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Jessica Huff

University of Nebraska at Omaha, jessiehuff@unomaha.edu

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Understanding police decisions to arrest: The impact of situational, officer, and neighborhood characteristics on police discretion

Jessica Huff

School of Criminology and Criminal Justice, University of Nebraska at Omaha, 6001 Dodge Street, Omaha, NE 68182, United States of America

ABSTRACT

Purpose: Promote the use of multilevel modeling to refine theories of police discretion. Specifically, examine the simultaneous influence of situational factors, responding officers, and neighborhood context on arrests guided by a social-ecological framework.

Methods: Cross-classified models were used to assess the outcomes of 835,381 incidents responded to by 835 Phoenix Police officers in 388 census tracts.

Results: Situational, officer, and neighborhood factors all significantly influence arrests. Incident-level factors account for most of the variation, followed by officers, and neighborhoods. Incidents that resulted in arrest were more likely to involve victims, a greater number of responding officers, female officers, and college-educated officers. Arrests were more likely to occur in Hispanic and Black neighborhoods, even when controlling for situational and officer-level characteristics. Arrests were less likely to occur when officers were assigned to high crime precincts.

Conclusions: Multilevel models enable a comprehensive examination of police use of arrest using administrative data that are already being collected by police agencies. Through accounting for both officer and neighborhood-level influences, this strategy improves on prior theory testing in policing research. The results support elements of some theories, but conflict with others. These findings have important implications for police policies surrounding arrest and resource deployment.

Keywords:

Arrest, Police, Discretion, Officer decision-making, Multilevel modeling, Theory

There are so many types of policing, so many ways a day can be spent, and so many different quirks and oddities that thinking systemically seems impossible. On any patrol, an officer might be in a city or a rural desert, arresting a murderer or delivering a baby, saving a life or taking one. Because of the randomness,

policing remains localized and largely unexamined by data-driven systems. (Ferguson, 2017, p. 162).

The police role in society is complex. As noted by Ferguson (2017), officers are expected to respond to a wide variety of incidents that occur in diverse contexts. As a result, policing as a profession is defined by the high levels of discretion officers have to address the situations they encounter. "The fact, of course, is that the police always have some choice in any situation" (Brown, 1988, p. xiii), with this ability to choose among a set of alternative options referred to as discretion. The choices available to officers enable them to determine when, how, and where to enforce laws and maintain order, rendering police use of discretion a key decision point in the criminal justice process.

Policing scholars have proposed several theories to explain police use of discretion, but few have been fully tested. Some theories were hypothesized to explain broad concepts, like the application of the law (Black, 1976, 1980) or police use of vigor (Klinger, 1997), while others were designed to explain specific police behaviors, such as misconduct (Kane, 2002). These theorists also incorporate elements operating at multiple levels of explanation, including situational characteristics, officer-level factors, neighborhood structure, and organizational context. However, many policing researchers who examine variation in police use of discretion focus on a single level of explanation, often inhibiting a full theoretical assessment. Most research has examined the characteristics of individual incidents or responding officers (Riksheim & Chermak, 1993; Sherman, 1980). Those researchers who have examined factors operating at multiple levels of explanation generally examine incidents nested within officers or incidents nested within neighborhoods, and do not account for the influence of variables at all three of these levels of explanation. This is a notable limitation given theoretical expectations that the same officers might respond to similar incidents in different ways depending on neighborhood context (e.g., Herbert, 1997). As a result, using more appropriate methodological approaches to assess police use of discretion has important implications for refining policing theories. These considerations also have ramifications for policymakers tasked with hiring and training police officers and ensuring equitable policing in different types of neighborhoods. Namely, understanding whether discretion is being used appropriately by individual officers and in individual neighborhoods has important implications for guiding police policies.

The use of cross-classified multilevel models can improve our understanding of the factors that influence police use of discretion, thereby improving theory testing in policing. Using cross-classified models produces robust estimates that account for a level of nuance in police encounters that have previously only been captured using systematic social observation. While observational methodologies have been instrumental in advancing scholarly understanding of the application of police discretion, these studies are often cost prohibitive and collecting enough data using these methodologies to conduct appropriately powered analysis is challenging. By using

administrative data that are already being collected in police agencies, in addition to US Census data, it is possible to capture information about the individual incident, the responding officer, and the neighborhood context that an incident occurs within for a large number of police-civilian interactions for relatively low cost. As an example of the proposed strategy, I use data collected from the Phoenix Police Department to examine officer decisions to arrest. Specifically, the current study uses cross-classified models to assess the impact of numerous situational factors, officer characteristics, and neighborhood features on discretionary arrests guided by a social-ecological framework of police decision-making grounded in Klinger's (1997) negotiating order in patrol work perspective.

1. Literature review

Police use of discretion was first broadly acknowledged in an American Bar Foundation study conducted in the 1950s. That study revealed that officers exercise discretion routinely as they encounter complex and varied situations involving both criminal and noncriminal incidents (Beckett, 2016; Goldstein, 1993; Walker, 1993). The use of discretion to resolve incidents has been deemed necessary because it would be impossible for officers to fully enforce every law (Bayley & Bittner, 1997; Brooks, 1997; Goldstein, 1963). Officer ability to use their discretion to select which laws to enforce, when, and against whom enables them to establish what constitutes legally acceptable behavior (Davis, 1969). Many of these early studies relied on the use of ethno-graphic methodologies to identify factors that influenced police use of discretion, resulting in the creation of several proposed frameworks for understanding police decision making.

Although multiple theoretical frameworks have been created to explain police use of discretion, prior research has not fully assessed these models. This has resulted in some criticism that police research is atheoretical (Engel, Calnon, & Bernard, 2002; Riksheim & Chermak, 1993). For example, Sherman (1980) argued that studies of police behavior generally fall into five levels of explanation – individual (i.e., civilian and officer-level characteristics), situational (i.e., features of the specific incident being addressed), organizational (i.e., characteristics of the police agency), community (i.e., the structural conditions of the area), and legal (i.e., procedural and legal guidelines) – but he cautions that none of these approaches can be considered as theories of policing in and of themselves. Further, of the theoretical models that do exist, some operate primarily at one level of explanation while others suggest that factors operating multiple levels of explanation influence officer use of discretion.

The lack of rigorous theory testing to better understand police decision making is likely due to the complexity of these perspectives, which requires accounting for a multitude of factors. As a result, the potential for omitted variables bias is a commonly noted limitation in policing research, with scholars regularly promoting the use of systematic social observation to more fully assess police-civilian contacts. Unfortunately, observing a large enough number of police-civilian contacts to attain sufficient statistical power is often cost prohibitive and infeasible due to associated

resource constraints. As a result, much of the policing research relies on administrative data collected within police agencies for their own purposes. Though administrative data are subject to their own criticisms (e.g., potential for inaccurate reporting), these data are readily available and can include numerous relevant explanatory factors about a large number of police-civilian contacts. As a result, when systematically collected and organized, these data can enable sophisticated examinations of police behavior. Advances in statistical modeling approaches can additionally be used to maximize the utility of administrative data to assess complex theoretical models that attribute variation in police behavior to factors occurring at multiple levels of explanation. For instance, researchers are increasingly estimating multilevel models to examine police discretion (e.g., Terrill & Reisig, 2003; Tillyer, Smith, & Lloyd, 2019).

Given the police role as gatekeepers for the criminal justice system, the manner in which police discretion is used has substantial implications. As a result, enhancing current knowledge about the factors that influence police use of discretion and refining existing policing theories is imperative. Studies examining officer use of discretion often assess behavioral outcomes, with police decisions to arrest being one of the most influential decisions in the criminal justice process (Bittner, 1967; Goldstein, 1963; Walker, 1993). This section discusses the importance of examining arrests and then reviews officer-oriented, social-ecological, and multilevel theories of police use of discretion, with particular attention to the application of these theories for understanding police decisions to arrest. This sets the stage for the current study, which examines discretionary arrests guided by Klinger's (1997) negotiated order perspective to provide a more comprehensive assessment of factors that influence these decisions.

1.1. The importance of arrests

Though legal guidelines establish when and how officers can conduct arrests, officers retain a considerable amount of discretion when making arrest decisions (Walker, 1993). Arrests generally fall into one of two categories, those that are mandated by law or department policy and discretionary arrests in which responding officers can choose to conduct an arrest or to resolve the situation using another alternative. In the case of mandatory arrests, officers are required to conduct an arrest due to the presence of a warrant, through witnessing the individual committing a serious offense, or when an incident involves an offense type that results in automatic arrest (e.g., domestic violence). However, the vast majority of police-civilian contacts involve less serious offenses with ambiguous evidence (Engel et al., 2019). In these cases, officers might choose to conduct a discretionary arrest, or they might not. Because officers cannot write citations and conduct arrests for every violation they witness (Lipsky, 1980), some have argued that the practicality of full enforcement is a stronger determinant of police action than laws (Bittner, 1967). In fact, many improper uses of officer discretion involve nonenforcement, though selective enforcement (i.e., enforcing laws in different ways depending on the characteristics of the violation and the individuals involved) is a more serious problem (Davis, 1969). Arrests are associated

with notable collateral consequences for arrestees, such as missed school, loss of work, and can even culminate in psychological consequences for impacted individuals (Engel et al., 2019; Jashnani, Bustamante, & Stoudt, 2020). Some researchers have additionally found that the factors that contribute to discretionary arrests differ from those that do not involve discretion. For instance, one study found that suspect race and neighborhood socioeconomic status predicted arrests in incidents without complainants, but were insignificantly related to arrests in incidents with a complainant (Smith, Visher, & Davidson, 1984). As such, discretionary arrests could be subject to more extralegal influences than mandatory arrests, highlighting the importance of understanding factors that contribute to discretionary arrests in particular.

Arrests are strongly influenced by the characteristics of the situation to which an officer is responding. Offense severity is a consistent predictor of arrest (Black, 1980; R. A. Brown & Frank, 2006; Buvik, 2016; Smith & Visher, 1981; Sobol, 2010), with officers being more likely to conduct arrests for more serious offenses. It is also important to consider whether a police-civilian encounter was initiated by the civilian or the officer. Officer-initiated activities are subject to lower levels of organizational oversight than responses to civilian requests for service. However, the manner in which a contact is initiated has an unclear influence on arrest (Smith & Visher, 1981). The number of officers present at an incident could also impact the likelihood of an arrest. Incidents involving more than one responding officer have multiple witnesses, which could encourage more legalistic officer behavior. A higher number of responding officers could also be indicative of a more serious event. As such, numerous situational considerations could influence the likelihood of an arrest during an individual police-civilian contact. These situational elements have also been incorporated in some officer-oriented and social-ecological theories of police decision-making, as noted in Table 1.

1.2. Officer-oriented theories of police discretion and arrest decisions

Some theories of discretion explain police decision-making as the result of individual officer attitudes and demographic characteristics. It has been well-established that individual police officers approach their responsibilities differently, with these varied approaches having important implications for police use of discretion (Brooks, 1997; Muir, 1977; Paoline, 2004). Based on fieldwork conducted in the Los Angeles Police Department, Herbert (1997) argued that policing is oriented around six normative orders: law, bureaucratic regulations, adventure, safety, competence, and morality. Law is central to policing because officers are expected to enforce laws. Bureaucratic regulations establish the guidelines officers need to follow to perform their law enforcement function. Adventure emphasizes the courage that officers display as they respond to serious offenses. Safety is a constant concern because police officers interact with criminals. Competence is an officers' ability to effectively assert their authority and earn respect from both civilians and fellow officers. Finally, morality is centered around the police definition of themselves as 'the good guys' and suspects as 'the bad guys'. Herbert (1997) found that individual officers placed different emphasis on

each of these orders, and that the same officers even ranked the importance of these orders differently depending on the characteristics of the specific situation to which they were responding and the context in which the situation was taking place. As such, his perspective operates largely at the officer level, but does incorporate both situational and neighborhood elements.

Other theoretical perspectives emphasizing the influence of officer characteristics also incorporate factors operating at several levels of explanation. In his seminal work, Black (1976, 1980) argued that the behavior and application of the law varies in relation to the social standing of the law enforcers (officers), the civilians who invoke the law (victims), and the civilians the law is invoked against (suspects). One of the major contributions of his work is the proposition that law varies in quantity, with some actions constituting more law than others. For example, arrest involves more law than no arrest. Black (1976, 1980) further argued that the law is usually applied in a downward direction. This means that those of higher social standing are more able to invoke the law, that law enforcers are more likely to apply the law against those of lower social standing than themselves, and that laws will be more strictly enforced in low status neighborhoods. Thus, a full examination of Black's (1976, 1980) sociological theory of law requires accounting for the characteristics of the officer who responds to an incident, the civilians involved in a situation, and the neighborhood context that the police-civilian contact occurs within.

Although researchers have not fully tested the applicability of either Herbert's (1997) or Black's (1976, 1980) perspectives for explaining arrest decisions, prior research confirms the importance of accounting for the influence of officer-level characteristics. For instance, early policing scholars found that an officers' occupational outlook influences their use of arrest (M. K. Brown, 1988; Muir, 1977). Officer demographic characteristics have also been associated with their arrest behaviors. Some researchers have found that white officers were more likely to conduct arrests than their Black counterparts (R. A. Brown & Frank, 2006), though others have found that officers are more likely to arrest members of their own racial/ethnic group (Mbuba, 2018). A study that examined the impact of the racial composition of a police department on arrests found that increases in the number of minority officers increased white arrest rates while increases in the number of white officers increased minority arrest rates (Donohue III & Levitt, 2001). In a study examining the impact of officer gender on arrest, Novak, Brown, and Frank (2011) found that male and female officers consider different factors when conducting arrests. For instance, females were more likely to arrest non-deferent suspects than male officers, a finding the authors attributed to female officers experiencing additional pressure to establish competency in their interactions with suspects (Novak et al., 2011). In terms of educational attainment, some researchers have found that more educated officers were more likely to conduct discretionary arrests (Rosenfeld, Johnson, & Wright, 2018), though others have found no association between education and arrest (Rydberg & Terrill, 2010).

TABLE 1: Theories of police discretion

Theory	Summary	Situational influences	Officer-level influences	Social-ecological influences
Herbert's (1997) normative orders	Policing is oriented around 6 normative orders.	Orders are ranked differently depending on the characteristics of the situation (e.g., severity of the incident, presence of fellow officers as witnesses).	Individual officers place different emphasis on each normative order, resulting in variation in police use of discretion at the individual officer level.	Officers prioritize different normative orders in different types of areas (e.g., officers prioritize safety in areas they perceive as being dangerous).
Black's (1976, 1980) theory of law	The law is a quantitative variable, ranging from low to high levels.	Higher levels of law are more likely to be applied against civilians with lower social standing (e.g., racial/ethnic minorities), especially when the victim has a higher social status than the suspect.	Officers apply higher levels of law against suspects with lower social standing than themselves (e.g., white officers apply more law against Black suspects) and less law against suspects with higher social standing (e.g., Black officers apply less law to white suspects).	Officers apply higher levels of law in areas populated with individuals of lower social standing (e.g., neighborhoods with large minority populations and low socioeconomic status).
Klinger's (1997) negotiated order perspective	Police use of vigor depends on a combination of ecological and organizational factors, in addition to the characteristics of individual incidents.	Officers use higher levels of vigor to address more serious offenses.	Officers are part of workgroups that influence their use of vigor. Officers assigned to workgroups in high crime areas are more cynical about the utility of vigorous enforcement.	Officer use of vigor depends on the levels of deviance in their assigned organizational unit. Officers in high crime neighborhoods respond less vigorously because they do not have the resources available to vigorously respond to every incident.

Officer job-related experiences have also been associated with arrests. Some researchers have found that officers with fewer years of experience are more likely to resolve situations in accordance with civilian requests, including through the use of arrests (Mastrofski, Snipes, Parks, & Maxwell, 2000). Others have found that officers with fewer years of service conduct more arrests than more experienced officers in general (Bonkiewicz, 2017). However, Brown and Frank (2006) found that although less experienced Black officers were more likely to conduct arrests than their more experienced counterparts, there was no relationship between years of service and arrest for white officers. Officers also have different attitudes and orientations toward their role depending on the norms and expectations in their organizational workgroups (Ingram, Paoline, & Terrill, 2013). As such, it is important to account for organizational assignments when examining behavioral outcomes.

In short, prior research highlights the importance of accounting for the influence of individual police officers when examining arrests. However, this body of work does not explicitly test or provide conclusive support for prior theories of discretion. This could be attributed to the fact that both Herbert (1997) and Black (1976, 1980) additionally implicate situational and community characteristics in their proposed frameworks. As a result, the use of multilevel models in general, and cross-classified models specifically, could more fully test their theoretical propositions through accounting for all of the relationships they propose. Namely, cross-classified models allow for the inclusion of a random effect to account for the influence of individual responding officers on the outcomes of police-civilian contacts in different neighborhoods.

1.3. Social-ecological theories of police discretion and influences on arrest

An enduring debate in the policing research is whether identified racial/ethnic disparities in discretionary outcomes are due to biased decision making (whether implicit or explicit) or to differential concentrations of crime and police resource deployment. This has resulted in examinations of the influence of neighborhood characteristics on variation in officer use of discretion across different social-ecological

contexts. Several scholars have incorporated elements of theories designed to explain geographic variation in crime in their explanations of police behavior. For instance, the social disorganization perspective suggests that neighborhood variation in socioeconomic status, racial/ethnic heterogeneity, and residential stability impact neighborhood crime rates through neighborhood propensity for informal social control and collective efficacy (Bursik & Grasmick, 1993; Sampson, Raudenbush, & Earls, 1997; Shaw & McKay, 1942; Wilson, 1987). The police are one of the most critical forms of formal social control that neighborhood residents utilize in an attempt to control behavior (Bursik & Grasmick, 1993). As such, the principles of social disorganization have been used to promote changes to police practices. In their seminal piece, Wilson and Kelling (1982) suggested that the police should emphasize eliminating disorder in order to reinforce informal social control in neighborhoods on a tipping point of becoming high crime, thereby implicating the use of arrests to achieve these goals.

Social control theories have also been used to explain police behavior. In his minority threat perspective, Blalock (1967) suggests that the police use the law to control minority populations that threaten the majority interests. As a result, the size of a minority population could influence variation in the use of arrests across demographic groups. Similarly, the defended neighborhoods perspective suggests that arrests could be used to 'defend' historically white neighborhoods from the integration of racial/ethnic minorities (Suttles, 1972). As such, arrests could be more likely to occur in neighborhoods that were predominantly inhabited by whites, but that are becoming more racially/ethnically heterogeneous, in response to a perceived invasion of white spaces by minority residents.

Although researchers have examined neighborhood influences on arrests, the findings are somewhat inconsistent across studies. Beginning with social disorganization, some researchers have found that officers were more likely to conduct arrests in poor and socially disorganized neighborhoods (Lum, 2011; Smith, 1986), others have found that officers conducted fewer misdemeanor arrests in socially disorganized areas (Johnson & Olschansky, 2010), and finally some researchers have identified no relationship between arrest and neighborhood concentrated disadvantage (Novak, Frank, Smith, & Engel, 2002; Sobol, Wu, & Sun, 2013). Turning to racial/ethnic population distributions, Kane, Gustafson, and Bruell (2013) found that increases in Black populations in historically white neighborhoods in New York City led to increased Black misdemeanor arrest rates; further, increases in the Hispanic population led to higher misdemeanor minority arrest rates in all types of neighborhoods, not just those previously dominated by white residents. In summary, prior research examining the relationship between arrest and neighborhood conditions provides mixed support for ecological theories of police discretion.

1.4. Multilevel explanations of discretion and predictors of arrests

Although many of the above perspectives implicitly incorporated explanatory factors operating at multiple levels of explanation, some theoretical perspectives have

explicitly specified these relationships in their logic models. For example, Klinger's (1997) negotiated order in patrol work perspective explains the vigor of police responses to deviance as a function of an officer's organizational and physical environment. Vigor refers to the level of formal legal authority that an officer uses to address a situation. His model involves variables at several levels of explanation, including situational, officer, organizational (i.e., district boundaries within police departments), and neighborhood characteristics, and is therefore most relevant for the current inquiry. He argues that as district-level deviance increases, both district workload and the severity of incidents that an officer responds to increase. Officer use of vigor also increases proportionately with the severity of the immediate offense. Klinger (1997) then incorporates officer beliefs. As district deviance and workload increase, an officer's perceptions of deviance increase. An officer's increased perception of deviance translates into beliefs that crime is normal, that victims are undeserving of vigorous law enforcement, and to higher levels of officer cynicism. When officers are cynical about the utility of vigorous enforcement, workgroup rules maintaining that officers should formally address deviance decrease. The final component of Klinger's (1997) model includes district resources (e.g., personnel, patrol cars). Districts with high levels of deviance experience resource constraints because officers are expected to address a large number of serious incidents. As a result, resource constraints decrease workgroup rules encouraging vigorous responses to deviance. In short, officers are less vigorous in districts with higher rates of deviance.

As implicated in Klinger's (1997) model, one of the predominant explanations for disparities in police behavior in minority neighborhoods is that the police are not responding to resident race/ethnicity, but rather to indicators of crime. This argument is based on the recognition that both crime and police activities are often geographically concentrated in lower income segments of society, which tend to have higher numbers of racial/ethnic minorities (Bittner, 1970). These explanations are sometimes referred to as differential enforcement or differential offending, with the first referring to higher levels of enforcement in minority neighborhoods and the second referring to higher levels of offending among minority populations. As a result, the police could use higher levels of law in high crime minority neighborhoods because officers are more likely to perceive the people within these neighborhoods as likely contributors to crime. Implicit bias scholars have weighed in on this argument and suggest that officers are strongly influenced by neighborhood context, with officers having initial negative reactions to dangerous areas – which overshadow the effect of civilian race/ethnicity (Fridell & Lim, 2016). They suggest that these effects ultimately result in limited disparities in police behavior in high crime neighborhoods, regardless of the racial/ethnic composition of the area (Fridell & Lim, 2016). This argument has been referred to as the context hypothesis (Correll, Wittenbrink, Park, Judd, & Goyle, 2011) and suggests that researchers should account for the strong influence of neighborhood crime on police use of discretion when considering racial/ethnic disparities in behavioral outcomes.

Prior research assessing the influence of neighborhood violence on arrests has revealed inconsistent findings. Although some researchers have found that officers were more likely to conduct arrests in areas with high levels of violence (Johnson & Olschansky, 2010; Sobol et al., 2013), these findings are not universal across studies (Novak et al., 2002). In his study, Sobol (2010) found that the higher use of officer vigor (measured on a scale from no action to arrest) in districts with higher violent crime rates disappeared when a measure of offense severity was added to the model. As such, it is important to consider the influence of both neighborhood and situational variables when examining the relationship between crime and police behavior.

Despite the recognition that the outcomes of police encounters are influenced by factors operating at multiple levels, most prior arrest research is limited to a single level of analysis. Researchers who have used multilevel modeling have often examined incidents nested in neighborhoods (Kane, 2002; Lautenschlager & Omori, 2018; Terrill & Reisig, 2003) without accounting for the officer involved in the incident. These methods are limited in their ability to explain how the relationship between responding officers and neighborhood context impacts the outcomes of individual incidents. For example, it is commonly noted that the least experienced police officers are often assigned to patrol the most dangerous precincts, typically during swing and night shift. This could culminate in problematic behavior among inexperienced officers who are immediately and repeatedly exposed to serious incidents. However, without accounting for the relationship between incident characteristics, responding officers, and the specific social-ecological context, it is not clear whether this pattern truly warrants concern and potential policy responses. The lack of multilevel research accounting for both officers and neighborhoods in understanding the outcomes of individual incidents also poses an important limitation to theory testing in the policing literature given suggestions that all of these factors contribute to police use of discretion (e.g., Black, 1976, 1980; Herbert, 1997; Klinger, 1997).

2. Current study

As the above section illustrates, numerous theories have been proposed to explain the outcomes of police-civilian encounters depending on situational considerations, officer characteristics, neighborhood context, and interactions between these factors. A full test of the applicability of any of these theories to understanding arrest decisions has not been conducted. This is likely due to the theoretical complexity of these models, which requires accounting for multiple variables from separate levels of explanation. To do so necessitates the use of comprehensive data encompassing enough police-civilian interactions to attain sufficient statistical power for multilevel modeling. Prior studies that have used multilevel models generally examine incidents hierarchically nested within officers or incidents nested within neighborhoods, without accounting for the simultaneous influence of each of these levels of explanation. The varied approaches used to assess arrests in particular have resulted in uncertainty surrounding which factors contribute to these decisions. In an effort to address this

limitation, this study uses data collected from the Phoenix Police Department to assess the simultaneous influence of situational, officer, and neighborhood characteristics on police decisions to arrest.

As indicated in the above review, many of the theories of police discretion discussed incorporate situational and officer characteristics in addition to the elements of neighborhood social disorganization, racial/ethnic population distributions, and crime. Given the complex interrelationships between these factors, I use a broader social-ecological framework including factors from each of these levels of explanation to better identify predictors of arrests guided largely by Klinger's (1997) framework. Through conducting a multilevel analysis to assess the influence of variables that commonly emerge in officer-oriented and social-ecological theories of police use of discretion, while accounting for the characteristics of the individual situation, this analysis provides useful directions for future theoretical refinement by identifying the strongest predictors of discretionary arrests. This study also has substantial practical implications through providing a comprehensive assessment of factors that influence arrest decisions, while accounting for the influence of individual responding officers and specific neighborhood context. In essence this study seeks to build on prior research which has largely focused on situational and officer-level predictors, which is a notable limitation given longstanding discussions about the influence of police deployment patterns and neighborhood structure on arrests.

3. Methodology

I examine the influence of situational, officer, and neighborhood context on arrests using data collected from the Phoenix Police Department. Phoenix is the capital and the largest city in Arizona, with a population of about 1.6 million residents spread over more than five-hundred square miles (U.S. Census Bureau, 2017). The majority of the population is white (72.6%; 44.4% non-Hispanic white), 41.8% of the population is Hispanic (any race), and 6.8% of the population is Black (U.S. Census Bureau, 2016). According to the 2016 Uniform Crime Report, Phoenix had higher violent and property crime rates than the national average: 674.39 and 3690.38 per 100,000 residents compared to 386.3 and 2450.7 per 100,000 residents, respectively (Federal Bureau of Investigation, 2016). The Phoenix Police Department is one of the largest law enforcement agencies in the nation, employing almost 3000 sworn officers across seven precincts.

3.1. Data

The data used in this study were collected as part of an evaluation of body-worn cameras conducted in six of the seven Phoenix Police Department precincts (see Huff, Katz, and Hedberg (2020) for a full description of that evaluation). For the purposes of this study, which is not to evaluate the impact of body-worn cameras, I only examine incidents that occurred in the eighteen months prior to body-worn camera deployment (11/24/15–5/23/17). Computer-aided-dispatch (CAD) data and arrest reports were

collected from the Phoenix Police Department to gather information about all police-civilian contacts and arrests. The CAD data include information about the characteristics of the interaction, such as how the contact was initiated, the type of offense in question, the officers who were involved in the contact, and the location of the event. Numerous studies of officer decision-making have relied on administrative CAD data, sometimes referred to as calls-for-service data, due to the rich information collected in these records (e.g., Engel, Smith, & Cullen, 2012; Lum, 2011; Wallace, White, Gaub, & Todak, 2018). The arrest data are used as a flag to identify those police-civilian encounters that resulted in either custodial arrests and/or a citation and release. Arrests involving warrants were excluded from the analysis due to the current focus on police use of discretion. Cases involving more than five responding officers were also removed from the analysis, given that these incidents were likely more serious incidents and involved substantially lower levels of officer discretion (less than 5% of incidents involved more than five responding officers). This resulted in a final sample of 835,381 individual police-civilian contacts.

Employee personnel data were collected from the City of Phoenix Human Resources Department to obtain officer characteristics for the 835 study officers. These administrative records include information about officer gender, race/ethnicity, age, and educational attainment. Officer job-related characteristics including precinct assignment and years of service were also collected given the potential influence of these variables on officer use of discretion.

Finally, 5-year estimates from the 2016 U.S. Census Bureau's American Community Survey were used to create measures of neighborhood structure at the census-tract level. Though census tracts have been criticized as imperfect measures of neighborhoods (Coulton, Korbin, Chan, & Su, 2001; Logan, 2012), these units are well-suited to the current study given the availability of structural data at this level (Hipp, 2007; Sampson & Groves, 1989) and the fact that police officers cross multiple census tract boundaries through the performance of their duties. The Phoenix Police Department provides police services to 388 census tracts.

3.2. Variables

A binary measure of arrest serves as the dependent variable. The arrest variable in the current study was created by merging the arrest data with the CAD data to identify those incidents that culminated in an arrest. According to the PPD Operations Orders, officers are legally allowed to make two types of arrests: arrests with a warrant and arrests without a warrant. According to PPD policy, individuals with active warrants are required to be arrested unless the arrest would pose a threat to the health and safety of the civilian, rendering these arrests largely mandatory police outcomes. Given the current focus on officer decision-making, all arrests with a warrant were removed from the data prior to analysis. In order to conduct an arrest without a warrant, officers must have probable cause to believe that a misdemeanor or felony has been committed, the officer must have witnessed the misdemeanor or felony offense, or an

officer might conduct an arrest pursuant to a traffic accident investigation. Individuals arrested for a misdemeanor offense are not required to be booked into jail and can instead be cited and released with the understanding that they must appear in court at a later date. Unfortunately, the data do not identify whether an individual arrest involved a custodial booking or a cite and release. About 23% of incidents examined resulted in an arrest. The relatively large portion of incidents that resulted in arrests could be due to a high propensity for PPD officers to cite and release individuals.

Given that the purpose of this study is to examine situational, officer, and neighborhood influences on arrests, independent and control variables at each of these levels were included, as shown in Table 2. Beginning with the situational variables, a measure of *self-initiated* (14.2%) was used to account for incidents that were police- as opposed to civilian-initiated. Due to the strong association between offense severity and arrest, I include a series of binary variables for call type. The 361 unique call codes in the CAD data were recoded into one of the following categories: *violent* (16.9%), *property* (26.7%), *subject/vehicle stops* (19.5%), and *other* (36.9%). Violent offenses include fights, domestic violence, and assaults. Property offenses include burglaries and theft. Subject/vehicle stops include all subject and vehicle stops, as well as other minor traffic related contacts. Call types that did not fall into any of the other categories were coded as other, including welfare checks, suspicious persons, and loud noise disturbances. The most common call types in each of these categories are shown in Appendix A. Finally, an independent variable for the *number of responding officers* was included (mean = 2.2; standard deviation = 1.0).

Officer demographic characteristics and job-related factors were also examined. Demographic characteristics include officer gender, race/ethnicity, and educational attainment. The majority of incidents involved male (88.5%) and non-Hispanic white (73.2%) officers. PPD officer demographic characteristics are largely consistent with police personnel across the U.S. According to the 2016 Law Enforcement Management and Administrative Statistics survey, roughly 13% of local police officers were female and 25% were Black and/or Hispanic (Hyland & Davis, 2021). Almost one-third of officers had attained a Bachelor's degree or above (31.7%). Responding officers had an average of 10.3 years of service (standard deviation = 7.3). I accounted for officer precinct assignment using a series of binary variables: Black Mountain (14.3%), South Mountain (15.8%), Central City (5.6%), Desert Horizon (21.2%), Mountain View (21.8%), and Cactus Park (21.3%). These measures are included to account for potential workgroup dynamics and resource deployment across different precincts that could influence officer decision-making.

At the neighborhood level, I used exploratory factor analysis to create a disorganization factor using: the percentage of residents living below the poverty line, percent unemployed, percent receiving public assistance, percentage who have moved into their residence in the past five years, percentage of renter-occupied households, and percentage of female-headed households (factor loadings ranged from 0.55 to

0.85; eigenvalue = 3.10; $\alpha = 0.78$). Both a scree test and the Kaiser criteria (eigenvalue > 1) suggested that all six measures loaded onto a single factor (mean = 0.01; standard deviation = 0.95). Compared to principal components analysis, which functions as a data reduction strategy that does not account for common variance among included predictors, exploratory factor analysis creates a parsimonious measure of a latent construct that captures common information and patterns of correlations among included variables (Fabrigar, Wegener, MacCallum, & Strahan, 1999). Although the measures of social structure could have been included as individual predictors, the use of a disorganization factor reduces the overall number of parameters in the model and provides a more meaningful point of discussion. Numerous prior studies have used similar approaches to creating composite measures of social disorganization based on indicators of economic disadvantage (i.e., poverty, unemployment, public assistance), residential instability (i.e., residential mobility, percentage renters), and familial structure (i.e., single female-headed households) (see discussions in Kane, 2002; Land, McCall, & Cohen, 1990; Sampson et al., 1997).

TABLE 2: Descriptions of study variables

Variable	Description	# (%)	Mean (SD)	Range
Dependent variable				
Arrest	Binary variable (0 – No arrest; 1 – Arrest)	191,947 (22.98%)	–	0–1
Independent and control variables				
Situational				
Self-initiated	Binary variable (0 – Not self-initiated; 1 – Self-initiated)	118,489 (14.18%)	–	0–1
Violent call	Binary variable (0 – Not violent; 1 – Violent)	140,787 (16.85%)	–	0–1
Property call	Binary variable (0 – Not property; 1 – Property)	223,094 (26.71%)	–	0–1
Subject/vehicle stop	Binary variable (0 – Not subject/vehicle stop; 1 – Subject vehicle stop)	163,152 (19.53%)	–	0–1
Other call type	Binary variable (0 – Not other incident type; 1 – Other incident type)	308,348 (36.91%)	–	0–1
# officers	Continuous variable (number of officers present)	–	2.21 (1.00)	1–5
Officer				
Male officer	Binary variable (0 – Female; 1 – Male)	739 (88.50%)	–	0–1
White officer	Binary variable (0 – Nonwhite; 1 – White)	611 (73.17%)	–	0–1
Bachelor's degree+	Binary variable (0 – No Bachelor's degree; 1 – Bachelor's degree+)	265 (31.74%)	–	0–1
Officer tenure	Continuous variable (years of service)	–	10.27 (7.33)	0–35
Black Mountain	Binary variable (0 – Not Black Mountain; 1 – Black Mountain precinct)	119 (14.25%)	–	0–1
South Mountain	Binary variable (0 – Not South Mountain; 1 – South Mountain precinct)	132 (15.81%)	–	0–1
Central City	Binary variable (0 – Not Central City; 1 – Central City precinct)	47 (5.63%)	–	0–1
Desert Horizon	Binary variable (0 – Not Desert Horizon; 1 – Desert Horizon precinct)	177 (21.2%)	–	0–1
Mountain View	Binary variable (0 – Not Mountain View; 1 – Mountain View precinct)	182 (21.8%)	–	0–1
Cactus Park	Binary variable (0 – Not Cactus Park; 1 – Cactus Park precinct)	178 (21.32%)	–	0–1
Neighborhood				
Disorganization	Factor variable created from % of residents living below the poverty line, % unemployed residents, % of residents receiving public assistance, % residential instability, % renter-occupied households, and % female-headed households	–	0.01 (0.95)	-1.72 - 3.17
% Hispanic	Continuous variable (% of residents who are Hispanic)	–	0.38 (0.27)	0.01–0.94
% Black	Continuous variable (% of residents who are Black)	–	0.06 (0.07)	0.00–0.43
Violence rate	Continuous variable (n. violent incidents/1000 residents)	–	104.33 (128.73)	0.00–1374.44
Population density	Continuous variable (n. residents/square mile ²)	–	5359.25 (3418.02)	18.90–24,576.90

Based on 835,381 incidents involving 835 officers in 388 census tracts; all continuous variables were grand mean centered prior to analysis.

Although some researchers have included measures of racial/ethnic populations in indicators of concentrated disadvantage (e.g., Kubrin & Weitzer, 2003), others have evaluated the influence of racial/ethnic residential populations separately from other

structural factors (e.g., Kane, 2002; Krivo & Peterson, 1996). Due to the focus of the current study on the impact of structural factors on police decisions to arrest, evaluating racial/ethnic population distributions separately from the other elements of social disorganization is important. Continuous measures of percent Hispanic (mean = 0.38; standard deviation = 0.27) and percent Black (mean = 0.06; standard deviation = 0.07) residents at the census-tract level are included to examine racial/ethnic influences on arrest.

Finally, given the importance of crime and perceived danger throughout many of the theories previously discussed, a neighborhood violent crime rate was constructed by spatially joining the CAD data to census tracts and dividing the total number of violent calls-for-service within a census tract by the population of each census tract, standardized to a rate per 1000 residents (violent crime rate = $\frac{n.violent\ calls}{population} \times 1,000$; mean = 104.33; standard deviation = 128.73). I additionally account for population density, which is the total residential population divided by the number of square miles in each census tract (mean = 5359.25; standard deviation = 3418.02). This measure controls for differential exposure of census tracts and residents within census tracts to police activity. Several checks for multicollinearity were performed to examine relationships between the independent variables. All of the variance inflation factors were below four and the condition number was 10.7, indicating limited concerns related to multicollinearity (Dormann et al., 2013; Hair, Anderson, Tatcham, & Black, 1998; Thompson, Kim, Aloe, & Becker, 2017).

3.3. Analytical strategy

The purpose of this paper is to conduct a comprehensive examination of the factors that influence arrests, accounting for situational, officer, and neighborhood factors. This requires the use of multilevel modeling to assess the impact of both individual responding officers and specific neighborhood context on the outcomes of individual incidents. Many multilevel models involve observations that are strictly nested into higher order categories, however, observations are not always hierarchically classified and some observations are classified into multiple higher order groups (Rasbash, 2005). Although prior policing studies have used hierarchical models to assess incidents nested within officers or incidents nested within neighborhoods, researchers have yet to assess the influence of all three of these levels of explanation simultaneously. As indicated by the quote at the beginning of this paper, individual police officers respond to incidents that occur in a variety of neighborhoods throughout the course of their work. Therefore, given the nature of police work and the theoretical propositions discussed above, it is not possible to fully account for the nuance that influences police discretion using hierarchical models. For instance, nesting incidents within police officers does not capture the potential for the same officers to respond to similar incidents differently in different neighborhoods; or alternatively, nesting incidents within neighborhoods does not account for the potential for individual officers to use their discretion in diverse ways. Given prior theoretical frameworks and evaluations of

officer use of discretion, either of these approaches are thereby incomplete representations.

To address the complex relationships between responding officers and neighborhood context on the outcomes of individual incidents, I use cross-classified random effects models. Cross-classification occurs when individual observations that are nested within one cluster can belong to multiple separate values of an additional cluster (e.g., students nested within schools do not always live the same neighborhoods) (Raudenbush, 2002; Sommet & Morselli, 2017). In this study, police-civilian contacts are nested within a crossed officer-neighborhood factor. This specifically enables an examination of the impact of individual officers who travel through different neighborhoods on the outcomes of individual incidents, while accounting for the specific context of the surrounding neighborhood. The use of cross-classified models enables a comprehensive assessment of the influence multiple factors on police use of discretion. As such, individual incidents serve as the level 1 unit of analysis, which are cross-nested within both the responding officer and the neighborhood at level 2. I use logistic regression because arrest is a binary variable. I first estimate an unconditional model represented by the following equation:

$$Y_{ijk} = \beta_0 + u_j + u_k + e_{ijk}$$

where Y_{ijk} is the outcome (arrest/no arrest) of incident i cross-nested in officer j and neighborhood k , β_0 is the intercept, u_j is the random effect of the officer, u_k is the random effect of the neighborhood, and e_{ijk} is the residual.

TABLE 3: Cross-classified logistic regression results predicting arrest

Fixed effects		Model 1				Model 2			
		β	SE	OR	p	β	SE	OR	p
<i>Situational</i>	Self-initiated					0.780	0.01	2.18	<0.001
	Property					0.303	0.01	1.35	<0.001
	Subject/vehicle stop					-1.750	0.01	0.17	<0.001
	Other call type					-0.871	0.01	0.42	<0.001
	# responding officers					0.069	0.00	1.07	<0.001
<i>Officer</i>	Male					-0.149	0.05	0.86	<0.01
	White					-0.046	0.04	0.95	0.20
	College educated					0.079	0.03	1.08	<0.05
	Tenure					-0.020	0.00	0.98	<0.001
	Black Mountain					0.023	0.06	1.02	0.68
	South Mountain					-0.162	0.05	0.85	<0.01
	Central City					-0.089	0.08	0.91	0.24
	Desert Horizon					0.070	0.05	1.07	0.16
	Cactus Park					0.006	0.05	1.01	0.90
<i>Neighborhood</i>	Disorganization					-0.020	0.02	0.98	0.34
	% Hispanic					0.241	0.06	1.27	<0.001
	% Black					0.536	0.17	1.71	<0.01
	Violence rate					-0.0002	0.0001	0.9998	0.10
	Population density					0.0000	0.0000	1.0000	<0.001
Intercept									
		-1.19	0.02	0.30	<0.001	-0.817	0.06	0.44	<0.001
Random effects		Var. Comp.	SD	ICC		Var. Comp.	SD	ICC	
Responding officer		0.22	0.46	0.060		0.20	0.44	0.056	
Neighborhood		0.06	0.24	0.016		0.03	0.17	0.008	
Deviance		875,854.90				819,715.10			
AIC		875,860.90				819,759.10			
BIC		875,895.90				820,015.10			

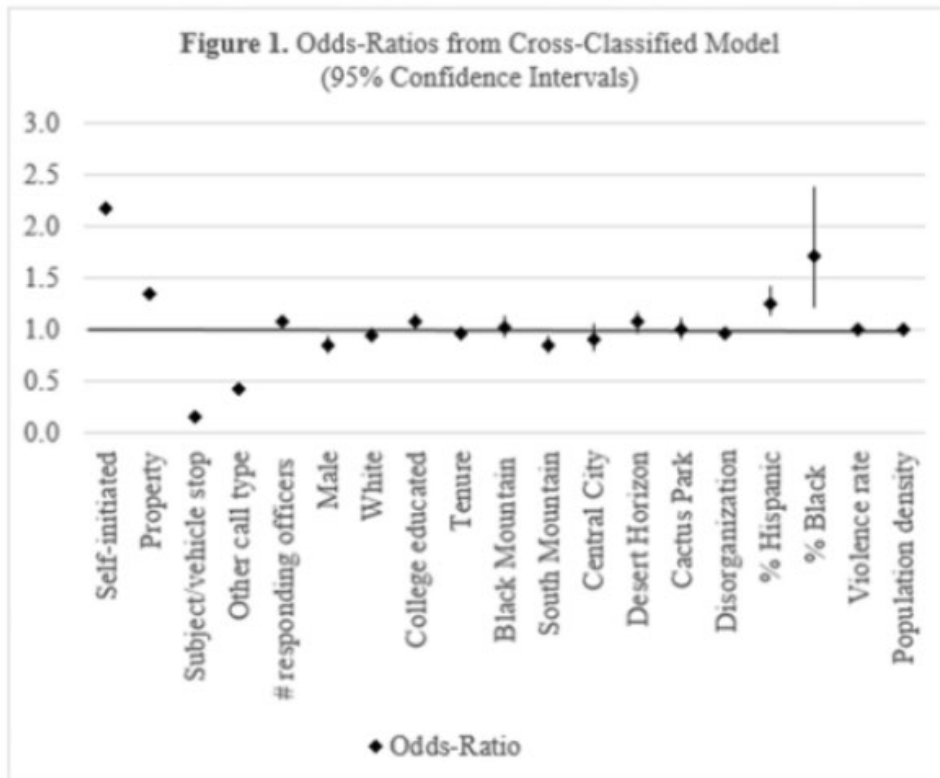
Note: Var. Comp. = variance component; ICC = intra-class correlation coefficient; 835,381 incidents cross-nested in both officers ($n = 835$) and neighborhoods ($n = 388$); violent calls and the Mountain View precinct were used as the reference categories.

This model is used to determine whether arrests are significantly associated with individual responding officers and neighborhoods, thereby necessitating the use of cross-classified models. In other words, this model establishes whether discretionary arrests depend on the individual responding officer and the specific neighborhood in which an incident occurs, as suggested by Klinger (1997) and other policing scholars. I then estimate a fully conditional model including all of the situational, officer, and neighborhood variables, represented by the following equation:

$$Y_{ijk} = \beta_0 + \sum_{q=1}^Q \lambda_q S_{qijk} + u_j + u_k + e_{ijk}$$

where Y_{ijk} is again the outcome, β_0 is the intercept, λ_q is the effect of the q th predictor S for incident i nested within officer j and neighborhood k , u_j is the random effect of the officer, u_k is the random effect of the neighborhood, and e_{ijk} is the residual. The unconditional cross-classified model is compared to the fully conditional model to establish whether the inclusion of additional predictors at each level of explanation improves upon the power of the model. This is also used to identify which specific variables are associated with arrests, accounting for all other factors. In short, this methodology allows a more complete assessment of the complex influences on arrest decisions, accounting for the unique situation, the officer involved in the incident, and the neighborhood the incident occurred within. As such, the results provide guidance about which factors are most influential and should be included in future studies, theoretical refinements, and policy considerations.

FIGURE 1, Odds-ratios from cross-classification model (95% confidence intervals)



4. Results

To examine whether the use of a cross-classified model was appropriate, I first estimated an unconditional hierarchical logistic regression model (HGLM) predicting arrests as a function of officers and a second HGLM predicting arrests as a function of neighborhoods. I then estimated an unconditional cross-classified model predicting arrests as a function of both individual officers and neighborhoods. I used a likelihood-ratio test to compare each of the HGLMs to the unconditional cross-classified model. The results suggest that the cross-classified model is a significantly better fit than either of the two-level HGLMs examined ($\chi^2 = 3903.9$; $p < 0.001$ for the HGLM predicting arrest as a function of responding officers; $\chi^2 = 19,544$; $p < 0.001$ for the HGLM predicting arrest as a function of neighborhoods). This suggests that the cross-classified model including the unique effects of responding officers and neighborhoods better explains discretionary arrests than looking solely at officer or neighborhood effects on the outcomes of individual incidents. Collectively, these preliminary results indicate that cross-classified models, which more accurately reflect theoretical propositions outlined by Klinger (1997) and other police decision-making scholars, statistically improve upon the traditional use of hierarchical models which only account for the effects of individual officers or individual neighborhoods. The results from the unconditional cross-classified model are presented as Model 1 in Table 3. The intra-class correlation coefficients (ICCs) for the unconditional model indicate that arrests are more strongly associated with the responding officer (6.0% of the variation) than the neighborhood (1.6% of the variation) in which the incident occurred. I calculated the ICCs using the performance package in R, which adjusts the estimates to account for the binary dependent variable (Lüdecke, Makowski, Waggoner, & Patil, 2020; Nakagawa, Johnson, & Schielzeth, 2017).

I then estimated a fully conditional cross-classified model to examine the influence of the situational, officer, and neighborhood-level factors on arrests (Model 2). After the inclusion of the independent and control variables, the ICC for the officer decreased to 5.6% and the ICC for the neighborhood decreased to just 0.8%. This suggests that the influence of individual officers remains an important predictor of arrests, though individual neighborhoods account for less of the variation in arrests once other factors are included. These findings collectively suggest that arrests are strongly associated with the characteristics of the individual incident itself (see Fig. 1).

Beginning with situational predictors, arrests were significantly more likely to occur during officer-initiated encounters (OR = 2.18; $p < 0.001$). The likelihood of an arrest was 118.1% higher in incidents that were self-initiated by the officer, holding all other variables constant. In terms of call type, arrests were significantly more likely to occur during property offense calls (OR = 1.35; $p < 0.001$), but were significantly less likely to occur during subject/vehicle stops (OR = 0.17; $p < 0.001$) and other call types (OR = 0.42; $p < 0.001$), relative to violent calls. The likelihood of an arrest was significantly higher when multiple officers were present at an incident (OR = 1.07; $p <$

0.001). The likelihood of an arrest increased by 7.14% for each additional officer who responded to an incident. These findings are largely consistent with the expectation that police officers respond more legalistically to more serious incidents and to incidents that involve a greater number of witnesses.

Turning to officer characteristics, incidents involving male officers were 13.8% less likely to result in an arrest than incidents involving female officers (OR = 0.86; $p < 0.01$). College-educated officers (OR = 1.08; $p < 0.05$) and officers with fewer years of service (OR = 0.98; $p < 0.001$) were significantly more likely to be involved in incidents that resulted in arrest. Officers assigned to the South Mountain precinct were significantly less likely to be involved in incidents that resulted in arrest (OR = 0.85; $p < 0.01$), a 15.0% reduction in the likelihood of arrest relative to incidents involving officers assigned to the Mountain View precinct. It is important to note that South Mountain is one of the higher crime precincts within the Phoenix Police Department.

Finally, neighborhood characteristics were also associated with the likelihood of arrest. Arrests were significantly more likely to occur in neighborhoods with larger Hispanic (OR = 1.27; $p < 0.001$) and Black populations (OR = 1.71; $p < 0.01$), holding all other variables constant. With each unit increase in neighborhood percent Hispanic, the likelihood of arrest increased by 27.3% and each unit increase in neighborhood percent Black increased the likelihood of arrest by 70.9%. Incidents that occurred in more densely populated neighborhoods (OR = 1.00; $p < 0.001$) were also significantly more likely to result in arrest, though the magnitude of this effect was negligible (a 0.002% increase in likelihood with each unit increase in population density). Although incidents in neighborhoods with higher levels of disorganization and higher violent crime rates were slightly less likely to result in arrest as proposed by Klinger (1997), these relationships were statistically insignificant and the effects were substantively small.¹

¹ Separate supplemental analyses examining fully conditional HGLMs estimating incidents nested within officers and incidents nested within neighborhoods were also examined. Although some differences in coefficients and significance levels were identified, the ICCs again indicated that roughly 6% of the variation in arrests is due to responding officers and around 1% to individual neighborhoods. In the HGLM estimating discretionary arrests nested within officers, neighborhood social disorganization (OR = 1.03; $p < 0.00$) and neighborhood violence rate (OR = 1.00; $p < 0.00$) were also significant predictors of arrest, although the effects were relatively small in terms of magnitude. In the HGLM estimating incidents nested in neighborhoods, the influence of officer race/ethnicity was also significantly associated with discretionary arrests (OR = 0.97; $p < 0.01$) and the influence of neighborhood percent Hispanic (OR = 0.96; $p = 0.42$) and neighborhood percent Black (OR = 1.30; $p = 0.14$) were statistically insignificant predictors of arrest. Although some of these differences are meaningful in terms of theories of police discretion, it is important to recall initial results indicating that cross-classified models are a better fit to the present data, and that truly understanding discretionary arrest outcomes depends on accounting for both individual officer and neighborhood effects. Although the differences between the cross-classified and HGLM approaches are interesting, the cross-classified results should be considered more robust given the results of the likelihood-ratio tests and the foundation of cross-classified models in prior theories of police decision-making. These identified differences across modeling approaches could further indicate that inconsistencies in prior research examining police arrest decisions could be due to model misspecification. The full HGLM results, in addition to logistic regression results using robust standard errors, are available from the author upon request.

5. Discussion

The purpose of this study was to examine a comprehensive model of police use of arrest by accounting for factors operating at three levels of explanation. Though arrests were significantly influenced by situational, officer, and neighborhood-level characteristics, most of the variation in arrest is accounted for at the incident-level, followed by the responding officer, and then the neighborhood. Roughly 6% of the variation in arrest was attributable to the responding officer and less than 1% was due to the neighborhood an incident occurred within. The variance explained at the officer level in this study is much lower than prior research conducted by Tillyer et al. (2019), who found that about 20% of the variation in post-traffic stop outcomes, including arrest, was attributable to individual officers. However, arrests pursuant to traffic stops could be more discretionary than arrests involving violent or property offenses. As such, officer characteristics could have a stronger influence on arrests in traffic-related incidents relative to other types of events. Similar to my results, Tillyer et al. (2019) found that police districts explained less than 1% of the variance in post-traffic stop outcomes after accounting for situational and officer-level factors. In short, even though arrests were significantly influenced by individual officers and neighborhoods, arrests were much more strongly associated with the characteristics of the incident itself. However, given that both officers and neighborhoods were significantly associated with arrests, even after accounting for the characteristics of the individual situation, it is important to ensure that individual officers are using arrests consistently and that arrests are being used fairly, regardless of neighborhood characteristics.

5.1. Major findings and practical implications

My results are largely consistent with prior research examining situational influences on police use of arrest. Namely, arrests were more likely to occur in incidents that involved constraints on police discretion, either through the presence of a victim or other officer witnesses (Black, 1971, 1980; Goldstein, 1963; Smith & Visher, 1981; Westley, 1970). Interestingly, officers were also more likely to conduct arrests during incidents that were self-initiated. This is consistent with some prior research, which has found that officers were more likely to conduct arrests during self-initiated encounters than civilian requests for service (Black, 1980; but see Smith, 1986; Smith & Visher, 1981 for conflicting findings). This could be due to officers using alternatives to arrest in civilian-initiated encounters at the request of complainants. If that is the case, the PPD should clarify organizational policies surrounding the use of discretionary arrests or alternatives to arrest in order to promote consistency in the outcomes of similar offenses. Given that self-initiated activities are subject to limited organizational review, and therefore higher levels of officer discretion, future research should examine the factors that influence officer decisions to self-initiate encounters with civilians and the ultimate outcomes of these events (using a similar approach as Lum (2011), for example). For instance, understanding why officers choose to initiate encounters with some civilians, but not others, can provide additional information about the factors that

trigger officer suspicion. Further, through assessing the productivity of self-initiated relative to civilian-initiated contacts, the PPD can better understand whether officer discretion is being used to effectively identify criminal behavior.

Though some officer characteristics were significantly associated with the likelihood of arrest, many of these relationships were substantively small. These findings mirror the results from one of the only other studies to use cross-classified models to examine arrests, in which Tillyer et al. (2019) found that individual officers influenced the likelihood of an arrest, but that the specific officer-level demographic characteristics and job-related experiences examined were not significantly strong or substantively meaningful predictors. In this study, female officers were significantly more likely to be involved in incidents resulting in arrest than males. This finding contradicts some of the early research examining the impact of officer gender on arrest, which suggested that males were more likely to conduct arrests (Sherman, 1980). However, it is important to note that female officers were initially assigned to different duties than their male counterparts, which limited their opportunities to conduct arrests (Archbold & Schulz, 2012). More recent research examining the relationship between officer gender and arrests has identified limited differences between male and female officers (Novak et al., 2011).

Research examining the influence of officer gender more broadly suggests that female officers might be better communicators and less authoritarian relative to their male counterparts, which could lead to enhanced de-escalation, fewer uses of force, and fewer complaints (Fitzsimmons, 2001; Rabe-Hemp, 2008). My finding that female officers could be more legalistic in terms of arrest, in combination with these prior findings that female officers are less coercive, lends further support for the importance of increasing female representation within police agencies in order to promote effective and safe policing (for more information, see <https://30x30initiative.org/>). College-educated officers were also significantly more likely to conduct arrests than officers who had not completed a college degree. This is consistent with some prior research and has been attributed to the desire for promotion among more highly educated officers (Niederhoffer, 1967; Rosenfeld et al., 2018). Namely, college-educated officers might be more motivated to achieve promotions and could actively pursue arrests in order to meet performance metrics associated with promotional standards. College graduates could also be better equipped to identify individuals engaging in criminal behavior based on critical thinking skills. Some scholars have suggested that officer educational attainment can be considered a constellation of factors, like desire to succeed, ambition, and interest in promotional advancement (Harris, 2010), which could influence propensity for arrest. As such, police agencies might want to attract and reward education to enhance the number of arrests conducted.

Turning to job-related characteristics, officers with fewer years of service were significantly more likely to conduct arrests. This is consistent with prior research examining the relationship between years of service and arrest (Wallace et al., 2018),

and could be due to the fact that newer officers are more active than their more experienced counterparts in general (Bonkiewicz, 2017). This has sometimes been attributed to newer officers being more legalistic in attempts to fit into the police culture (Niederhoffer, 1967). Further, officers assigned to the South Mountain precinct were less likely to conduct arrests than those assigned to Mountain View. This suggests that organizational assignments within the police department also influence the likelihood of an arrest, lending additional support to the importance of workgroups in understanding police behavior (Ingram, Terrill, & Paoline, 2018; Klinger, 1997). If this pattern is driven by cultural orientations against the use of arrest or perceived resource deficiencies that inhibit low-level arrests in the South Mountain precinct, PPD leadership should seek to identify and address these issues either through promoting the use of discretionary arrests or reallocating resources.

Neighborhood racial/ethnic population distributions also influenced the likelihood of arrest, even when controlling for the characteristics of the incident and the responding officer. Arrests were about 27% more likely to occur in neighborhoods with larger Hispanic populations and 71% more likely to occur in neighborhoods with larger Black populations, holding all other variables constant. This could suggest that officers are over-enforcing laws in Black and Hispanic neighborhoods in Phoenix, or alternatively, that officers are underenforcing laws in neighborhoods predominately inhabited by whites. These results are consistent with some prior research finding that arrests are more likely to occur in neighborhoods with growing minority populations (Kane et al., 2013).

There was no significant relationship between neighborhood disadvantage and arrest or between neighborhood violent crime rate and arrest, suggesting that this issue is directly related to race/ethnicity, not neighborhood poverty or crime levels. The differential use of arrest depending on neighborhood racial/ethnic breakdown is a particularly notable finding in the current climate given widespread attention to police treatment of racial/ethnic minorities. The finding that discretionary arrests are related to neighborhood racial/ethnic population distributions, regardless of offense severity, individual officers, and other neighborhood contextual factors indicates a need for additional research to better understand the mechanisms underlying these results. Although the present study was not able to account for every possible legal explanation for these disparities, nor can these results definitively indicate discriminatory policing in minority neighborhoods, the PPD should seek to identify and mitigate the causes of these differences. Through conducting an in-depth analysis of the factors underlying the differential use of arrests in minority neighborhoods, the PPD should examine whether organizational policies or norms are promoting differential officer responses across neighborhoods. These analyses will help guide data-driven responses such as targeted training efforts and policy changes designed to mitigate these disparities.

5.2. Theoretical implications

One of the defining features of a good theory is that it should be falsifiable. The complex theoretical models proposed to explain police use of discretion could contribute to the somewhat limited theoretical testing in the policing research. This study shows that police use of arrest is indeed related to situational, officer, and neighborhood characteristics. Overall, my findings are consistent with the elements of some theories of police discretion, but conflict with others. Beginning with Herbert's (1997) normative orders perspective, there were significant differences in the use of arrest by individual officers. The greater likelihood of arrest in incidents involving female, relative to male, officers could be due to increased pressure for female officers to demonstrate their law enforcement competence and authority to both their colleagues and the civilians they interact with. This argument is consistent with prior research conducted by Novak et al. (2011) who found that female officers feel more pressure to prove their competence in front of their supervisors than their male counterparts. Though officer attitudinal orientations toward policing were not directly examined in this study, these results suggest that future research should examine the impact of individual officers on the outcomes of police-civilian encounters.

The results provide mixed support for Black's (1976) sociological theory of law. Based on his propositions, I expected that incidents involving white officers, that occurred in socially disorganized neighborhoods, that occurred in Hispanic neighborhoods, and those that occurred in Black neighborhoods would be more likely to result in arrest. However, contrary to Black's (1976, 1980) propositions, there were no significant differences in the likelihood of arrest between white and nonwhite officers or depending on neighborhood social disorganization. Consistent with his arguments, arrests were more likely to occur in both Hispanic and Black neighborhoods (Black, 1976, 1980). A prior meta-analysis of forty studies found that minority suspects are more likely to be arrested than whites (Kochel, Wilson, & Mastrofski, 2011). The higher likelihood of arrest for minority civilians could be driving the greater likelihood of arrest in Hispanic and Black neighborhoods in this study, if those individuals arrested in these neighborhoods were minorities. Unfortunately, without being able to directly examine civilian race in this study it was not possible to fully test Black's argument, a notable limitation to the current study.

Finally, my results were fairly consistent with Klinger's (1997) negotiated order in patrol work perspective. Given that Klinger's perspective provides the most explicit specification of the anticipated relationships between incident, officer, organizational, and ecological factors on police use of discretion, this an important finding. Consistent with his argument, arrests were more likely to occur during more serious incidents, net of other factors. Arrests were also less likely to be used by officers assigned to the South Mountain precinct, which is one of the highest crime precincts in the city, although there was no direct relationship between neighborhood violent crime rate and arrest (OR = 0.999; $p = 0.10$). These findings are generally consistent with Klinger's (1997) suggestion that officers assigned to workgroups with high workloads and officers responding to incidents in areas with higher levels of violence will respond less

vigorously, although the direct relationship with violent crime rate was less robust. Further research should be conducted to determine whether the differential likelihood of arrest across similar incidents involving officers from different precincts could be eliminated through reallocating additional resources to South Mountain, or if these differences are due to officer cynicism or work-group rules that might need to be addressed through revised training, adjusted performance standards, or through rotating officer precinct assignments.

5.3. Limitations

Like most research, my ability to fully examine the complex influences on arrest was limited to the information available in the data, which inhibited a full analysis of some key theories of police decision-making. For example, several researchers have suggested that officers determine whether or not civilians 'belong' in certain neighborhoods based on their past experience, and use higher levels of law when civilians are perceived as being 'out of place' (M. K. Brown, 1988; Novak & Chamlin, 2012; Skolnick, 1996). These arguments are often based on whether the civilian matches the demographic composition of the neighborhood in which the officer encounters them. Without knowing the race/ethnicity of the individual involved in a police encounter, I was not able to fully assess Black's (1976, 1980) propositions that police application of the law is tied to civilian status.

The inability to account for civilian characteristics is a very important limitation to the current study given continued research attention to police treatment of minority civilians in particular. Although the inability to account for civilian characteristics is a substantial limitation that should not be understated, it is also important to note that some studies find that civilian demographics become inconsequential once offense severity and other key legal and extralegal factors are statistically accounted for (Engel & Calnon, 2004). However, without access to civilian information in the present study it is not possible to directly address this possibility. As such, future research should more fully examine the influence of civilian characteristics on police use of discretion, and could use a strategy similar to Tillyer et al. (2019). The ability to conduct analyses examining the influence of civilian characteristics on police decision making depends on the systematic collection of civilian demographic data. Although targeted use of force specifically, the recommendations outlined in a recent Police Executive Research Forum (2021) report should be reviewed by police agencies in order to improve their data collection practices across information systems to facilitate more comprehensive analyses of factors that influence the outcomes of police-civilian encounters.

This study was also limited to an evaluation of police behavior in a single police department in a southwestern US city. Additional research examining the influence of situational, officer, and neighborhood factors on arrests should be conducted in other places to determine whether the patterns identified in Phoenix are consistent across different types of agencies and contexts. Further, the use of data from a single agency limited my ability to examine organizational correlates of arrest, which could also

influence the findings. Further, the administrative data used were created based on a combination of dispatcher reported information and police officer reported information, which could also pose some concerns related to the validity of these data due to inaccurate reporting (see discussions about misreporting in the police use of force literature in Durlauf & Heckman, 2020; Fryer, 2019). Finally, this study solely examined influences on a single decision point in police-civilian encounters, but a similar multilevel strategy could be used to test and refine theories of police discretion by examining police proactivity, nonenforcement, use of force, citizen complaints, or any number of other outcomes, which might exhibit different patterns relative to arrests.

6. Conclusions

The factors that influence police use of discretion are complex. As a result, policing scholars have traditionally used ethnographic and observational methods to examine police use of discretion. This study, however, demonstrates that it is possible to examine multiple influences on police behavior operating at distinct levels of explanation using administrative police data. Given that collecting ethnographic and observational data can be cost prohibitive, this is an important contribution. Using combinations of administrative data sources that are already being collected by many police agencies, in addition to publicly available data like the US census, facilitate the examination of multiple factors that influence officer decisions at a much lower cost. These administrative data often encompass a large number of police-civilian contacts, further enabling the use of multilevel models designed to account for complex data structures. Continued use of similar strategies can be informative for testing and refining theories of policing.

Researchers have generally found that the strongest influences on police use of discretion occur at the situational level, with decreasing levels of variance attributable to officer characteristics and neighborhood context. This has resulted in some suggestions that understanding why the police do what they do in a systematic way is nearly impossible without physically being present during the encounter. However, through limiting our attention solely to incident-level characteristics that drive police behavior, we minimize our ability to inform police policy (Bayley & Bittner, 1997). It has long been known that creating specific policies to regulate every potential situation an officer could face is impossible.

Accounting for the influence of individual officers on police use of discretion enables the identification of officer-level characteristics that could contribute to appropriate and inappropriate police behaviors. As a result, these types of evaluations have important implications for hiring standards, training practices, and even early intervention systems. Similarly, examining social-ecological influences on police behavior can help identify disparate police practices across neighborhoods within a community. Given that laws are intended to apply equally to all civilians, regardless of where an officer encounters them, examining differences in police behavior in different areas has important implications for police community relations. Namely, differential

police enforcement in minority neighborhoods can be considered either over-enforcement or benign neglect, with each type of disparity negatively impacting community perceptions of the police (Wilson, 1978). Due to continued national protests calling for improved policing in minority neighborhoods, my finding that arrests were more likely to occur in Hispanic and Black neighborhoods, regardless of the characteristics of the individual situation and the responding officer, are particularly deserving of further research attention.

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Appendix A. Call code categorizations (top 3 per category)

Category	Original call code	#	%
<i>Violent</i>	Fight	51,899	36.86
	Domestic violence	46,949	33.35
	Assault	12,396	8.80
<i>Property</i>	Trespassing	64,653	28.98
	Burglary	49,265	22.08
	Theft	23,712	10.63
<i>Subject/vehicle stop</i>	Vehicle stop	51,147	31.35
	Subject stop	33,908	20.78
	Accident - no injuries	29,478	18.07
<i>Other</i>	Suspicious person	80,627	26.14
	Check welfare	64,773	21.01
	Loud noise disturbance	20,087	6.51

A full list is available from the author upon request.

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