researchers have employed a variety of analytical strategies.

Analytical strategies and theoretically derived confounding factors

The most basic analytical strategy found among racial profiling studies are bivariate analyses. The explanatory power of bivariate analyses is limited because within unit differences may confound the results. To this point, Withrow (2006) insisted that bivariate analyses 'cannot be used to infer or predict and generally cannot account for intervening causes of police behavior' (p. 193).

Although a limitless number of factors may contribute to an officer's decision-making, the inclusion of additional variables in multivariate models is only as good as their explanatory value because the inclusion of irrelevant factors does not provide greater causal elaboration, nor does it withstand falsification challenges. Omitted influences, however, can badly bias parameter estimates and obfuscate existing but small effects. Theoretically derived confounding factors in racial profiling research have been organized according to their legal and extralegal influence in the extant literature (Lundman, 2004). Extralegal factors have been further distinguished into policing (i.e. officer and departmental influences), ecological, and situational typologies. Finally, driver, passenger, vehicle, and temporal characteristics of police-citizen encounters have also been differentiated among situational influences (see Figure 2).

The current study's coding scheme

To explore the prevalence of theoretically derived confounding factors, the variables employed by the studies found in Figure 1 were coded using the typologies found in Figure 2. To ensure classification consistency, variables from each of the studies were independently coded among two analysts. The initial coding procedure produced 89.3% coding agreement. Where differences were observed, analysts discussed and came to an agreement about how the items should be coded with 100% consistency.[5]

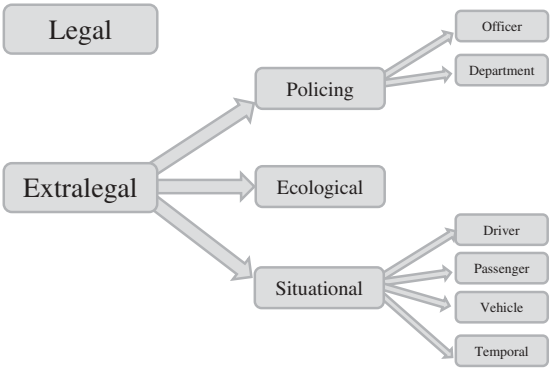

Figure 2. Organization of confounding factor typologies in racial profiling research.

Spuriousness results

There does not appear to be a relationship between the type or number of confounding factors included among these studies and the associative relationship found between driver race and the search disposition; however, the inclusion of control variables is sporadic (see Table 1). In fact, the racial profiling research observed in the current study employed on average fewer than 20 control variables ($\bar{x}$ = 19.8; not depicted) from a limited number of the nine theoretically derived typologies ($\bar{x}$ = 5; not depicted). Studies from the last 5 years of the sample tended to employ a greater number of variables ($\bar{x}$ = 21; not depicted) from a wider variety of the theoretically derived typologies ($\bar{x}$ = 5.6; not depicted). Subsequent sections go deeper into the types and effects of variables employed in this body of research.

Legal

A legal variable was found in all of the studies listed in Table 1 (n = 12, 100.0%). Officers are legal actors influenced by legal forces, which explains why legal variables are often found in racial profiling literature (National Research Council, 2004). Accordingly, many researchers noted that the legal reason for a stop was the most important factor when attempting to understand automobile stop outcomes because the cause of the stop often dictates the scope of discretion afforded to officers (Engel, 2008).

Investigatory stops, for example, function as part of a continuing investigation and are encounters where the driver, passengers, vehicle, or combination of some or all entities is known to police. In an investigatory stop, police may encounter someone who has not violated a traffic law but fits the description of a suspect, witness, or vehicle involved in a crime. These stops are an example of proactive policing and, are, therefore, qualitatively different in their presumed presence of racial bias. Traffic stops, for example, may be presumed to be racially neutral (see the 'Temporal Order' subsection), while investigatory stops may not. Even though investigatory stops may be initiated with different knowledge of the driver's race, hypothetically, their post-stop dispositions should be absent racial disparity if selection bias, which occurs during the stops' initiation, is controlled. Unfortunately, this type of sampling error is often overlooked by many racial profiling researchers.

Perhaps equally important to the cause of the stop is the inclusion of factors relating to the offense severity and the quantity of evidence against the citizen. Engel and Calnon (2004) and Withrow (2006) report that as the severity of the offense and/or the amount of evidence of wrongdoing increases, officer discretion decreases and procedural/departmental policies become more influential on an officer's decision-making. As such, legal factors are critical to understanding officer use of discretion. Substantively, without considering the legal conditions of automobile stops, the influence of citizen race may be obscured. In Table 1, however, there is no a pattern with the presence, number, or type of legal variables employed and the associative relationship observed between citizen race and the search disposition.

Extralegal

Turning now to non-legal factors: there are three distinct types of extralegal factors (i.e. policing, ecological, and situational) identified in the racial profiling literature.

Table 1. The number of variables observed from each variable typology among racial profiling studies estimating the officer decisions to search the driver, vehicle, passengers, or a combination of some or all three entities.

				Extralegal									
				Policing			Situational						
Article	Sample size	Race association	Legal	Officer	Department	Ecological	Driver	Passenger	Vehicle	Temporal	Additive	Other	Total
Antonvics and Knight (2009)	70,652	Positive	1	1		1	6			1			10
Briggs (2007)	9989	Positive	3			9	5				15		32
Engel and Calnon (2004)	19,277,002	Positive	7	2		2	8	1			2	2	24
Farrell, McDevitt, Bailey, Andersen, and Pierce (2004)	442,873	Positive	1			1	4	1		3			10
Lovrich et al. (2005)	1,102,529	Positive	1	2		2	8			1			14
Lundman (2004)	7034	Positive	7	4		4	9	2			7		33
Pickerill et al. (2009)	677,514	Positive	1	6		8	6			1	9		31
Schafer et al. (2006)	61,037	Positive	3				3						6
Tillyer et al. (2011)	43,707	Positive	7	5		3	7	1	2	3	1		29
Fallik and Novak (2012)	4569	Non-Significant	6			1	6			1			14
Paoline and Terrill (2005)	549	Non-Significant	3	5		1	5						14
Rydberg and Terrill (2010)	3356	Non-Significant	6	6	1	1	6					1	21
Total		n = 12	46	31	1	33	73	5	2	10	34	3	

Policing. Each encounter brings together people from unique backgrounds and policing variables suggest that these encounters may differ across officer and departmental characteristics (Batton & Kadleck, 2004).

Officer. Two thirds (n = 8, 66.7%) of the studies found in Table 1 evaluated the race, ethnicity, gender, age, years of service, and/or educational achievement of the officer involved in the search. The National Research Council (2004), on this topic, reported that officer variables tend to yield mixed, insufficient, or no influence on officer decision-making. This sentiment is echoed by the studies found in Table 1 (not depicted). Furthermore, the inclusion, number, or type of officer-related factors does not appear to influence the associative relationship observed between the driver's race and the search disposition.

Departmental. In addition to officer characteristics, differential departmental priorities may influence the types of persons encountered by law enforcement. To this point, organizational theorists posit that the actions of the individual officer are a reflection of formal and informal policing policies (Crank & Langworthy, 1992). Batton and Kadleck (2004), for example, contended that researchers should consider the department's mission as it impacts 'the time, energy, and resources allotted to various aspects of law enforcement' (p. 50). Within this context, it is highly likely that departmental tools, like 'hot spot' and 'problem-oriented' policing, will differentially impact officer deployments. In this example, disparity may result from more time spent in minority communities and not individual officer animus (Alpert et al., 2007). Departmental factors suggest that racial disparity – if it exists – is a 'blue' issue. Unfortunately, nearly all of the studies in Table 1 failed to consider departmental characteristics as a confounding influence upon officer decision-making (n = 1, 8.3%)[6] and, thus, it remains largely unclear how departmental priorities impact officer decision-making.

Ecological. Ecological factors have also been found to influence an officer's decision-making. While most of the studies found in Table 1 employed at least one ecological variable (n = 11, 91.7%), there was little consistency in the types of variables utilized and only two variables were used in multiple studies: street type and community characteristics. Relating to street type, police-citizen encounters on highways are typically the result of a traffic violation. Alternatively, surface streets provide an extra opportunity for community engagement. As a result, researchers expect officer discretion to be different in these context.

Likewise, police discretion may vary based on community characteristics. The variables used to measure community contexts tend to overlap with the measures found in social disorganization and collective efficacy research (e.g. Sampson, Raudenbush, & Earls, 1997). Unfortunately, racial profiling research has yet to fully understand how communities influence officer decision-making. Klinger (1997), for example, reported that officers working in higher crime communities are more lenient with their enforcement practices than their peers in lower crime communities. Though he attributed differences to policing factors, his ecological theory of police responses to deviance suggests that the brink of police use of authority is distinguished by community crime levels and not the racial identity of citizen who has been stopped or racial composition of the community.

While Klinger's (1997) results are somewhat racially neutral, the theory of contextual attentiveness suggests something different. Withrow (2006) reported that officers may act 'differentially attentive toward individuals or behaviors that appear inconsistent with predetermined conceptualizations' (p. 127). An officer's suspicion becomes heightened, Withrow (2006) noted, when a citizen's racial identity is inconsistent with the neighborhood context in which he or she is found. Race 'out of place' policing, as it is more commonly known, is most evident when a Caucasian citizen is encountered in a predominantly Black neighborhood or when a Black citizen is encountered in a predominantly Caucasian neighborhood. Unfortunately, the extant literature provides mixed evidence of this phenomenon (Meehan & Ponder, 2002; Novak & Chamlin, 2008). In any case, failure to include ecological factors may inflate the influence of citizen race on automobile stop dispositions. In Table 1, however, there does not appear to be a pattern between the inclusion, number, or type of ecological factors employed in racial profiling research and the associative relationship found between the driver's race and the search disposition.

Situational. The final type of extralegal variables found in the racial profiling literature are situational. Situational factors are important to officer decision-making because, like the theory of contextual attentiveness, officers may perceive some drivers, passengers, vehicles, and/or temporal factors with greater suspicion.

Driver. All of the research found in Table 1 (n = 12, 100.0%) included some demographic information on the driver being searched, including the driver's race, ethnicity,[7] gender, and age; however, more rigorous racial profiling analyses have included the driver's socioeconomic status (SES), educational achievement, and demeanor. Similar to racial minorities, ethnic minorities, males, younger citizens, citizens of lower SES, and persons with low educational achievement tend to be overrepresented at every stage of the criminal justice system and, as a result, the presence of these driver characteristics may independently influence officer decision-making. On the issue of driver demeanor, many researchers believe that disrespectful citizens are more likely to receive punitive sanctions during their encounters with police. The studies found in Table 1 fail to support this contention as none of the studies observing citizen demeanor (n = 3) found significant associations with the search disposition (not depicted). Furthermore, there does not appear to be a relationship between the inclusion, number, or type of driver variables and the associative relationship between the driver's race and the search disposition.

Passengers. Passengers are equally susceptible to racial profiling and require the same due diligence in data collection and analyses. More specifically, Withrow (2006) suggested that the number of occupants in the vehicle and their demographic characteristics may be as critical as driver characteristics in understanding officer decision-making. Although information about drivers are found in most racial profiling studies (see Table 1), researchers have poorly accounted for their passengers (n = 4, 33.3%). In fact, the only time that passengers were accounted for among the identified studies was if there were passengers in the vehicle at the time of the police–citizen encounter. None of the studies included demographic information for passengers and, therefore, it remains largely unclear on how passenger characteristics impact officer decision-making.

Vehicle. The vehicle transporting the driver and passengers is an outwardly visible factor vulnerable to bias according to some researchers. Batton and Kadleck (2004) asserted that vehicle characteristics, such as make, model, color, year, and modifications, may influence officer decision-making. Two vehicle factors were examined in the sample by Tillyer, Klahm, and Engel (2011): vehicle age and the presence of a vehicle defect. The vehicle's age was unrelated to officer decision-making but the presence of a vehicle defect increased the likelihood of a search (not depicted). Vehicle defects provide legal grounds for officers to initiate a stop if the defect poses a safety concern for motorists; however, an officer's decision to conduct a search should not be influenced by vehicle defects. Unfortunately, this finding was beyond the scope of Tillyer et al.'s (2011) objectives and was not discussed further. The overwhelming majority of these studies, however, did not estimate vehicle effects (n = 1, 8.3%) and, therefore, their influence on officer decision-making remains unknown.

Temporal. Temporal factors consider when a police-citizen encounter transpired. The only reoccurring temporal factor found in Table 1 was based on the time of day the contact took place (i.e. day vs. night). Although the majority of stops are made during daylight hours, Barnum and Perfetti (2010) reported that younger officers often work nightshifts and are more likely to make arrests during their encounters with citizens. As such, there may be a confounding organizational influence on time of day observations. Other temporal considerations found among the studies in Table 1 included the day of the week (i.e. weekday vs. weekend), enforcement quota periods, and seasonal/weather effects (e.g. rainy vs. sunny days). Temporal factors tended to be underrepresented among the studies found in Table 1 (n = 6, 50.0%), which has also relegated their influence on officer decision-making unclear.

Additive probabilities

Finally, the presence of multiple risk factors may produce stronger associative results. It may be, for example, that citizen race is a nonsignificant predictor of officer decision-making. Separately, it may be determined that citizen age does not predict officer decision-making; however, persons who are both Black and under the age of 21 may be statistically more likely to be searched. Interaction variables, or additive probabilities as they are also known, demonstrate the complexity of police-citizen encounters. Interactive factors were utilized in five (41.7%) of the studies found in Table 1. Every study that considered additive probabilities combined driver race with other driver risk factors, such as age and gender. The inclusion of interaction variables tended to increase the likelihood of a significant associative result between the driver's race and the search disposition; however, this was not an absolute finding among the sampled studies and, therefore, warrants further exploration.

Discussion

National media coverage of police use of force against racial minorities has caused many to question the efficacy of law enforcement practices. To assuage fears of racial profiling, departments across the nation began collecting and disseminating explorations into law enforcement practices. Unfortunately, quantitative inquiries into automobile stop data have

been plagued by methodological issues. This has done little to reassure citizens that law enforcement decision-making is transparent and procedurally fair. To inform the next generation of racial profiling scholarship, the current study deconstructed this body of literature through a causal lens. The causal question of racial profiling was first contextualized as disparity among aggregates of police–citizen encounters. Among potential data sources, researchers have further honed their efforts onto three officer-initiated and highly discretionary decision-making points in automobile stop encounters, including the decision to (1) initiate a stop, (2) conduct a search, and (3) apply a sanction.

This manuscript then presented these dispositions among the three criteria of causality: temporal order, association, and spuriousness. The logical consistency of two temporal ordering issues were discussed. First, many officers do not know the racial identity of the persons they have stopped (Alpert et al., 2007). Citizen race, therefore, is temporally inconsistent with research aimed at an officer's decision to initiate an automobile stop. Additionally, Withrow (2006) reported that the temporal ordering of the search and sanction dispositions are rarely specified in automobile stop data. This has relegated racial profiling research to be measured cross-sectionally, which is inconsistent with the officer decision-making process. The second criteria of causality (i.e. association) was distinguished in the current study from news media incidents and attitudinal research by evaluating the associative relationship between citizen race and the search disposition among systematically identified studies. Three-quarters of the studies sampled (n = 9, 75.0%) found that racial minorities were more likely to be searched by police (see Figure 1) but this relationship has somewhat dissipated among more contemporary studies due to the inclusion of a growing number and variety of theoretically derived confounding factors (see Table 1). Although studies published in the last half decade of the sample appear to be doing a better job at combating spuriousness, independent coding of theoretically derived confounding factors found that their inclusion in multivariate models is erratic as departmental, passenger, vehicle, and temporal considerations were nearly non-existent among the sampled studies.

Inherent barriers and policy implications

Based on these results and a reading of the available empirical literature, two barriers are inhibiting a greater understanding of the etiology of the racial profiling phenomenon: (1) narrowly constructed analytical strategies and (2) static secondary data analyses.

Narrowly constructed analytical strategies

Although the prior racial profiling literature has contributed greatly to initial understandings of the etiology of officer decision-making, we now know that their analytical strategies produce poor causal validity. Researchers, for example, have employed several benchmarks to estimate the driving and/or traffic offending population but none have compared how they impact automobile stop dispositions. Furthermore, studies employing multivariate modeling techniques have weakly attempted to eliminate spuriousness. Where suitable controls are lacking, recent innovations in causal effect estimations, such as propensity score matching, weighting, marginal meaning weighting, and instrumental variable estimators have been neglected by researchers. Even when adequate controls exist, many studies have not observed between unit differences in organizational

and community characteristics, as is proposed by organizational theorists and the theory of contextual attentiveness. This is unfortunate, given the availability of hierarchical modeling techniques that can account for these structural relationships.

Researchers have also been remiss in modeling the decision-making process. This is problematic because cross-sectional observations of officer decision-making may be misleading. Novak (2004), for example, found that minority drivers were more likely to be stopped by police but were no more likely to be sanctioned. Given the previous temporal ordering discussion and null findings with regards to the sanction disposition, Novak (2004) could have dismissed racial disparity among these police-citizen encounters; however, by considering these dispositions together, he was able to draw anecdotal conclusions about the officer decision-making process. Novak (2004) hypothesized that officers use minor traffic violations as a pretext to stop racial minorities more frequently, but with few stops producing legal grounds for a formal sanction, many racial minorities are released with only a warning.

The conclusion to be drawn from Novak (2004) is that post-stop dispositions always involve some selection bias, whereby the population that is searched or sanctioned is always preselected to be stopped. Although citizen race may not directly influence a stop's initiation, it may be confounded in other factors that do. Modeling the decision-making process, therefore, requires researchers to collect data that distinguishes the temporal order of post-stop dispositions and allows them to estimate selection bias that can occur during a stop's initiation. Selection and structural equation modeling can be used to control for such biases, whereby officer decision-making points are controlled and/or measured simultaneously. Unfortunately, the decision-making process has yet to be modeled in racial profiling research.

Static secondary data analyses

In addition to narrowly constructed analytical strategies, racial profiling researchers typically make use of data that are collected by law enforcement for other purposes. Researchers select available data for a variety of reasons, including the lack of resources to conduct original data collection. The problem with this custom is that available data do not directly address the research questions being proposed by racial profiling researchers and, thus, are limited in their ability to engage in falsification. Given this predicament, much of the aforementioned racial profiling research suffers from specification error, which 'is a term used to describe situations in which multivariate models are misspecified due to [… the] inclusion of erroneous variables and/or the exclusion of unobserved variables' (Engel, 2008, p. 11).

For our purposes, specification error causes two issues. First and foremost, it threatens our ability to draw associative inferences about race and officer decision-making because the observed associative relationships may be due to one of the many unobserved theoretically derived confounding factors discussed in Figure 2. Furthermore, specification error impacts statistical conclusion validity. When theoretically derived confounding factors are omitted from multivariate models, the weight of observed factors is likely inflated by unexplained variance. Most of the multivariate models in Figure 1, for example, had goodness of fit indices that fell far below chance (not depicted).

Perhaps the most concerning element of racial profiling's academic-practitioner arrangements is the lack of adjustment. Simply put, knowledge on the etiology of officer

decision-making has outgrown available data collection methods, yet many data collection strategies have not evolved. A push needs to be made to make use of our existing knowledge to better inform methodologically conceived and executed research studies. At a minimum, this would require evolving data collection instruments and ongoing collaborations with a host of stakeholders, including law enforcement, researchers, legislators, city/state executives, and community advocates.

Limitations and areas of future research

Racial profiling researchers have an ethical responsibility to identify and communicate the explanatory limits of their findings. That burden falls equally upon these analyses. First, the discussion of automobile stop temporal ordering was nonsystematic. Temporal ordering is best assessed informally by evaluating the logical consistency of an events timing. With regards to associative and spuriousness analyses, the studies under review in the current study were systematically analyzed but do not represent an exhaustive list of racial profiling research. This was due in part to Bolger's (2014) omission of more recent studies without sufficient statistical information. Although the exclusion of the latter studies was pertinent to his meta-analysis, this sampling criteria was beyond the scope of the current study. Nevertheless, a cursory search for omitted studies suggests that they do not differ from those that were included in Figure 1 and Table 1. Additionally, many of the omitted studies that lacked sufficient statistical information would have been excluded in the current study because they were not multivariate analyses, which was critical to assessing how researchers have eliminated rival hypotheses. Finally, it may be more appropriate for conclusions based on the stop initiation and sanction dispositions to be drawn from additional research that explores association and spuriousness results among those outcomes. Neighborhood characteristics, for example, may be of critical importance during the initiation of a stop but inconsequential to post-stop dispositions. This will allow scholars to triangulate their results among a host of findings and better inform our understandings of racial profiling.

Conclusion

The answer to the causal question of racial profiling remains largely elusive because researchers have failed to make a causal connection between citizen race and officer decision-making. While automobile stop data has been able to establish some consistency in the associative relationship between citizen race and officer decision-making, temporal order and spuriousness issues continue to plague racial profiling research. More specifically, stop initiation research tends to be temporally inconsistent with officer decision-making and post-stop dispositions are rarely specified in automobile stop data. Additionally, specification error has constrained our ability to fully engage in falsification, as researchers rarely estimate departmental, passenger, vehicle, and temporal factors that can influence officer decision-making. Narrowly constructed analytical strategies and a heavy reliance on static secondary data analyses continue to perpetuate these issues. In order to advance this field of inquiry, researchers should engage in primary data collection and work with stakeholders to amend current data collection procedures based on existing knowledge of officer

decision-making. Furthermore, researchers should explore recent statistical innovations in their analytical strategies. Addressing these methodological issues will advance our understandings of racial profiling, ground our theoretical understandings of the driving while Black phenomenon in reality, and provide citizens with the procedural justice transparency that they demand.

Notes

1. Though 'race' is used throughout this manuscript, this is not to imply that the differential treatment of ethnic minorities is any less important. Rather, these terms are equally relevant to this text.
2. This should not be misconstrued, however, as delegitimizing community perceptions, which are often symptomatic of citizen assessments of procedural fairness (Tyler & Wakslak, 2004). Rather, the point here is to highlight the methodological gap between citizen perceptions and the reality of racial profiling.
3. Paoline and Terrill (2005) and Rydberg and Terrill (2010) were among the 12 studies identified by Bolger (2014). These studies, however, employ the same Project on Policing Neighborhoods data. Accordingly, the weight of these studies in these analyses may be overestimated. It is also worth noting that three-quarters of these studies were from peer review journals, while two were retrieved from technical reports, and the final was observed in a dissertation.
4. Figure 1 does not account for variations in methodological rigor. Nevertheless, racial disparity among all these endeavors was characterized as significant covariation between racial minority status and the search disposition at the $p<.05$ significance threshold or greater.
5. Three variables were categorized as 'Other' because they did not easily fit into an officer decision-making typology.
6. The lone exception to this statement, Rydberg and Terrill (2010), accounted for the number of officers on the scene of the police-citizen encounter.
7. The operationalization of the driver's race and/or ethnicity has lacked consistency in this field of inquiry. Some studies have identified all minority drivers and compared them to white drivers, while other research has parsed the data further to understand individual groups of minorities (e.g. Asians, Blacks, Hispanics, Whites).

Disclosure statement

No potential conflict of interest was reported by the author.

Notes on contributor

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