Examining Variation in Police Discretion: The Impact of Context and Body-Worn Cameras on Officer Behavior

by

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ABSTRACT

Discretion is central to policing. The way officers use their discretion is influenced by situational, officer, and neighborhood-level factors. Concerns that discretion could be used differentially across neighborhoods have resulted in calls for increased police transparency and accountability. Body-worn cameras (BWCs) have been promoted to further these goals through increasing oversight of police-citizen encounters. The implication is that BWCs will increase officer self-awareness and result in more equitable outcomes. Prior researchers have largely evaluated the direct impact of BWCs. Researchers have yet to examine the potential for BWCs to moderate the influence of neighborhood context in individual incidents.

To address this gap, I use Phoenix Police Department data collected as part of a three-year randomized-controlled trial of BWCs to examine variation in police discretion. These data include over 1.5 million police-citizen contacts nested within 826 officers and 388 neighborhoods. I examine two research questions. First, how do proactivity, arrests, and use of force vary depending on situational, officer, and neighborhood contexts? This provides a baseline for my next research question. Second, examining the same contexts and outcomes, do BWCs moderate the influence of neighborhood factors on police behavior? As such, I examine the untested, though heavily promoted, argument that BWCs will reduce the influence of extralegal factors on officer behavior.

Using cross-classified logistic regression models, I found that situational, officer, and neighborhood factors all influenced proactivity, arrest, and use of force. BWCs were associated with a lower likelihood of proactivity, but an increased likelihood of arrest and

use of force. Officers were more proactive and were more likely to conduct arrests in immigrant and Hispanic neighborhoods. The moderating effects suggest that officers were even more likely to proactively initiate contacts and conduct arrests in immigrant and Hispanic neighborhoods when BWCs were activated. However, after BWCs were deployed, use of force was significantly less likely to occur in black neighborhoods. Given that high-profile police use of force incidents involving black suspects are often cited as a major impetus for the adoption of BWCs in American police agencies, this finding is a key contribution to the literature.

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1. INTRODUCTION

1.1 Introduction

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. However, police decisions are not made in a vacuum. The police respond to a variety of situations, individual officers have distinct characteristics and orientations, and police officers operate in diverse social-ecological contexts. Further, the level of oversight that police behaviors receive depends on what the officer is doing. Officer decisions to proactively self-initiate contacts with citizens are largely unreviewed by the agency an officer works for, especially when these contacts do not result in formal charges. Arrests, however, are later reviewed by court actors. Finally, use of force incidents are more likely to come to the attention of both the agency the involved officer works for and, when the force used is severe, the community in which the incident took place. Given the central role of discretion in policing, understanding the influence of situational, officer-level, and broader social-ecological context on different forms of police behavior subject to varying levels of oversight is imperative to provide a holistic view of the use of officer discretion.

Due to the broad range of police discretion, and the potential for this discretion to be used in a discriminatory way, several checks on discretion have been proposed and evaluated. Many of these efforts to control officer discretion take the form of

organizational policies, internal supervision, and legal regulations. Because officers have high levels of autonomy and largely work without direct supervision, this regulation and oversight has been challenging. Recent technological developments, however, have increased the ability of police agencies and citizens to observe officer behavior in individual encounters. For instance, body-worn cameras (BWCs) are being widely adopted in response to contentious police uses of force against minority citizens. The increased oversight of officer and citizen behavior as a result of the presence of BWCs has been argued to have a 'civilizing effect' on police-citizen encounters (White, 2014). BWC proponents suggest that BWCs will improve police use of discretion through providing additional oversight of officer behaviors. Others, however, have raised concerns that this increased oversight could lead to depolicing if officers become so concerned about potential scrutiny of their actions that they disengage from their jobs. As such, BWCs could change the way officers use their discretion.

The purpose of this study is to examine how officers use their discretion in proactive (i.e., self-initiated) encounters, arrests, and use of force. As prior research examining officer use of discretion has largely emphasized situational and officer-level factors, this study expands on that body of work through introducing a social-ecological lens to assess the simultaneous influence of situational, officer, *and* neighborhood characteristics on police use of discretion. Using data from the Phoenix Police Department (PPD), I address two interrelated research questions. First, what impact do situational, officer, and social-ecological factors have on proactivity, arrest, and use of force? Second, examining the same outcomes and contributing factors, do BWCs

influence the relationship between neighborhood factors and officer use of discretion? In short, I examine whether BWCs moderate the relationship between social-ecological characteristics and police behavior, accounting for the influence of situational and officer-level factors.

1.2 Theoretical Framework

Police use of discretion is complex and varies depending on situational, officer, and social-ecological factors. In order to examine how discretion is used while accounting for influences at each of these levels, it is important to incorporate elements from multiple theoretical perspectives. Though a large body of work has examined influences at the situational and officer level, I expand on this literature through examining how these factors operate in various social-ecological contexts as well. Lum (2011) suggests that police behavior in different types of places can be linked to legal factors, like crime, and extralegal factors, like social disorganization and racial/ethnic heterogeneity. She argues that understanding variation in police behavior across space is important because if officers behave differently when responding to certain areas or residents, it could undermine police legitimacy (Lum, 2011). This variation in citizen perceptions of the police across space has also been associated with a lower probability of arrest for offenders who live in neighborhoods characterized by high levels of legal cynicism (Kirk & Matsuda, 2011).

Though social-ecological influences have been used to explain crime and delinquency for decades (Park & Burgess, 1925; Shaw & McKay, 1942), fewer researchers have examined the influence of neighborhood characteristics on criminal

justice actors, such as police officers. Scholars who have theorized about the variation in police behavior in different areas have proposed that structural conditions, population characteristics, and crime are important social-ecological considerations (Black, 1980; M. K. Brown, 1988; Herbert, 1997; Kane, 2002; Klinger, 1997; J. Q. Wilson, 1978).

Given the various social-ecological contexts officers navigate throughout the performance of their duties, it is important to examine how these factors impact officer use of discretion across space. To do so, I use a broad social-ecological lens that includes measures of social disorganization, racial/ethnic population distributions, and violent crime to examine police behavior at the neighborhood level.[1] Using this broader framework allows me to evaluate the impact of social-ecological factors on police behaviors with varying levels of oversight across different situations, officers, and neighborhood contexts. In sum, I address limitations in the prior research through examining the influence of social ecology, in addition to situational and officer-level factors, on police behavior using census tracts to approximate neighborhoods.[2] I specifically evaluate whether neighborhood social ecology contributes to variation in

[1] Prior social ecological work has evaluated variation in formal social control at the state (R. R. Johnson & Olschansky, 2010), county (Freilich, Adamczyk, Chermak, Boyd, & Parkin, 2014; Osgood & Chambers, 2000), city (Liska & Chamlin, 1984), agency (Kane, 2002; Lum & Vovak, 2018; Nowacki, 2015), and neighborhood levels (Chamberlain & Hipp, 2015; Kane et al., 2013; Lum, 2011; Renauer, 2012; Steenbeek & Hipp, 2011).

[2] It has been widely noted that census tracts are not perfect measures of neighborhoods, as individuals are generally unaware of these boundaries (Bursik & Grasmick, 1993; Coulton et al., 2001; Klinger, 1997), but these geographic units are often used as neighborhood proxies given the availability of administrative data for these spatial units and the initial construction of census boundaries to represent relatively homogenous areas (Hipp & Yates, 2011; Kane et al., 2013; Sampson & Groves, 1989). Further, census tract boundaries in Phoenix are very closely aligned to Phoenix Police Department beat boundaries, so the use of these units has conceptual meaning to officers. Census tracts have been used to approximate neighborhoods in other studies of police behavior as well (Arnio, 2019).

proactive police activities, arrests, and use of force. I then examine whether BWCs moderate the relationship between these levels of explanation and outcomes of interest.

Social disorganization theory was originally conceptualized to explain the stability of crime in certain neighborhoods over extended periods of time, despite changes in the individuals and the demographic characteristics of residents inhabiting these neighborhoods. Social disorganization theory suggests that concentrations of persons in poverty, residential instability, and foreign-born residents undermine the informal social control processes that protect neighborhoods from crime and delinquency (Bursik & Grasmick, 1993; Shaw & McKay, 1942). This concept was further expanded on by W. J. Wilson (1987) who suggested that concentrated disadvantage – encompassing concentrations of unemployment, people living in poverty, people dependent on welfare, and single female-headed households – increases crime at the neighborhood level. As such, concentrated disadvantage encompasses limited economic, institutional, and social resources in certain neighborhoods. These concentrations of disadvantage were argued to disproportionately impact black neighborhoods (Wilson, 1987).

Social ecologists recognize that areas characterized by social disorganization often have high concentrations of minority residents. As such, the relationships between structural disadvantage and racial/ethnic population distributions are difficult to disentangle. Though some researchers have included measures of racial/ethnic populations in indices of social structure (Katz & Schnebly, 2011; Kubrin & Weitzer, 2003), others have evaluated the impact of racial/ethnic residential population separately

(Arnio, 2019; Kane, 2002; Krivo & Peterson, 1996). In their discussion of the relationship between neighborhood racial characteristics and social disadvantage, Sampson, Wilson, and Katz (2018) argue that racial distributions are often strong predictors of clusters of social disadvantage. As such, they suggest that indices of concentrated disadvantage should include measures of black residents because of the difficulties associated with identifying similarly disadvantaged black and white neighborhoods. Given the focus of the current study on the impact of social ecology and technology on police behavior in citizen encounters, evaluating racial/ethnic population distributions independently from measures of social disorganization is important.

Black's (1976, 1980) theory of law specifically implicates the role of race/ethnicity in the application of the law by police officers. He suggests that the race/ethnicity of citizens and police officers, as well as the racial/ethnic composition of the neighborhood in which a police-citizen contact takes place, have direct implications for the amount of social control applied by the officer. As such, theories explaining variation in police behavior at the situational and officer-level have alluded to further relationships between these factors and racial/ethnic characteristics of neighborhoods.

Police researchers have long noted that officers behave differently in areas with higher levels of crime (Herbert, 1997; Niederhoffer, 1967; D. A. Smith, 1986). Klinger (1997) proposed a theory of negotiating order in patrol work to explain why officers use more or less vigor in some areas compared to others. He defines vigor as, "the degree to which police officers extend their formal legal authority in encounters with citizens by making arrests, taking reports, conducting investigations, and so on" (p. 279). He argues

that because controlling deviance is central to the function of the police, officer use of vigor will vary in areas with differing levels of deviance due to the different ways officers interpret their role in opposing deviance (Klinger, 1997).

Policing scholars have identified links between neighborhood factors and police proactivity (Lum, 2011; D. A. Smith, 1986; Wu & Lum, 2017), arrest (Kane, Gustafson, & Bruell, 2013; D. A. Smith, 1986), and use of force (Klinger, Rosenfeld, Isom, & Deckard, 2016; Lautenschlager & Omori, 2018; Terrill & Reisig, 2003). Researchers have yet, however, to address the potential interactions between situational, officer, and neighborhood-level factors simultaneously on police behaviors. This is an important limitation given the nature of these theories, which often include elements operating at multiple levels of explanation.

1.3 Police Discretion and Behavior

As noted above, police use of discretion is influenced by factors occurring at multiple levels – including characteristics of the specific situation an officer is responding to, the characteristics and orientations of the responding officer, and the broader social-ecological context in which an encounter occurs. This section briefly discusses influences on police discretion at each of these levels.

1.3.1 Situational Factors. Officers respond to a wide range of situations and must choose when and how to apply laws to individual incidents, while adhering to relevant legal and administrative guidelines. One of the strongest predictors of officer use of discretion is the severity of the offense, with officers having greater discretion in minor incidents and less discretion in more serious incidents (M. K. Brown, 1988; Buvik,

2016; J. Q. Wilson, 1978). Scholars often suggest that the severity of crime outweighs any other situational consideration, as officers are required to respond forcefully and aggressively to serious offenses (Black, 1980; Klinger, 1997). The number of officers responding to an incident also impacts officer use of discretion at the situational level, as the presence of additional officers impacts the dynamic of a situation (Lawton, 2007; Terrill & Reisig, 2003).

Citizen characteristics and other extralegal considerations have been associated with officer use of discretion as well. One of the most widely noted situational predictors of officer behavior is citizen demeanor, with respectful citizens being treated more professionally and leniently than disrespectful citizens (Black, 1980; Brooks, 1997; Dunham & Alpert, 2009; Engel, Sobol, & Worden, 2000; Lipsky, 1980; Sobol et al., 2013; Van Maanen, 1978, Westley, 1970). The demographic characteristics of the citizen involved, including their race/ethnicity, sex, age, and socioeconomic status, have also been associated with police use of discretion (Engel et al., 2000; Novak, Brown, & Frank, 2011; Nowacki, 2015; Sobol et al., 2013; Sun, Payne, & Wu, 2008; Terrill & Reisig, 2003; Weitzer & Tuch, 2005).

1.3.2 Officer-Level Factors. Brown (1988) defines police discretion as "a behavioral process in which the interpretation of events and the choice of alternatives is strongly influenced by the values and beliefs of the actor" (p. 221). As such, he directly links the use of discretion to the characteristics of the responding officer. Davis (1969) argues that one of the primary issues with police discretion is that officer behavior varies depending on the individual officer, and that variation in outcomes in similar situations

exists even within officers. Researchers have addressed the impact of officer-level factors on the outcomes of incidents in a number of broad areas. Scholars have examined the impact of officer demographic characteristics, such as officer race/ethnicity, sex, age, and educational attainment on officer behavior (Alpert & Dunham, 2004; Brandl & Stroshine, 2012; Buvik, 2016; Niederhoffer, 1967; Sun et al., 2008; Terrill & Mastrofski, 2002; Weitzer & Tuch, 2005; White, 2002).

The impact of officer characteristics specifically associated with police service, like years of experience, shift assignment, and jurisdiction have also been evaluated (Brandl & Stroshine, 2012; Buvik, 2016; Kane, 2002; Lawton, 2007; Phillips, 2016; M. R. Smith & Alpert, 2007; Sun et al., 2008; Terrill & Mastrofski, 2002; White & Kane, 2013). Fewer researchers have examined the link between officer attitudes and cultural orientations and officer behaviors (Ingram, Terrill, & Paoline, 2018; Phillips & Sobol, 2011; Sobol, 2010b; Terrill & Paoline, 2015).

1.3.3 Social-Ecological Factors. Several social-ecological factors contribute to variation in officer behavior, depending on where a situation occurs. The current study focuses on the impact of social disorganization, racial/ethnic population distributions, and violent crime as measures of social ecology. Several scholars have examined the relationship between social disorganization and police use of discretion (Kane, 2002; Lum, 2011; Terrill & Reisig, 2003). Given the attention paid to racial issues in policing, researchers have also assessed the impact of neighborhood racial/ethnic characteristics on police behavior (Arnio, 2019; Kane, 2002; Kane et al., 2013; Klinger et al., 2016). Finally, the impact of neighborhood crime levels on policing have also been examined

(Herbert, 1997; D. A. Smith, 1986; Terrill & Reisig, 2003). These studies have been guided by theoretical frameworks created to explain police use of vigor (Klinger, 1997), the application of law and formal social control (Black, 1976, 1980), and police misconduct (Kane, 2002). In sum, scholars have found that social ecology impacts the way the police use their discretion. However, the way officers behave in different areas is also influenced by the specific situation and the individual officer involved.

1.3.4 Police Behavior and Oversight. Just as officers respond to diverse situations in various social-ecological contexts, the way officers become involved in incidents and how they chose to respond to those incidents also varies. For example, officers could choose to proactively contact citizens, make arrests, or use force depending on the characteristics of the situation, the officer, and/or the social-ecological environment. As discussed more fully in the next chapter, researchers examining officer decisions to proactively initiate activities, arrest suspects, and use force have largely evaluated situational, citizen, or officer characteristics as opposed to social-ecological factors. Further, the level of review that proactive contacts, arrests, and use of force decisions are subject to ranges from low to high. This variation in oversight could result in different factors influencing different types of decisions.

An officers decision to proactively self-initiate a contact is highly discretionary and involves limited organizational oversight (M. K. Brown, 1988; D. A. Smith & Visher, 1981; J. Q. Wilson, 1978). Understanding the factors that influence these self-initiated contacts is important because proactivity could be used differently by different officers and could disproportionately impact certain types of neighborhoods. Unlike

proactive contacts, which are subject to limited oversight, arrest decisions are later reviewed by courts to determine whether the arrest was conducted appropriately and for adjudication (Bittner, 1967; Goldstein, 1963). However, officers still retain a large amount of discretion when choosing whether or not to conduct an arrest (Walker, 1993). Finally, use of force has become a major topic in policing as a result of several police shootings of unarmed minority suspects. Use of force incidents are subject to increasing levels of review and regulation both within police agencies and externally (Alpert & Dunham, 2004).

1.4 BWCs

The recognition that officers wield broad coercive powers and act with high levels of autonomy has resulted in various attempts to control officer discretion. Formal attempts to control officer decisions have come from organizational policies, state and federal laws, and Supreme Court rulings (Brooks, 1997; M. K. Brown, 1988; Walker, 1993). The use of BWCs is a recent development in policing that could be used to regulate and monitor officer use of discretion. Proponents of BWCs argue that increased transparency of officer activities could in turn increase officer accountability and decrease the use of discretion to engage in differential enforcement practices. These arguments are often grounded in deterrence theory, with scholars suggesting that police officers wearing BWCs (and potentially citizens interacting with these officers) will be more self-aware of their behavior and will feel like they have a greater chance of having misbehavior identified and sanctioned than in incidents in which a BWC is not present (Ariel, 2016; see also Hedberg, Katz, & Choate, 2017). In sum, the adoption of BWCs is

theoretically expected to deter poor officer and citizen behaviors through increasing individuals' self-awareness in police encounters and increasing perceptions of the certainty of punishment associated with misbehavior.

In addition to increased transparency and accountability, the adoption of BWCs in police agencies has been suggested to result in several benefits, including: reduced civil liability for police agencies, reduced complaints against officers, reduced officer use of force, a 'civilizing effect' on both officers and citizens, and the potential to use footage in police training and as evidence in court (Ariel, Farrar, & Sutherland, 2015; Braga, Coldren, Sousa, Rodriguez, & Alper, 2017; Headley, Guerette, & Shariati, 2017; White, 2014). As officer proactivity, arrests, and use of force are of particular interest in the current project, the impact of BWCs on these behaviors is briefly addressed here and more fully discussed in the next chapter.

Despite the potential benefits of BWCs, one of the concerns surrounding this technology is the potential for BWCs to result in depolicing. This is the argument that officers could become so concerned with scrutiny of their actions due to the presence of a BWC that they stop engaging in self-initiated, proactive activities and will only engage in reactive tasks. Researchers who have examined the impact of BWCs have largely refuted this claim, often finding that BWC officers were more likely to proactively initiate contacts with citizens (Ready & Young, 2015; Wallace, White, Gaub, & Todak, 2018). Findings related to the impact of BWCs on arrests are somewhat mixed, with some researchers finding increases, others finding decreases, and some finding no relationship between BWCs and arrests (Hedberg et al., 2017; Katz, Choate, Ready, & Nuno, 2014;

Morrow, Katz, & Choate, 2016; Ready & Young, 2015; Wallace et al., 2018). Because increased support for BWCs has often been tied to public outrage over lethal incidents of police use of force, many early evaluations of BWCs have focused on the impact of BWCs on officer use of force. Similar to arrests, researchers have again identified mixed effects across studies, with some finding increases, others finding decreases, and some finding no change in use of force as a result of BWCs (Ariel et al., 2015; Braga et al., 2017; Headley et al., 2017; Jennings, Lynch, & Fridell, 2015; Peterson, Yu, La Vigne, & Lawrence, 2018). It has been suggested that the impact of BWCs on police use of force can be tied to policies regulating when BWCs should be activated and officer compliance with those regulations (Ariel, Sutherland, Henstock, Young, Drover, et al., 2017), which could account for the inconsistent findings.

As the above section illustrates, BWCs could impact how officers behave due to increased oversight of officer behavior in individual incidents, thereby increasing transparency and accountability of officer activities. As such, the presence of a BWC could influence officer use of discretion based on the potential for both internal review by the organization the officer works for and external review by the community the officer works within. If this occurs, the adoption of BWCs could moderate the relationship between factors that impact police use of discretion and police behavior. This would be consistent with the deterrence and self-awareness arguments, suggesting that officers reacting to increased oversight could be more legalistic than those who are not subject to additional BWC surveillance. This increased tendency to respond legalistically would

decrease the influence of extralegal factors at the situational, officer, and social-ecological levels on police behavior.

1.5 Current Study

In this study, I examine situational, officer, and social-ecological influences on officer behavior. I then examine whether BWCs moderate the influence of neighborhood factors on police proactivity, arrest, and use of force. To do so, I use data collected through a three-year evaluation of BWCs in the PPD. I collected administrative data for all patrol officers in the department as part of a larger BWC experiment. I combined these data with US Census data to account for neighborhood-level factors. I use multilevel modeling to address two interrelated research questions guided by a social-ecological theoretical framework of policing.

First, how do situational, officer-level, and social-ecological factors impact proactivity, arrest, and use of force? To address this research question, I use data collected from the 18 months prior to the deployment of BWCs. I specifically examine the impact of social disorganization, racial/ethnic population distributions, and violent crime (herein collectively referred to as social ecology) on proactivity, arrests, and use of force. I also include several independent variables to account for situational and officer characteristics. To account for the cross-classified nature of incidents nested in both officers and neighborhoods, I use logistic regression and cross-classified multilevel

modelling. The results of this research question serve as a baseline for my second research question.

Second, do BWCs moderate the relationships between social-ecological factors and proactivity, arrests, and use of force, accounting for situational and officer-level factors? I use data collected for the 18 months following the deployment of BWCs to randomly selected officers to examine this question. In addition to all of the variables used to answer the first research question, I also include an independent variable to account for whether a BWC was activated during an incident. Accounting for BWC activation, as opposed to mere assignment to wear a BWC, is important given some prior BWC research which has reported that the effects of BWCs are only present when the BWC is turned on (Hedberg et al., 2017). To examine the potential for BWCs to moderate the influence of neighborhood factors on officer use of discretion, I include interaction terms between the BWC activation variable and neighborhood measures of social disorganization, racial/ethnic populations, and violent crime. I again use logistic regression and cross-classified multilevel models to evaluate situations cross-nested within officers and neighborhoods.

In sum, in this study I examine the influence of situational factors, officer characteristics, and social-ecological context on proactivity, arrests, and use of force. Given the potential for BWCs to increase organizational and community oversight of police activities, I then evaluate whether BWC activation moderates the relationship between social-ecological context and officer behavior. As police behavior varies across

situations, officers, neighborhoods, I include factors from each of these levels to provide a comprehensive examination of officer use of discretion.

1.6 Organization of the Dissertation

I begin with a discussion of the relevant prior literature to set the backdrop for the current research (Chapter 2). I first describe the guiding theoretical framework. I then discuss police use of discretion and police behavior. This review highlights the importance of accounting for situational, officer, and environmental factors to evaluate police behavior. This further sets a framework for understanding how the introduction of BWCs could change the relationship between social-ecological context and proactivity, arrests, and use of force. I conclude with a discussion of prior BWC research.

In Chapter 3, the research setting, the data used, and my analytical strategy are explained in detail. The results of each research question are discussed in separate chapters. I first evaluate the influence of situational, officer, and social-ecological characteristics on officer proactivity, arrests, and use of force (Chapter 4). I then examine whether the introduction of BWCs moderates the relationships between social-ecological context and police behavior (Chapter 5). I conclude with a summary of the major findings, as well as their policy implications, and directions for future research (Chapter 6).

2. LITERATURE REVIEW

2.1 Introduction

Policing researchers have long examined the impact of situational and officer-level characteristics on police use of discretion, though fewer scholars have examined the effect of social ecology on police behavior. Further, many studies focus on how these factors impact a single outcome, though officer use of discretion could vary across different types of behaviors. In this study, I examine whether officer proactivity (i.e., self-initiated contacts), arrests, and use of force vary as a function of situational, officer, and neighborhood factors. To expand on prior literature, I use a social-ecological framework to evaluate the influence of social disorganization, racial/ethnic population distributions, and crime on officer use of discretion in individual incidents. I then examine whether BWCs influence the relationship between neighborhood factors and proactivity, arrests, and use of force. In short, the purpose of this study is to determine whether discretion is used differently depending on factors occurring at different levels of explanation and for different outcomes, and, if so, whether the introduction of BWCs moderates these differences across different types of neighborhoods. This is an important contribution given the suggestion that BWCs could result in more equitable policing. Specifically, in the first part of my dissertation I examine whether police behavior differs in minority, compared to white neighborhoods while accounting for situational and officer-level factors. In the second part, I examine whether BWCs eliminate differences in police behavior in minority communities, again accounting for the characteristics of individual situations and responding officers.

In this section, I first discuss the theoretical perspectives that explain variation in police use of discretion as a function of situations, officers, and neighborhoods. Because officer use of discretion is influenced by all of these considerations, I broadly describe the major elements contributing to officer behavior at each of these levels of explanation. I then review prior research examining proactivity, arrest, and use of force, the behavioral outcomes examined in the current study. Finally, I address how police discretion is controlled and the potential for BWCs to impact police discretion through increased administrative and community oversight of officer behavior.

2.2 Theoretical Frameworks

Criminologists have long recognized the link between social ecology and crime. This has resulted in the development of criminological theories to explain the relationship between neighborhood conditions and crime, most notably social disorganization (Shaw & McKay, 1942) and concentrated disadvantage (W. J. Wilson, 1987). The relationship between neighborhood context and deviance has also been suggested to impact police responses to crime (Klinger, 1997; J. Q. Wilson & Kelling, 1982) and police behavior (Black, 1980; Kane, 2002), depending on the conditions of the neighborhood in question. Some scholars have called attention to the limited use of theory to explain police behavior (Kane & White, 2009), though the use of solid theory is imperative to guide policy and practice (Mears, 2010). The current study integrates concepts from multiple theories of crime and the application of social control to understand variation in officer use of discretion, with a particular emphasis on theoretical perspectives that account for neighborhood context.

The social-ecological framework used in this study encompasses several theoretical constructs that are expected to influence police behavior, including social disorganization, racial/ethnic population distributions, and violent crime rates. As this dissertation is primarily focused on ecological influences on police behavior, theories initially designed to explain variation in criminal behavior are discussed briefly to explain causal mechanisms and their relation to the role of the police at the neighborhood level. I then detail relevant theoretical perspectives explaining variation in the application of the law and police behavior as a function of neighborhood ecology. Several of these perspectives emphasize the importance of situational elements and officer characteristics in understanding variation in police behavior across space. The important link between micro-level and macro-level explanations of crime has long been discussed (Kornhauser, 1978; Matsueda, 2017; Short, 1998). I argue that these considerations should be expanded to include explanations of police behavior as well. Though none of the theories discussed are directly tested in the current study, the tenets of these perspectives inform the theoretical framework used.

2.2.1 Social Disorganization. Social disorganization theory stems from ecological research conducted in the city of Chicago. Park and Burgess (1925) suggested that cities are organized in distinct urban zones: the central business district, the zone in transition, the zone of workingmen's homes, the residential zone, and the commuter zone. They argued that these zones developed as American cities expanded geographically, which led wealthier residents to move to the suburbs and residents who could not afford to move to residential and commuter zones becoming concentrated in the zone of

transition and workingmen's homes. This process of economic segregation in settlement further resulted in occupational and racial/ethnic segregation, as jobs were increasingly moved to the suburbs where lower-income minority residents were less able to access these opportunities. Shaw and McKay (1942) expanded on early ecological work in Chicago to examine how these patterns of development impacted distributions of delinquency. Their findings indicate that delinquency is tied to neighborhood factors including poverty, residential instability, and population heterogeneity. They further found that neighborhood rates of delinquency, which were often higher in zones in the inner city, remained stable despite changes in the racial/ethnic groups that inhabited those neighborhoods. Thus, neighborhood conditions, not race/ethnicity, were argued to contribute to delinquency through creating social disorganization (Shaw & McKay, 1942).

William J. Wilson (1987) expanded on the social disorganization perspective and suggested that the continual deterioration of inner-city communities contributes to concentrations of disadvantage. He argued that concentrations of female-headed households, unemployment, families dependent on public assistance, and concentrations of racial/ethnic minorities should also be considered in understanding neighborhood organization (W. J. Wilson, 1987). As wealthier and more educated blacks moved from the inner city to the suburbs, inner-city blacks also lost access to strong institutions like schools and churches, resulting in institutional instability in these neighborhoods (W. J. Wilson, 1987). Further, these concentration effects are suggested to differentially impact poor blacks, who are more likely to live in high-poverty, inner-city neighborhoods than

poor whites, who are more geographically dispersed in neighborhoods throughout cities (W. J. Wilson, 1987).

Sampson and Groves (1989) argued that the social disorganization framework was incomplete without accounting for social control and social ties. They suggest that the relationship between neighborhood context and crime is not direct, but instead is mediated through informal social control. As neighborhoods become increasingly disorganized, residents are less able to engage in meaningful informal crime control and instead socially retreat, creating further opportunities for individuals in these neighborhoods to engage in deviant behavior unchallenged (Sampson & Groves, 1989).

In short, social disorganization theorists suggest 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; W. J. Wilson, 1987). Poverty is associated with weaker social institutions, like schools, employment, and churches. Racial/ethnic heterogeneity and concentrations of immigrants inhibits the development of social bonds between neighbors through cultural and language barriers, which limits resident ability to exercise informal social control. Finally, residential instability occurring as individuals move out of these neighborhoods as soon as economically feasible further prevents the development of social bonds between neighbors. As such, these perspectives maintain that neighborhood crime is related to neighborhood-level social control, not concentrations of individuals who are crime-prone in certain neighborhoods (Bursik & Grasmick, 1993).

Given the relationship between social control and crime proposed in social disorganization and concentrated disadvantage frameworks, these perspectives have implications for the police. Neighborhoods attempt to control behavior using both informal and formal social control, with the police being one of the most critical forms of formal social control (Bursik & Grasmick, 1993). As such, the principles of social disorganization have been used to promote changes to policing in certain types of neighborhoods. J. Q. Wilson and Kelling (1982) suggested that the police should emphasize eliminating disorder, as neighborhood inability to maintain order could invite crime into the neighborhood through signaling resident inability to control activities in the area. They suggest that enforcing minor disorder violations can reinforce informal social control and help neighborhoods on the tipping point of becoming crime-ridden regain control over the activities occurring in their neighborhoods (J. Q. Wilson & Kelling, 1982). This variation in the way officers address crime depending on neighborhood structure likely contributes to differences in officer behaviors in different types of neighborhoods.

2.2.2 Racial/Ethnic Population Distributions. Though social disorganization theories argue that racial/ethnic population distributions are related to informal social control and crime, neighborhood racial/ethnic population distributions have long been discussed in relation to police behavior in different areas as well (Black, 1976; Blalock, 1967; Bursik & Grasmick, 1993; Herbert, 1997). Scholars have also suggested that the race/ethnicity of the individual officer and citizens involved in an incident influence

police encounters (Black, 1976, 1980). This section briefly addresses theories surrounding the impact of race/ethnicity on various forms of social control.

In his minority threat perspective, Blalock (1967) suggests that the police use the law to control populations that threaten the majority interests. He further suggests that the relationship between levels of law enforcement and racial/ethnic minority populations is nonlinear. Because small minority populations are unlikely to threaten the majority interest, he suggests that a minority population must reach a certain size threshold before triggering a minority threat response (Blalock, 1967). Once the minority population becomes large enough to threaten the majority, the perceived racial threat will result in increased application of formal social control for members of the group who triggered the threat. However, once a minority population exceeds a certain size, police enforcement against members of that group will diminish as this population is no longer perceived as a threat because it has become part of the majority. As such, Blalock (1967) suggests that the size of the minority population has differential effects on the application of formal social control.

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 citizens who invoke the law (victims/complainants), the law enforcers (police officers), and the citizens 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) argued the law is often applied in a downward direction. As such, those of higher social standing are more

able to invoke the law, those of higher social standing are more likely to invoke the law against those of lower social standing, law enforcers are more likely to apply the law against those of lower social standing than themselves, and that the law is more likely to be applied against suspects with lower social standing in general. He further suggests that citizens who are culturally dissimilar from other residents in their neighborhoods are subject to higher levels of law than those who are similar to their neighbors (Black, 1976). Thus, a full examination of Black's (1976, 1980) sociological theory of law requires accounting for the race/ethnicity of the citizens involved in a situation (victims and offenders), the officer who responds to the incident, and the racial/ethnic composition of the neighborhood the incident occurs within.

Several other hypotheses have implicated the role of racial/ethnic populations on social control. Similar to propositions posed in the racial threat perspective, 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 in neighborhoods that were predominantly inhabited by whites, but that are becoming more racially heterogenous, in response to a perceived invasion of white spaces by minority groups. Black (1976) suggests that racial/ethnic minorities will have higher levels of law used against them when they are encountered in white neighborhoods. Other researchers have similarly suggested that officers determine whether or not citizens 'belong' in certain neighborhoods based on the officers' past experience, and use higher levels of law when citizens are perceived as being 'out of place' (M. K. Brown, 1988; Novak & Chamlin, 2012; Skolnick, 1996). Importantly, this

suspicion is not limited to minorities in white neighborhoods, but also applies to whites in predominantly minority neighborhoods.

Several scholars have suggested that differences in police enforcement in racial/ethnic minority neighborhoods contribute to inequality in later stages of the criminal justice system (Reiman, 2007), and have pronounced effects on the structure of minority neighborhoods. For instance, W. J. Wilson (1987) suggests that the increased likelihood of arrest and incarceration for black males has contributed to the concentration of female-headed households in black neighborhoods, highlighting the power the police have to shape community structure. As such, it is imperative to understand whether the police behave differently in different neighborhoods based on extralegal factors, like race/ethnicity.

2.2.3 Crime. One of the predominant explanations for disparities in police treatment of minority citizens and police behavior in minority neighborhoods is that the police are not responding to race/ethnicity, but rather to indicators of crime (see review in Gelman et al., 2007). This argument is based on the recognition that both crime and police activities are often geographically concentrated in lower income segments of society, often implicating areas with higher numbers of racial/ethnic minorities (Bittner, 1970). This disproportionate deployment of police officers to low income, high crime, minority areas is often attributed to concerns that individuals in these areas are more likely to engage in crime than those in other areas (Bittner, 1970; Kane, 2002; Satzewich & Shaffir, 2009). Ethnographic researchers have also found that officers are more cautious in high crime areas and are more relaxed in low crime areas (Herbert, 1997). In

sum, these scholars suggest that the police could use higher levels of law against citizens they encounter in high crime neighborhoods because officers perceive the people within these neighborhoods as likely contributors to crime and as potentially dangerous.

Implicit bias scholars have also weighed in on this argument and suggest that officers are strongly influenced by neighborhood context, with officers having initial negative reactions to dangerous areas (Fridell & Lim, 2016). These negative reactions to high crime neighborhoods result in the effect of citizen race/ethnicity being overshadowed, ultimately resulting in limited racial/ethnic disparities in police treatment of citizens in high crime neighborhoods (Fridell & Lim, 2016). This has been referred to as the context hypothesis (Correll, Wittenbrink, Park, Judd, & Goyle, 2011) and suggests that researchers should account for the strong impact of neighborhood crime on police behavior when considering racial/ethnic disparities in outcomes. As mentioned above, other scholars have suggested that these factors are interrelated and impact police behavior based on whether the officer perceives the citizen as 'belonging' in the neighborhood that they encountered the citizen within (Lawton, 2007). Lawton (2007) further suggests that these determinations are easier in racially homogenous neighborhoods and are more difficult in racially heterogeneous neighborhoods.

2.2.4 Social Ecology of Police Misconduct. Kane's (2002) social ecology of police misconduct framework explains spatial variation in police misconduct as a function of social disorganization and racial conflict theory. He suggests that the causal mechanisms that result in offending at the neighborhood level also impact police misbehavior. He noted that as deviance increases in an area, police resources are also

increasingly allocated to that particular area, resulting in more opportunities for police-citizen conflict and police use of coercion (Kane, 2002). He specifically argues that socially disorganized communities lack the social capital necessary to address police misconduct and that they experience higher levels of police-citizen conflict due to lower levels of police legitimacy. In sum, the increase in officer misconduct in socially disorganized areas can be tied to increased opportunities for deviance, a higher likelihood of police-citizen conflict, or a combination of these factors (Kane, 2002). To account for constructs from both social disorganization and the racial conflict perspective, Kane (2002) includes measures of community structure, population mobility, and racial/ethnic population distributions as key explanatory variables in his model.

To test his hypotheses, Kane (2002) examined police misconduct from 1975-1996 in the NYPD. His results indicated that police misconduct varied both between and within police divisions and precincts over time, with structural disadvantage and population mobility predicting increases in misconduct over time. Though increases in Hispanic populations predicted increases in police misconduct over time, increases in black populations did not (Kane, 2002). He attributed this to the potential for Hispanic populations to be viewed as a threat due to their increasing population spread, while black populations were increasingly concentrated in smaller areas, and could be viewed as less threatening to the majority group. Kane (2002) provides a useful framework for understanding misconduct as a function of the neighborhoods where officers work. I argue that the mechanisms he proposes to explain misconduct can also be used to explain other forms of police behavior, including proactivity, arrest, and use of force.

2.2.5 Normative Orders in Policing. Unlike Kane (2002) who focused on the impact of police defined geographical units on police behavior, Herbert (1997) emphasizes the impact of more micro-level context on police behavior, while accounting for situational and officer-level factors. Based on fieldwork conducted in the LAPD, he suggests that the way officers control space is driven by six normative orders: law, bureaucratic regulations, adventure/machismo, safety, competence, and morality. Each order is briefly discussed.

Herbert (1997) argued that the importance of *law* should not be overlooked because it is the defining feature of what the police are created to maintain and enforce. Officers also had to be able to match individual actions to laws to refer to such actions as crimes, which limited police behavior in some situations. *Bureaucratic rules* determined the boundaries for officer behaviors and the territoriality they could exercise within those boundaries. *Adventure* highlighted the courage of officers who handled serious offenders. Adventurous officers engaged in aggressive behaviors, such as arrests and use of force, and often preferred to work in high crime minority neighborhoods where they were more likely to encounter dangerous situations (Herbert, 1997).

Concerns for *safety* resulted in officers being hyperaware of their environments (Herbert, 1997). Officers who perceived themselves to be at greater risk in certain areas justified bending legal limitations to preserve their safety, which resulted in disproportionate abuse of blacks and Hispanics in minority neighborhoods which were often viewed as ‘anti-police’ (Herbert, 1997). Officers valued *competence* as the ability to show suspects that their authority should be respected and to show other officers that they

were in control of their assigned areas (Herbert, 1997). When officers felt their authority was challenged, they acted to prove that they were competent and in control, which resulted in officers resorting to higher levels of vigor to reassert their authority and reclaim their sense of competence (Herbert, 1997). Turning to *morality*, the police defined themselves as good guys, suspects as bad guys, and the spaces suspects occupied as 'polluted'. Officers used morality as a way to justify aggressively enforcing laws in some neighborhoods while absolving themselves of the potential for their actions in those neighborhoods to be harmful (Herbert, 1997).

There is no universally agreed upon ranking of the importance of these orders, which can vary depending on the situation, the officer, or the neighborhood, but, they are all used to inform police behavior as they create order through controlling space (Herbert, 1997). The potential for normative orders to conflict leaves room for human agency as individual officers decide how to behave in individual situations (Herbert, 1997). In sum, the normative orders framework provides a useful explanation for understanding how officers give meaning to the spaces they patrol, and how this meaning, in turn, influences their behavior in different types of situations and areas. This perspective also highlights the differences between individual officers in terms of the normative orders they prioritize, which likely contributes to variation in officer behaviors, even when addressing similar situations in the same neighborhoods.

2.2.6 Negotiated Order of Patrol. Klinger (1997) observed that research examining variation in police behavior across different environments was rare, and that there was no theory explaining police behavior as a function of an officer's

organizational *and* physical environment. To address this limitation, he developed a theoretical model to explain ecological variation in the vigor of police enforcement, with vigor referring to the level of formal legal authority an officer uses to address a situation. He notes that policing is territorially defined by an agency's respective jurisdiction, which is then additionally broken down into districts and beats (Klinger, 1997). Further, officers within a shared district develop workgroups, as officers generally remain in the same districts and work with the same officers over extended periods of time (Klinger, 1997). He argues that a combination of organizational and occupational characteristics stemming from the district an officer is assigned to, and the workgroup an officer is a part of, explain variation in officer use of vigor across districts.

Klinger's (1997) model involves variables at several levels of explanation. The first element in his model is the district level of deviance. He argues that as district deviance increases, the district workload increases and the severity of incidents an officer responds to increase as well. As the severity of the immediate offense to which an officer is responding increases, the vigor an officer uses to address that incident also increases. This portion of his model is straightforward and suggests that as the level and severity of deviance increases, officer vigor increases as well.

Klinger (1997) then incorporates aspects of workgroups into his model. As district deviance and workload increase, an officer's perceptions of deviance in their district increase. An officer's increased perception of deviance translates into increased beliefs that crime is normal, that victims are less deserving of vigorous law enforcement, and to higher levels of officer cynicism. With officers increasingly perceiving deviance to be

normal in their districts and being more cynical about the utility of vigorous enforcement, workgroup rules maintaining that officers should vigorously address deviance using formal measures decrease.

The final component of Klinger's (1997) model addresses district resources (e.g., personnel, patrol cars, etc.). When district deviance and district workload are high, resource constraints in the district are also high as officers are expected to address a large number of serious incidents with a fixed number of resources. Higher levels of resource constraints result in decreased workgroup rules encouraging officers to vigorously respond to deviance. In short, officers are less vigorous in districts with higher rates of deviance because they are more likely to view crime as normal, victims as deserving, to be cynical about the utility of vigorous enforcement, and to experience resource constraints that limit their ability to engage in vigorous enforcement.

Despite the age of Klinger's (1997) model, it has yet to be fully tested. Some researchers have attributed this to the theoretical complexity of the model, which requires the use of multiple data sources and complex statistical analyses (Sobol et al., 2013). Researchers who have partially evaluated this model have found mixed results (R. R. Johnson & Olschansky, 2010; Lautenschlager & Omori, 2018; Sobol, 2010a; Sobol et al., 2013). I do not attempt to test Klinger's model. However, given its emphasis on organizational structure, crime, and officer behavior in different places, it is relevant to the present inquiry.

As the above section illustrates, numerous social-ecological constructs have been proposed to impact police behavior in different types of neighborhoods. The elements of

neighborhood social disorganization, racial/ethnic population distributions, and crime are found through many of the policing theories discussed. Given the complex interrelationships between these factors, I use a broader social-ecological framework including all of these elements to examine variation in police proactivity, arrests, and use of force. As several of these theoretical perspectives additionally implicate the role of situational and officer characteristics, incorporating situational and officer factors is imperative to assess the use of police discretion.

2.3 Police Discretion

In his book *The rise of big data policing: Surveillance, race, and the future of law enforcement*, Ferguson (2017) writes:

> 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 (p. 162).

This quote highlights the varied nature of policework in terms of the types of incidents the police address, as well as the different locations in which these encounters take place. Because policing is complex, officers have discretion in how they enforce the law. Police use of discretion was first studied by the American Bar Foundation in the 1950s. That study revealed that officers exercise discretion routinely as they encounter both criminal and noncriminal incidents (Beckett, 2016; Walker, 1993). One of the key

contributions of that study was the recognition of the complex and varied situations that officers were expected to address (Goldstein, 1993). Prior to that study, those who did not work in policing assumed that the police exercised full enforcement of the law, thereby minimizing the role of officer decisions in administering justice (Ohlin, 1993). However, by choosing which laws to enforce, when to apply them, and whom to enforce them against, the police establish what is legally acceptable behavior (Davis, 1969). Thus, police discretion is an integral part of the criminal justice process.

Police discretion is justified due to the resource and time constraints officers face enforcing vague laws guided by unclear organizational policies (Bayley & Bittner, 1997; Brooks, 1997; Goldstein, 1963). Though officers should fully enforce all laws, discretion is recognized as necessary due to citizen dissatisfaction with full enforcement and the benefits of overlooking minor offenses to solve more serious problems (Goldstein, 1963; J. Q. Wilson, 1978). As findings from the American Bar Foundation indicated, even if full enforcement was desirable it would be unattainable (Ohlin, 1993). The way officers choose to use their discretion is influenced by considerations operating at numerous levels, including the characteristics of the situation an officer is responding to, officer-level factors, neighborhood context, organizational and administrative considerations, policies, and laws. Given the focus of the current study, only situational, officer, and social-ecological influences on police discretion are discussed.

2.3.1 Situational Influences on Discretion. According to Goldstein (1963) discretion allows the police to use alternatives to arrest when presented with evidence of a crime in order to achieve desired objectives. The recognition that police discretion is

used to achieve goals should not be understated. J. Q. Wilson (1978) further notes the limitations of laws in guiding officer use of discretion.

> To the patrolman, the law is one resource among many that he may use to deal with disorder, but it is not the only one or even the most important; beyond that, the law is a constraint that tells him what he must *not* do but that is peculiarly unhelpful in telling him what he *should* do. Thus, he approaches incidents that threaten order *not in terms of enforcing the law but in terms of "handling the situation"*. (J. Q. Wilson, 1978, p. 31, emphasis in original)

As this quote indicates, officers consider numerous factors, in addition to laws and administrative policies, when determining how to act in a given incident. J. Q. Wilson (1978) describes some of the situational factors officers consider when responding to incidents, including: offense severity, the number of officers present, citizen characteristics, and the social distance between officers and citizens.

It is widely recognized that officers have more discretion when addressing minor offenses and less discretion when handling more serious incidents (M. K. Brown, 1988). Offense severity is often found to be the strongest predictor of police behavior (Buvik, 2016; D. A. Smith & Visher, 1981; J. Q. Wilson, 1978). J. Q. Wilson (1978) suggests that officer use of discretion is guided by both the function the police are expected to perform (either law enforcement or order maintenance) and how the incident is initiated (either police-initiated or citizen-requested). Police-initiated law enforcement situations are often victimless crimes in which the officer serves as the complainant. In citizen-requested law enforcement, a citizen has been victimized and calls the police for help. In police-

initiated order maintenance, officers choose to become involved in actual or potential disorder cases. Finally, in citizen-requested order maintenance, a citizen calls the police in response to public or private disorder. Given the differences in departmental oversight for each of these types of cases, officers have the most discretion in cases that are police-initiated and/or involve order maintenance, and the least discretion in citizen-requested law enforcement incidents (J. Q. Wilson, 1978). As these examples illustrate, the situational factors leading to officer intervention and the function officers are supposed to perform impact the way officers choose to use their discretion and the amount of oversight to which that use of discretion is subject.

Other scholars suggest that constraints on officer discretion depend on the specific activity the officer is engaging in. Bittner (1967) argues that the police serve two primary functions, law enforcement and peacekeeping. He argues that the law enforcement function is regulated by the law and that officers are held accountable for adhering to procedural guidelines through the dispositions of court cases (Bittner, 1967). However, officers are relatively unrestrained in peacekeeping activities, which are not subject to strong guidelines and the outcomes are rarely reviewed by others (Bittner, 1967). Thus, regulations impacting police discretion differ depending on what the officer is doing. The use of vigor is also suggested to depend on the severity of the offense an officer is responding to. Klinger (1997) suggests that officers always use high levels of vigor in serious offenses, but that the use of vigor varies depending on other factors in less serious offenses.

Because both the severity of the incident and the strength of evidence against a suspect impact officer behavior, some have suggested that officers could be more strongly impacted by extralegal characteristics (e.g., suspect and victim characteristics) in less serious offenses or those with ambiguous evidence (Tellis & Spohn, 2008). This suggestion is related to the liberation hypothesis that is often discussed in the courts and sentencing literature (Kalven & Zeisel, 1966). The liberation hypothesis suggests that racial disparities in sentencing outcomes are confined to minor offenses and are not present in more serious offense types. This suggestion has been supported in one study which found that defendant race was only associated with decisions to incarcerate in less serious offense types, but was not associated with incarceration decisions in serious offenses (Spohn & Cederblom, 1991). Some scholars have suggested that applying theories used in the sentencing literature to examinations of police behavior is an important step in improving our understanding of disparities in policing outcomes across racial/ethnic groups (Tillyer & Hartley, 2010).

Officers are likely to behave differently when they respond to incidents alone compared to when they respond to incidents with other officers. For instance, officers could use more discretion when addressing situations by themselves and resort to more legalistic policing when additional officers are present. On the other hand, officers could be more forceful in the presence of other officers in order to quickly exert control over the situation. For example, one study found that citizens involved in incidents with two-officer units were more likely to be arrested and to be injured than citizens who encountered solo officers, suggesting that solo officers could resolve incidents using less

formal methods (Decker & Wagner, 1982). The use of one-officer units was initially driven by cost, despite some concerns that solo officer units would be less effective than two officer units (C. Wilson & Brewer, 1992). Though concerns about the effectiveness of one-officer units have largely been abated, researchers comparing one-officer versus two-officer patrol cars have identified some differences in police behavior, depending on the study site and the outcome examined. For instance, some studies have identified differences in the number of complaints generated and the number of traffic violations observed between one-officer and two-officer patrol units (C. Wilson & Brewer, 1992). Thus, officers could behave differently when other officers are involved in an incident, though the nature of this effect is unclear.

In addition to offense severity and the presence of other officers, officers also consider the characteristics of the involved individuals when making decisions – a practice praised by some and condemned by others (Goldstein, 1993). As officers interact with both suspects and victims, the influence of the characteristics of each of these parties on officer behavior is discussed. The police are conditioned to constantly search out potentially dangerous people, this has resulted in officer reliance on a perceptual shorthand guided by a combination of citizen demographic and behavioral cues to identify ‘symbolic assailants’ (Skolnick, 1996). Thus, both citizen demographics and behaviors matter. Westley (1970) found that officers categorized citizens into groups based on the political power of the citizens and the neighborhoods they encountered citizens within. He found that officers treated citizens with more political power respectfully and those with less political power more forcefully. Considerations of

political power are often tied to citizen race/ethnicity and socioeconomic status. Demeanor is also important in determining how a case is handled, with officers underenforcing laws against respectful and deferent citizens (Black, 1980; Buvik, 2016) and using forceful action against citizens who are disrespectful or challenge police authority (Herbert, 1997; Lipsky, 1980; Van Maanen, 1978). Those citizens who challenge police authority are likely to be treated harshly by officers, either through arrest or use of force, as a way for the officer to correct the citizens' behavior (Van Maanen, 1978). Finally, though officers generally defer to victims, when a victim does not agree with an officers' decision, the officer will consider the characteristics of the victim and their culpability in their victimization when deciding how to resolve an incident (M. K. Brown, 1988; J. Q. Wilson, 1978).

In sum, multiple situational factors impact the amount of discretion that officers have to address an incident and how officers use their discretion to resolve the situation. Discretion is used differently in more serious incidents that are law enforcement issues and are initiated by citizens, when other officers are present, and in incidents involving victims who want to pursue charges (M. K. Brown, 1988; Lawton, 2007; Terrill & Mastrofski, 2002; J. Q. Wilson, 1978). Further, officers use their discretion differently depending on citizen demographic characteristics and demeanor (Black, 1976, 1980; Skolnick, 1996; Van Maanen, 1978). These considerations at the situational level likely impact police use of discretion in similar ways across different officers. However, the characteristics of individual officers could also impact police use of discretion.

2.3.2 Officer-Level Influences on Discretion. Police use of discretion is also informed by officer-level factors including demographic characteristics, past experiences, and beliefs (Brooks, 1997). Until relatively recently, American police officers were predominantly white males. Support for hiring more racial/ethnic minority and female officers has come from several sources, including the President's Task Force on 21st Century Policing (*Final Report of the President's Task Force on 21st Century Policing*, 2015).

Hiring racially/ethnically diverse officers is often promoted to improve police relations with minority communities (Decker & Smith, 1980). Using interviews with prospective police officers Todak, Huff, and James (2018) found that racial/ethnic minorities were motivated to become officers by a desire to better police relations with the communities they represent. This was especially noted in the case of Hispanics, who aspired to improve communication between Spanish-speaking communities and the police (Todak, Huff, et al., 2018). However, research examining whether improving minority representation in police departments reduces disparities in policing outcomes is inconclusive (Lum et al., 2016). Given Black's (1976, 1980) propositions, officer race/ethnicity is an important consideration in understanding officer application of the law.

Other officer-level factors have also been noted to impact officer use of discretion. Policing is a historically male dominated profession, with male officers still outnumbering female officers. Though female officers were initially given different assignments than men and were not assigned to routine patrol until relatively recently,

female patrol officers today are expected to perform the same function as males (Archbold & Schulz, 2012). Research examining differences between male and female officers has identified more similarities than differences (Archbold & Schulz, 2012), though some behavioral differences between male and female officers have been identified (Novak et al., 2011). For instance, one study found that female officers were more likely to conduct arrests when their supervisors were present, though male officers were not (Novak et al., 2011).

Several national commissions on policing have also promoted increasing educational requirements for police officers (e.g., the 1967 President's Commission on Law Enforcement and the more recent 2015 President's Task Force on 21st Century Policing). These efforts are predicated on the idea that higher education will improve police professionalism (Carter & Sapp, 1990). As such, examining differences in officer education and the use of discretion is important. Findings that higher levels of officer education improve police outcomes could justify increasing educational requirements, incentives for advanced education, and increased training for officers (McElvain & Kposowa, 2008). Researchers who examined traffic stops conducted in St. Louis (MO) found that college-educated officers were more likely to conduct stops for less serious violations, conduct higher rates of consent searches, and conduct more discretionary arrests than officers with lower levels of educational attainment (Rosenfeld, Johnson, & Wright, 2018). They suggest that these differences could be attributable to more educated officers responding to promotional criteria grounded in these activity measures, leading these officers to respond more legalistically in hopes of advancing their careers. Other

researchers have found that education can serve as a protective factor against misconduct (Huff, White, & Decker, 2018; Kane & White, 2009) and is associated with lower levels of violence in police-citizen encounters (Rydberg & Terrill, 2010; Shjarback & White, 2016). Prior researchers often examined the relationship between education and only one behavioral outcome, resulting in conflicting effects across studies – this renders the study of multiple police behaviors important (Rydberg & Terrill, 2010).

Job-related experiences also impact officer use of discretion. Police officers are street-level workers and their behaviors are guided by norms and beliefs surrounding the appropriate action to take in a given situation (Maynard-Moody & Musheno, 2000). As previously mentioned, these considerations are largely linked to the conception of the 'symbolic assailant', where officers use prior experience (perceptual shorthand) to identify and intervene in those individuals who are perceived as likely to engage in crime (Skolnick, 1996). Some researchers have suggested that racial disparities in policing outcomes are due to unconscious racial stereotypes that officers have based on past experience with racial/ethnic minority suspects (M. R. Smith & Alpert, 2007). They further suggest that these stereotypes cannot be attributed to differential offending on the part of minorities or differential deployment of the police to minority neighborhoods (M. R. Smith & Alpert, 2007). Thus, officer years of experience could result in different behavior because more experienced officers have been involved in a greater number of incidents that inform their use of discretion. Other job-related characteristics like patrol jurisdiction, shift assignment, and informal supervisor expectations have also been suggested to impact officer use of discretion (Bayley & Bittner, 1997; Brandl &

Stroshine, 2012; Kane, 2002; Klinger, 1997; M. R. Smith & Alpert, 2007), as the situations that officers encounter differ depending on where and when officers work.

A long line of research has addressed police officer development of distinct occupational styles based on individual officer values and perceptions. These occupational styles impact how officers perceive and use their discretion. Brown (1988) contends that officers develop individualized responses for how they address problems on the street, despite shared experiences. He argues that an officers' occupational style can be defined on the basis of how aggressive they are in the pursuit of crime control and how selective they are in enforcing the law. He categorizes officers into one of four styles: old style crime fighters (high aggressiveness, selective enforcement), clean beat crime fighters (high aggressiveness, non-selective enforcement), service (low aggressiveness, selective enforcement), and professional (low aggressiveness, non-selective enforcement). Operational style also impacts how officers perceive their organization and the perceived limits on their discretion by their organization, with professional officers perceiving the most organizational limits on their discretion (M. K. Brown, 1988). Scholars have also noted that officer cultural orientations are linked to their interactions in the training academy and with other members of their squad (Muir, 1977), highlighting the importance of workgroups on officer behavior. Other researchers have expanded on this work, finding important links between officer attitudes and behavior (Ingram et al., 2018; Phillips & Sobol, 2011; Sobol, 2010b; Terrill & Paoline, 2015). As attitudes are not directly examined in this study, I do not detail the findings from this body of research.

2.3.3 Social-Ecological Influences on Discretion. Researchers have identified differences in police behavior across different environmental contexts for decades. "Though the legal and organizational constraints under which the police work are everywhere the same or nearly so, police behavior differs from community to community" (J. Q. Wilson, 1978, p. 83). As highlighted in this quote, officers responding to similar incidents in different areas could use their discretion to resolve the situation in different ways. The social-ecological dimensions examined here are social disorganization, racial/ethnic population distributions, and crime.

Several policing scholars have suggested that social ecology impacts the amount of law, or vigor, an officer uses. However, these scholars have made somewhat conflicting arguments. Black (1976) suggests that officers will use higher levels of law in areas with lower social organization. He suggests that the use of formal social control (i.e., law) is higher in these areas to compensate for the lower levels of informal social control in these neighborhoods. In short, he argues that officers are more likely to resort to legalistic methods (like arrests) in disorganized neighborhoods compared to more organized neighborhoods. Klinger (1997), on the other hand, suggests that officers will use lower levels of vigor in areas that they perceive as deviant, often implicating poor, minority neighborhoods. Recall that vigor refers to the extent of formal authority officers use to enforce the law. He suggests that officers in these areas will view crime as normal and victims as undeserving of full enforcement (especially when dealing with minor offenses). In short, unlike Black (1976, 1980) who argues that the police are more legalistic in poor, minority neighborhoods, Klinger (1997) argues that the police are less

legalistic. Importantly, Klinger (1997) suggests that police responses are linked to the severity of the offense they are responding to, in addition to neighborhood conditions. As such, officers will respond legalistically in disorganized neighborhoods if the offense is severe enough.

Social disorganization has been theorized to impact other police behaviors, beyond the extent of authority used, as well. Kane (2002) suggests that the factors that contribute to citizen deviance also contribute to police deviance, resulting in officers engaging in higher levels of misconduct in areas with higher levels of social disorganization and concentrated disadvantage. He argues that the lack of informal social control in these neighborhoods creates opportunities for the police to take advantage of residents who have little means of protecting themselves. This misconduct could take many forms, including abuse of authority and excessive use of force. Though these social-ecological theories of policing have alternative explanations for officer behavior in different types of neighborhoods, and seek to explain different outcomes, they all have implications for how social disorganization impacts police behavior. Given the varying explanations proposed, and the different outcomes these theories attempt to explain, examining the influence of social disorganization on three distinct police discretionary behaviors (proactivity, arrest, and use of force) enables a comparison of the utility of these theories for explaining police use of discretion.

Researchers have also examined the relationship between racial/ethnic minority populations and the use of formal social control, including the police, for decades. Black (1976) argues that the police will use higher levels of law in areas with higher

racial/ethnic minority populations. He suggests this is linked to the social distance between the police (who were predominately white males at the time of his research) and the residents in minority communities. Kane (2002) argues that the police could respond to increases in minority populations by engaging in more aggressive police tactics in those areas. He found that areas with greater increases in Hispanic populations also experienced higher levels of misconduct.

Finally, policing scholars have long acknowledged that police behavior differs in high crime and low crime neighborhoods (M. K. Brown, 1988). Klinger (1997) argued that officers will come to view crime as normal in areas characterized by high levels of deviance, which results in officers responding to crime in these areas less vigorously. He suggests that this is largely due to officer perceptions that victims in high crime areas are likely to be offenders in other incidents, rendering them less worthy of vigorous police responses. Further, incidents occurring in high crime areas are particularly likely to be overlooked by the police when victims are unwilling to press charges, as these incidents are unlikely to be pursued by prosecutors anyway (Goldstein, 1963). Other scholars suggest that police officers could be more vigorous in addressing crime in dangerous neighborhoods as a way to exert their authority over residents in these areas (Black, 1976; Herbert, 1997). Some researchers suggest that the police view these high crime neighborhoods as places to prove their effectiveness in performing their law enforcement function by aggressively responding to incidents occurring in these areas (Herbert, 1997). Recent research examining predictive policing suggests that officers could be more guarded and on-edge in areas perceived as high threat, which could result in aggressive

police responses to situations in those areas (Ferguson, 2017). As indicated by these somewhat contradictory explanations, the relationship between neighborhood crime and police behavior is complex, and likely depends on the nature of the specific incident in question and the characteristics and motivations of the responding officer.

2.4 Police Behavior

As the above sections illustrate, police discretion varies across different types of situations, is used differently by individual officers, and is impacted by social-ecological factors operating at the neighborhood level. The way officers use their discretion is often examined through looking at behavioral outcomes, with prior research generally focusing on one type of behavior. This approach is limited in explaining the multitude of options officers have to address an incident. In the current study, I specifically focus on the impact of situational, officer, and social-ecological factors on three forms of police behavior: proactivity, arrests, and use of force. Through using three separate outcome measures, I examine the differences between officer behavior in situations with varying levels of oversight. These outcomes were selected because proactivity is highly discretionary and is subject to limited review, while arrest and use of force are subject to more stringent regulations and internal and external oversight.

This multilevel approach to examining police behaviors with varying levels of discretion fills an important gap in the literature on police behavior. This need was well articulated by Warner (1997):

> Most studies of police discretion operate at only one level of analysis. Some focus on political conflict and therefore examine broader units of analysis (e.g., cities);

> others, which explore social psychological processes, use individual incidents as units. We need systematic theories of police behavior that would incorporate findings across different behaviors and contextualize them in different units of analysis … Only when these behaviors are viewed in combination will we have a clearer understanding of police discretionary behavior. (p. 647-649)

Through using a multilevel framework to assess three different police behaviors, the current study fills this gap. In this section, I discuss the importance of each of the behavioral outcomes chosen, as well as the prior research examining the impact of situational, officer, and neighborhood factors on these outcomes.

2.4.1 Proactivity. Police activity is primarily driven by calls-for-service, where officers are requested to deal with a situation that has already, or is currently occurring (Black, 1980; Lum, Koper, Wu, Johnson, & Stoltz, 2018). However, a notable portion of police actions are instigated by police officers themselves. Using a national sample of 180 police agencies employing 100+ officers, researchers found that between 20-50% of incidents recorded in computer-aided-dispatch (CAD) data were self-initiated (Lum et al., 2018). These police-initiated incidents are referred to as proactive contacts in the current study.

Proactive activities are highly discretionary as officers use their initiative in attempts to achieve order maintenance or law enforcement functions, often with limited organizational oversight (M. K. Brown, 1988; Lum et al., 2018; D. A. Smith & Visher, 1981; J. Q. Wilson, 1978). Because officers cannot write citations and conduct arrests for every violation they witness (Lipsky, 1980), scholars have argued that the practicality of

full enforcement is a much stronger determinant of police action than laws (Bittner, 1967). In fact, many improper uses of officer discretion involve nonenforcement, though selective enforcement is a more serious problem (Davis, 1969). Selective enforcement can lead to officers enforcing laws depending on the characteristics of the involved individuals, or by fully, partially, or never enforcing particular laws (Davis, 1969). As such, examining proactive police contacts provides some insight into the types of situations the police are compelled to address. Prior research addressing proactivity is discussed at the situational, officer, and neighborhood level.

The American Bar Foundation survey indicated that officers routinely exercise vast amounts of discretion in determining whether to intervene in a situation, what types of incidents to intervene in, and what types of individuals to initiate contacts with (Goldstein, 1993), highlighting the relevance of situational factors in officer proactivity. Evaluating proactive police contacts is difficult because it is impossible to estimate the number of legal violations police officers witness but chose not to engage in. Particularly in less serious incidents, officers have to decide whether they are going to intervene, and if so, how they are going to intervene (J. Q. Wilson, 1978). Further, the types of incidents vulnerable to proactive police intervention are primarily limited to offenses that occur in public, such as traffic violations, vice, and drug related crimes (Black, 1980). In one study of police proactivity, researchers found that officers often defined proactivity as traffic enforcement (Lum et al., 2018). They further found that proactive traffic enforcement efforts were not guided by crime analysis or policy (Lum et al., 2018). The lack of guidance for officers engaging in proactivity could result in unintended

consequences, especially if this enforcement differentially impacts citizens depending upon their demographic characteristics.

In addition to the types of situations vulnerable to police proactivity, officer discretion involves decisions about whom to stop and search. Young, black males are often overrepresented in proactive contacts (Walker, 1993). This has been heavily studied in the traffic stop literature in response to racial profiling concerns, though the impact of citizen race/ethnicity on officer decisions to conduct stops remains unclear. In discussing racial disparities in police stops for vehicle equipment violations, Skolnick (2007) poses some critical questions, "what do police notice first, the race of the driver or the broken taillight? And how would we know?" (p. 68). Other research using interviews of officers in the Hamilton Police Service in Canada found that officers define what they do as criminal profiling, instead of racial profiling, and suggested that stops of minorities were linked to citizen behaviors, not demographic characteristics (Satzewich & Shaffir, 2009). In their study of pedestrian stops in New York City, Gelman, Fagan, and Kiss (2007) found that black and Hispanic citizens were overrepresented in proactive stops in relation to both their proportion of the population and compared to estimates of crime committed by these groups. They further found that controlling for precinct did not eliminate disparities in stop rates, but actually enhanced them, with blacks and Hispanics still being more likely to be stopped than whites, regardless of the racial characteristics of the precinct (Gelman et al., 2007). Because citizen characteristics have been suggested to impact police proactivity (Black, 1980), scholars suggest that these discretionary choices

have significant ripple effects for the rest of the criminal justice system as well (Ferguson, 2017; Kochel, Wilson, & Mastrofski, 2011).

Proactivity is also related to officer characteristics. Because proactivity is largely unregulated, when and how officers engage in proactivity is primarily left to the discretion of individual officers (Lum et al., 2018). The amount of proactivity an officer engages in is also related to their shift assignment and the geographic area the officer is assigned to, with some shifts and locations providing more opportunities for proactivity than others (Black, 1980). The high autonomy that patrol officers have in their uncommitted time results in some officers aggressively enforcing all laws, others selectively enforcing laws, and some using uncommitted time to engage in recreational activities (Black, 1980; M. K. Brown, 1988). Decisions to use nonenforcement are often spontaneous and can be influenced by extralegal factors like officer mood and how close they are to the end of their shift (M. K. Brown, 1988). Further complicating this issue is the fact that the official recording of proactivity varies across individual officers (Wu & Lum, 2017). Proactivity is captured when an officer reports their engagement in a self-initiated stop to dispatch. Officers have various motivations for recording their involvement in proactive activities. Officers could choose to record some proactivity if they feel they are at risk, or they could choose not to record a proactive contact if they are not concerned about their safety (Herbert, 1997). This possibility indicates that there could be bias in the types of proactive incidents that are commonly recorded compared to those that are not.

Finally, social ecology also impacts proactivity. Though reactive policing is primarily driven by citizens calling the police, proactive policing is related to the distribution of police resources to specific areas (Black, 1980). As such, police use of proactivity is tied to the characteristics of the neighborhood the officer is working in, with greater numbers of officers often assigned to neighborhoods with higher rates of crime. This differential deployment also results in increased officer presence in minority and poor neighborhoods. As officers are more likely to be present in certain types of neighborhoods, they are inherently more likely to self-initiate contacts in some neighborhoods compared to others.

Researchers have identified differential proactivity in relation to neighborhood characteristics, though the findings across studies are inconsistent. Many scholars examining proactivity have focused on traffic enforcement. For instance, researchers examining traffic stops in Miami-Dade found that concentrated disadvantage was unrelated to racial/ethnic group stop rates (Stults, Parker, & Lane, 2010). Prior researchers have also focused on the racial/ethnic population distributions and crime on proactivity in different neighborhoods. Officers interviewed in Canada suggested that these issues were intertwined, as officers deployed to high crime minority neighborhoods were naturally going to engage in more stops of minority citizens (Satzewich & Shaffir, 2009). However, recall that Gelman et al. (2007) found that blacks and Hispanics were overrepresented in pedestrian stops, regardless of the racial distribution of the precinct and the proportion of crime committed by blacks and Hispanics. Establishing policies for officer behavior in minority neighborhoods is challenging as officers who feel that

citizens in minority neighborhoods should be left alone are charged with underenforcement, and those who believe that the administration wants them to crack down are charged with harassment (J. Q. Wilson, 1978). This has led some researchers suggest that the police are "damned if they do, damned if they don't" when it comes to stopping racial/ethnic minorities (Gelman et al., 2007).

Neighborhood crime also impacts proactivity. Several researchers have found that officers are *less* likely to engage in proactivity in high crime neighborhoods (R. R. Johnson & Olschansky, 2010; D. A. Smith, 1986). Other researchers, however, have found that officers were *more* likely to conduct traffic stops in areas with higher levels of violence (Stults et al., 2010). This suggests that the relationship between police-initiated contacts and neighborhood crime is complex. Wu and Lum (2017) found that the proportion of police proactivity to crime was very similar in spatial units (they examined census tracts, block groups, blocks, and street segments) with low levels of crime. However, there were differences in levels of proactivity and crime in areas with higher levels of crime, as some areas experienced more crime than proactivity and vice versa (Wu & Lum, 2017). The finding that some high-crime areas had more crime than proactivity could suggest that officers were less proactive in those areas, or it could be indicative of resource deficiencies as officers spent more time responding to calls-for-service and had less time available to be proactive (Wu & Lum, 2017). The possibility that officers have less time to engage in proactivity in high-crime neighborhoods has been suggested by other scholars as well (Black, 1980; Klinger, 1997).

Some prior researchers have used multilevel models to examine influences on police proactivity. Researchers who examined searches pursuant to traffic stops in St. Louis (MO) found support for Black's (1976, 1980) propositions (Rojek, Rosenfeld, & Decker, 2012). Namely, searches were most likely to occur in stops of black drivers by white officers, followed by stops of white drivers by white officers, stops of black drivers by black officers, and least likely in stops of white drivers by black officers (Rojek et al., 2012). Several researchers have found that blacks were more likely to be stopped in neighborhoods with large white populations, supporting racial threat theory (Ferrandino, 2015; Gelman et al., 2007; Stults et al., 2010). In Miami-Dade, this effect was especially pronounced for black and Hispanic drivers in white neighborhoods with high levels of violence (Stults et al., 2010). Their findings suggest that neighborhood racial composition is a stronger predictor of stop rates for racial/ethnic minorities than concentrated disadvantage or social disorganization (Stults et al., 2010), lending support to the context hypothesis.

Other researchers have found that whites were subject to higher rates of stops, frisks, and searches when they were in neighborhoods with low white populations, suggesting that officers were more proactive in contacting whites who seemed "out of place" (Ferrandino, 2015; Rojek et al., 2012). Whites were also subject to higher levels of pedestrian stops on suspicion of drug-related activities in predominantly black neighborhoods in New York City (Gelman et al., 2007). These studies together indicate that police proactivity is impacted by the race of the subject stopped, the race of the officer, and the racial composition of the neighborhood the stop occurred within. These

findings highlight the importance of accounting for suspect, officer, and neighborhood characteristics when examining police behavior in individual incidents.

It is important to determine whether the same situational, officer, and social-ecological factors that contribute to proactive police contacts also contribute to arrests, which involve greater constraints on discretion. In their discussion of potential depolicing in response to DOJ pattern and practice investigations, Chanin and Sheats (2018) write, "it is much more difficult, even impossible, for an officer to engage in protest by ignoring evidence to support the arrest of a car thief or a burglary suspect in the same way an officer may choose to drive past someone loitering or engaging in disorderly conduct" (p. 112). This quote further emphasizes the different levels of discretion officers have to engage in proactive stops compared to arrests, which are discussed in the next section.

2.4.2 Arrests. Arrests are a crucial point in the criminal justice process because they determine whether or not an individual offense will be brought to the attention of the court for prosecution (Goldstein, 1963). The decision to conduct an arrest is complex because officers have a wide range of options to address situations and numerous potential charges to file if they do choose to conduct an arrest (Walker, 1993). In many cases, even when the police have evidence that an offense has been committed, they will still choose not to effect an arrest (Black, 1980; Goldstein, 1993). When officers choose not to conduct an arrest, it is not that they are choosing not to act, merely that they are choosing an alternative response to a situation – including issuing verbal warnings, separating parties in a disagreement, etc. (Bittner, 1967). Unlike incidents that do not result in arrest, arrests are later judged by criminal justice actors outside of the police

department (Bittner, 1967). Prosecutors and court officials who review arrests determine the appropriateness and preferred outcome of the arrest (Bittner, 1967). However, arrests are not exclusively made to initiate criminal prosecutions, but are also made to obtain order (Goldstein, 1993). This section details the situational, officer, and ecological influences on arrest decisions.

In terms of situational factors, offense severity is one of the strongest predictors of arrest (Black, 1980; D. A. Smith & Visher, 1981). Officers have a lot of power in choosing not to effect an arrest, especially in misdemeanor cases (M. K. Brown, 1988). In Westley's (1970) study, the officers that he worked with reported that conducting arrests for minor offenses that were unlikely to be pursued in court was a waste of time. Further, many officers felt that arresting every traffic violator would not only be impossible but would also harm community relations (Westley, 1970). In Bittner's (1967) study of policing on skid row, he found that officers sometimes conducted arrests for low-level offenses when suspects were intoxicated in order to protect the arrestee from being victimized while they were vulnerable. Officers in another study justified the use of arrests for low-level offenses using the pretext that these individuals were likely engaged in other crimes as well (M. K. Brown, 1988).

Suspect characteristics also influence arrest decisions. Officers are more likely to arrest disrespectful suspects (D. A. Smith & Visher, 1981), resulting in some concern that officers enforce their authority more than the law (Black, 1980). In a meta-analysis examining the impact of suspect characteristics on arrest decisions, Kochel et al. (2011) found that minorities were more likely to be arrested than whites even when controlling

for offense severity, suspect demeanor, and victim preferences (see Smith & Visher, 1981 for similar findings; though these findings are not universal Levchak, 2017). This overrepresentation of minority citizens at the arrest stage has important implications for later stages in the criminal justice process (D. A. Smith & Visher, 1981). In discussing the potential for arrests to vary across citizen demographics, Davis (1969) suggests that the unequal use of arrests across demographic groups results in unequal justice, with crimes that do not result in arrest being "forever unpunished". Finally, victim preference plays a strong role in officer decisions to arrest (D. A. Smith & Visher, 1981; J. Q. Wilson, 1978), with one researcher even finding that victim preference was a better predictor of arrest than evidence (Black, 1980).

Turning to officer-level factors, officers could choose an alternative to arrest because they view another action as a more effective way of addressing the problem at hand. These views vary between officers depending on their occupational outlooks (M. K. Brown, 1988). Researchers have also examined the impact of officer demographic characteristics. Though some researchers have found that officers with higher educational attainment are more likely to conduct discretionary arrests (Rosenfeld et al., 2018), others have found no association between education and arrest (Rydberg & Terrill, 2010). In a study on the impact of gender on arrest, Novak et al. (2011) found that male and female officers consider different factors when conducting arrests. Female officers were more likely to arrest suspects who were non-deferent than male officers, a finding the authors attributed to female officers experiencing additional challenges in establishing competency in interactions with suspects, as compared to male officers (Novak et al.,

2011). Female officers also reacted to the presence of other officers and their supervisors differently, with females being less likely to conduct an arrest when another officer was present but more likely to conduct an arrest when a supervisor was present (Novak et al., 2011). The authors suggested that these differences could be due to females deferring arrests to male officers to adhere to 'team-player' stereotypes when other officers were present, while experiencing additional pressure to prove their law enforcement proficiency in front of supervisors and increasing their arrests in response (Novak et al., 2011).

Officer shift and squad assignment can also impact officer perceptions about when arrests should be conducted. Officers in one study expressed that their work priorities were known within their unit and differed from officers working in other units (Buvik, 2016). This highlights the importance of controlling for officer assignment when examining officer behavior, as officers act differently depending on the norms and expectations in their workgroups (Ingram, Paoline, & Terrill, 2013; Klinger, 1997).

Neighborhood context also impacts arrest decisions. One study found that officers viewed arresting 'bad guys' in certain neighborhoods as restoring order and peace to those areas (Herbert, 1997). Some researchers have found that officers were less likely to conduct arrests in wealthier and more socially organized neighborhoods (Lum, 2011). Other researchers, however, found that officers conducted fewer misdemeanor arrests in areas with higher levels of social disorganization (R. R. Johnson & Olschansky, 2010). Some researchers have identified no relationship between arrest and neighborhood concentrated disadvantage (Sobol et al., 2013), suggesting the relationship between arrest

and community structure are not universal across all studies. A researcher examining differences in arrest rates for discretionary incidents in Illinois found that urban areas with higher per capita income had lower discretionary arrest rates and rural areas with higher per capita income had higher discretionary arrest rates (Crank, 1990). Percent unemployment and the number of foreign language speakers were associated with lower arrest rates in urban agencies, but were unrelated to arrest in rural agencies (Crank, 1990). Collectively, these results suggest that the elements of the social disorganization model do not uniformly impact arrest rates in urban and rural jurisdictions.

Turning to racial/ethnic population distributions, Kane et al. (2013) examined both the racial threat and defended neighborhood perspectives on the use of misdemeanor arrests. They found that when controlling for structural disadvantage and other community factors, neighborhood percent black did not predict black misdemeanor arrests. However, when looking at increases in black populations in historically white neighborhoods, the increase in black populations did significantly predict black misdemeanor arrests, consistent with the defended neighborhoods perspective (Kane et al., 2013). Changes in the Hispanic population in relation to the white population were also associated with increased minority arrests, but this relationship was curvilinear. This suggests that the racial threat trigger for Hispanics could have a lower threshold than the trigger for blacks, which could be attributable to greater increases in Hispanic populations and attention to Hispanic criminality. Overall, their findings suggest that changes in black and Hispanic populations result in racial threat when they encroach on historically white-dominated neighborhoods (Kane et al., 2013). Researchers have also

found that officers were more likely to conduct arrests in areas with high levels of violence (R. R. Johnson & Olschansky, 2010; Sobol et al., 2013). In sum, social disorganization, racial/ethnic population distributions, and crime have all been associated with arrest rates.

Some researchers have used multilevel models to examine arrests. Sobol (2010) found that the relationship between district violent crime and police vigor (measured on a scale from no action to arrest) disappeared when accounting for offense severity. A study of 175 large US cities found that concentrated disadvantage increased both black and white arrest rates (Parker, Stults, & Rice, 2005). They further found that the size of the black population and Hispanic population were significantly associated with lower black arrest rates (Parker et al., 2005). They suggest that the lower arrest rates for blacks in cities with larger minority populations could indicate 'benign-neglect', whereby the police devote less resources to controlling intra-racial crime involving blacks (Parker et al., 2005; see also Liska & Chamlin, 1984). Other researchers using data from 260 cities found that larger black populations were associated with lower drug arrest rates for black citizens (Eitle & Monahan, 2009). They further found that race specific disadvantage increased drug arrest rates for blacks, but not for whites (Eitle & Monahan, 2009). Together, these findings indicate that police treatment of racial/ethnic minority suspects depends on the context in which the officer encounters the suspect, highlighting the importance of accounting for situational, officer, and neighborhood factors simultaneously.

2.4.3 Use of Force. Some of the leading policing scholars have argued that the ability to use force is central to the police function. For instance, Brown (1988) wrote, "Coercion both defines the role of the police and lies behind or is instrumental in the accomplishment of most police functions" (p. 4). Bittner (1970) similarly argued that, "Every conceivable police intervention projects the message that force may be, and may have to be, used to achieve a desired objective" (p. 45). However, understanding police use of force is extremely complex. Officers have the authority to use force for legitimate reasons, but misuse of force can result in public criticism of the police (Westley, 1970). Use of force has received substantial research attention.

Prior researchers mostly use situational or officer perspectives to explain police use of force (Terrill & Mastrofski, 2002; Worden, 2015). Situational factors are generally those revolving around who the citizen is and what the citizen does. Officer-level factors examine whether certain types of officers (either based on their demographic characteristics, job-related factors, or attitudes) are more likely to use force. Less research has examined the influence of social ecology on police use of force. Prior research examining contributing factors at the situational, officer, and neighborhood level on use of force will be discussed.[3]

Situational influences on use of force include offense severity, the number of officers present, and citizen demographics and behavior. In terms of offense characteristics, Westley (1970) found that officers were more likely to use violence when dealing with suspects that they felt were unlikely to be punished in court. He further

[3] Organizational perspectives are also important to understanding use of force. Given the focus of the current study and in the interest of space these will not be discussed.

suggested that force was used as a method of goal achievement (i.e., handling a situation or ensuring the police are respected) more often than it was used as a method of law enforcement (i.e., effecting an arrest) (Westley, 1970). Other researchers have found that officers are more likely to use force as the severity of an incident increases (Lawton, 2007). Researchers using data from St. Petersburg and Indianapolis found that officers were more likely to use nonlethal force when suspects were in conflict with another citizen, when suspects possessed a weapon, when officers had evidence that the suspect committed an offense, and when the suspect was being arrested (Terrill & Mastrofski, 2002). Thus, several factors relating to offense severity impact officer use of force.

The number of officers involved in a situation has also been associated with use of force. Researchers in one study found that incidents that involved a larger number of responding officers were more likely to result in higher levels of force (Terrill & Mastrofski, 2002). Another researcher, however, found the opposite. Incidents involving lone officers in Philadelphia were likely to involve higher levels of force than those involving multiple officers (Lawton, 2007). He suggests that this finding could be attributable to one of a few explanations: citizens encountering lone officers could be more aggressive, officers who do not have backup could use higher levels of force to control situations quickly, and/or officers acting alone could be less concerned about being held accountable for excessive force because there are fewer witnesses to the incident.

Several researchers have found that officers were more likely to use force against young, poor, nonwhite, males even when controlling for suspect behavior (Alpert,

Dunham, & MacDonald, 2004; Hickman, Piquero, & Garner, 2008; Levchak, 2017; Terrill & Mastrofski, 2002; Worden, 2015). However, some studies have found no relationship between suspect race/ethnicity and use of force (Lawton, 2007). Disrespectful suspects have also been found to have force used against them more often (Black, 1980; Hickman et al., 2008; Lipsky, 1980; Van Maanen, 1978; Westley, 1970; Worden, 2015), though this finding is not universal (Terrill & Mastrofski, 2002). Other researchers suggest that suspect resistance is related to the level of force used, with non-resistant suspects experiencing the lowest levels of force and those who resisted receiving the highest levels of force (Alpert & Dunham, 2004; Hickman et al., 2008; Lawton, 2007; Terrill & Mastrofski, 2002; Terrill, Paoline, & Manning, 2003; Worden, 2015). As such, both citizen deference and resistance matter. This is suggested to be part of 'authority maintenance', where the level of force that an officer uses is related to the level of resistance to police authority an officer encounters (Alpert & Dunham, 2004). Some researchers have found that officers were more likely to use nonlethal force when suspects were under the influence of drugs/alcohol, or when the suspect was experiencing a mental issue (Lawton, 2007; Terrill & Mastrofski, 2002). However, researchers in Miami-Dade found that intoxicated individuals had lower levels of force used against them (Alpert & Dunham, 2004). Overall, these findings indicate that officer use of force at the situational level is highly related to the severity of the offense and what a citizen does, though extralegal factors also contribute to use of force.

Officer demographic and job-related characteristics have had inconsistent relationships with use of force across studies, with some researchers finding differences

in use of force based on officer sex, race/ethnicity, age, educational attainment, and years of service, and others finding either no differences or conflicting effects (Alpert & Dunham, 2004; Brandl & Stroshine, 2012; Lawton, 2007; McElvain & Kposowa, 2004, 2008; Sun et al., 2008; Terrill & Mastrofski, 2002; Worden, 2015). Researchers who have found that officers with higher levels of educational attainment are less likely to use force often suggest that education can increase officer verbal skills and thereby foster de-escalation (McElvain & Kposowa, 2008; Rydberg & Terrill, 2010). Researchers have also reported that officer shift assignment can impact use of force behaviors, with officers assigned to swing and night shift using force at higher rates than officers assigned to day shift (Brandl & Stroshine, 2012). These researchers also suggested that officers assigned to patrol areas with higher levels of crime were more likely to use force than those assigned to low crime areas (Brandl & Stroshine, 2012). Muir (1977) found that officers who considered themselves to be nonviolent gravitated toward certain assignments, often away from patrol and off the street, leaving those assignments to more coercive officers. Though officer attitudes have also been associated with use of force (Terrill, Paoline, et al., 2003), I do not discuss these findings in detail because officer attitudes are not examined in the current study.

Turning to social-ecological factors, social disorganization, racial/ethnic population distributions, and crime have all been associated with use of force. Using stop-question-frisk data from New York City from 2003 to 2012, Lautenschlager and Omori (2018) found inconsistent support for the impact of social disorganization on both the frequency and the severity of police use of force at the neighborhood level. They

found that concentrated disadvantage significantly increased the frequency of police use of force, but significantly decreased the severity of force used at the neighborhood level. Racial heterogeneity had the opposite effect, predicting significantly lower incidence and significantly higher severity of force at the neighborhood level. Finally, residential instability was associated with significantly higher frequency and severity of force at the neighborhood level (Lautenschlager & Omori, 2018). In their examination of police shootings in St. Louis between 2003 and 2012, Klinger et al. (2016) found that police shootings were more likely to occur in block groups with higher levels of economic disadvantage. However, a study of police shootings in Houston found that socioeconomic disadvantage was unrelated to officer-involved shootings in some segments of the city, but was related to shootings in other areas (Arnio, 2019). She attributes this result to different workgroups, in support of Klinger's (1997) propositions about the importance of workgroups in understanding police vigor.

Though Lautenschlager and Omori (2018) included measures of social disorganization, racial threat, and Klinger's ecological model (i.e., officer reported perceptions of crime), their results indicated that the racial threat measures, specifically neighborhood percent black, had the strongest and most consistent effects on police use of force at the neighborhood level. Other researchers have also found that police shootings were more likely to occur in block groups with higher levels of economic disadvantage and larger populations of black (but not Hispanic) residents (Klinger et al., 2016). Though Arnio (2019) found that police shootings were unrelated to socioeconomic disadvantage in some areas of the city, she did find that shootings were consistently more

likely to occur in neighborhoods with large black and Hispanic populations in Houston. In her study, the racial/ethnic characteristics of the neighborhood were the strongest predictors of police shootings. Researchers examining police use of nonlethal force found no relationship between racial heterogeneity at the police district level and the use of higher levels of police force in Philadelphia (Lawton, 2007). Using Supplemental Homicide Reports from 1980 to 1984, Nowacki (2015) found that cities with larger black populations experienced fewer lethal force incidents in general, and fewer involving blacks specifically.

Some researchers have found that an agencies level of use of force is related to the violent crime rate in the community that agency serves (Alpert & MacDonald, 2001). Klinger et al. (2016) found that police shootings were more likely to occur in block groups with higher violent crime rates. Further, they found that the relationship between neighborhood violence and police shootings was non-linear, which they attribute to officers responding to incidents in high-crime neighborhoods cautiously, relying heavily on regulations and procedures, resulting in fewer unwarranted shootings (Klinger et al., 2016). Overall, neighborhood violence was found to be the best predictor of police shootings in their study, with socioeconomic status and racial composition having indirect associations with neighborhood violence and police shootings (Klinger et al., 2016). The study of police shootings in Houston indicated that shootings were more likely to occur in neighborhoods with higher levels of violence, though the relationship again varied across different segments of the city (Arnio, 2019).

Using officer perceptions of neighborhood crime, Lautenschlager and Omori (2018) found that the neighborhood frequency of use of force is higher, but that the severity of the force used is lower in areas defined as high crime by officers. They suggest the divergent findings are due to the different processes that result in each measure of force. For instance, increased frequency of use of force is likely related to higher levels of proactive police interactions in these communities, resulting in more opportunities for force. However, the severity of force used is lower in these areas due to perceptions that these neighborhoods are crime-ridden. This finding is consistent with Klinger's (1997) hypothesis that officers are less vigorous in areas in which crime is perceived as normal (Lautenschlager & Omori, 2018). Interestingly, they found no significant relationship between the official crime rate at the precinct level and police use of force (Lautenschlager & Omori, 2018). Researchers examining police use of force in Philadelphia similarly found that the level of force an officer used was unrelated to the violent crime rate at the police district level (Lawton, 2007).

Scholars have also used multilevel models to examine police use of force. In Miami-Dade, officers were more likely to use force against citizens with the same racial/ethnic background, which could suggest that officers are more comfortable using force against citizens who are similar to themselves (Alpert & Dunham, 2004). White officers have also been found to be more likely to use higher levels of force when encountering black suspects (Alpert & Dunham, 2004; Paoline, Gau, & Terrill, 2018). Further, some researchers have found that black citizens did not resist black police

officers less than white officers, suggesting that the relationship between citizen and officer race does not necessarily impact suspect behavior (Paoline et al., 2018).

Using data from St. Petersburg and Indianapolis, Terrill and Reisig (2003) found that higher levels of force were more likely to be used against suspects in crime-ridden neighborhoods characterized by concentrated disadvantage, independent of encounter characteristics, suspect behavior, and officer characteristics. They further found that young, poor, nonwhite, males were more likely to have force used against them, even controlling for other factors (Terrill & Reisig, 2003). They suggest that minorities were more likely to receive higher levels of force because they were more likely to come into contact with the police in certain types of neighborhoods. However, the police were still significantly more likely to use force against young, male, and poor suspects even when controlling for neighborhood characteristics, though the impact of race/ethnicity became insignificant (Terrill & Reisig, 2003). These findings could suggest that police officers are more likely to use force in areas that they have characterized as problem areas based on past experience, similar to the way they identify problem people (Klinger et al., 2016; Terrill & Reisig, 2003). Thus, officers working in dangerous areas may be more likely to use force to protect themselves.

Other multilevel research using data from New York City found that blacks and Hispanics were more likely to have force used against them than whites, even controlling for precinct demographic characteristics and felony counts (Levchak, 2017). Levchak (2017) further found that the likelihood of blacks experiencing force decreased as the precinct percent black increased. He found that Hispanics, on the other hand, had a

greater likelihood of experiencing force as the precinct percent Hispanic increased (Levchak, 2017). His findings suggest that differences in use of force for nonwhites and whites is not driven by differences in precinct levels of crime, but rather by the racial characteristics of the precinct (Levchak, 2017). Ferrandino (2015) also examined the relationship between citizen race, neighborhood racial/ethnic population distributions, and use of force. His findings indicate that blacks are more likely to have force used against them in white neighborhoods and in racially mixed neighborhoods with large white populations, supporting racial threat theory (Ferrandino, 2015).

Researchers have also assessed the relationship between citizen race, neighborhood crime, and use to force. Researchers using data from Texas found that officers were more likely to use intermediate force than soft hand techniques in high crime neighborhoods (Fridell & Lim, 2016). Further, officers were more likely to use electric control devices (ECDs) against blacks in areas with lower levels of crime, though racial differences in the use of ECDs was insignificant in high crime neighborhoods (Fridell & Lim, 2016). Thus, their findings suggest that police officers treat all citizens similarly and are less influenced by citizen characteristics in high crime neighborhoods compared to low crime neighborhoods.

Taken as a whole, the findings of these studies suggest that use of force is related to social-ecological context in addition to situational and officer-level factors. The potential for officers to use force depending on extralegal factors at the situational, officer, and ecological level – especially when using force in a manner that could be perceived as discriminatory against some types of people, by particular officers, and in

certain neighborhoods – could undermine police legitimacy. It is important to note that some of the research cited here is dated and the nature of policing has evolved over time. In terms of officer use of force specifically, scholars suggest police ability to use force was once largely unregulated, then it was regulated only by internal administrative guidelines, and only recently has become regulated by external forces like courts and community review boards (Alpert & Dunham, 2004). The next section addresses how police oversight impacts officer use of discretion, and how this oversight varies depending on the type of behavior an officer is engaged in.

2.5 Police Oversight

Police officers have a broad range of discretion due to the nature of policing. Officers are primarily autonomous and work without supervision to achieve vague and sometimes conflicting goals in highly variable situations (M. K. Brown, 1988; Lipsky, 1980; J. Q. Wilson, 1978). These considerations, as well as the involuntary nature of police clients, renders the regulation and evaluation of officer use of discretion extremely difficult (Davis, 1969; Lipsky, 1980). Though some support the use of police discretion to handle situations on an individualized basis, others promote the uniform treatment of incidents, resulting in tension between the benefits of discretion and the need to regulate and supervise discretion to prevent discrimination (Ohlin, 1993). Because the patrol officer exercises the greatest discretion in a police agency (and arguably the criminal justice system as a whole), often without supervisor oversight, their behavior is the most important for police administrators to regulate and evaluate (Davis, 1969; J. Q. Wilson, 1978). Police officers are generally subject to two forms of oversight: internal oversight

that occurs within their organization and external oversight that comes from outside of the police organization, with both forms impacting officer use of discretion.

Oversight of police discretion principally operates through bureaucratic methods, including policy development and supervision (Lipsky, 1980; Maynard-Moody & Musheno, 2000). One of the most traditional mechanisms for any organization to regulate the behavior of its employees is through policy. Ideally, policies would clearly outline the criteria that should be considered in police decision-making and how these decisions will be evaluated (Ohlin, 1993). But, because police officers respond to complex incidents that require them to make decisions on a case-by-case basis, it is not possible for policies to completely eliminate the need for discretion. The amount of discretion available to officers is influenced by the structure of policies, with vague policies enabling officers to use greater discretion and specific, complex mandates limiting officer discretion (M. K. Brown, 1988). Though organizations have long attempted to impact officer use of discretion through administrative policies, the impact of policy on police behavior is generally unclear (Nowacki, 2015).

Policies regulating police discretion have also come from sources external to police agencies, including the Supreme Court, which can result in complex and occasionally conflicting mandates that the police are expected to adhere to (Walker, 1993). Policies controlling police use of deadly force, for example, have been effective in reducing these incidents, with many of these policies being implemented as a result of high-profile police shootings and in conjunction with court established guidelines (Walker, 1993). The success of police shooting policies is often attributed to built-in

accountability measures, which require officers to complete a report any time they engage in a shooting, and automatically trigger supervisor review of the incident (Walker, 1993). Thus, though administrative rulemaking can be used to guide discretion, officer decisions should also be reviewed by supervisors to ensure these decisions comply with policy (M. K. Brown, 1988). Unlike other professions in which work is routine, workers are supervised continuously, or workers can be evaluated on the basis of customer satisfaction or other performance metrics, policing tasks are complex and varied, officers are not under constant supervision, and officers cannot be adequately evaluated based on the satisfaction of their clients (Walker, 1993; J. Q. Wilson, 1978).

Controls on officer discretion also come from external sources, usually in response to highly publicized incidents of police misconduct or use of force. For instance, Rodney King was beaten by three uniformed LAPD officers in the presence of a sergeant and with a large group of officers from multiple agencies present. This incident was caught on tape and resulted in public outcry demanding police reform. The independent commission created to investigate the force used against Rodney King found that some officers routinely used excessive force in violation of departmental policies. The commission attributed the failure to control these officers to a management problem (in addition to a cultural issue) and suggested that the department should use multiple data sources to identify problematic officers and hold them accountable for their actions (*Report of the Independent Commission on the Los Angeles Police Department*, 1991). The beating of Rodney King resulted in the expansion of dashboard-mounted cameras in patrol cars to improve oversight of police behavior (Maynard-Moody & Musheno, 2000),

a relevant example given the focus of the current study on BWCs, which have similarly been promoted in response to widely publicized police uses of force.

As indicated by the Rodney King incident, environmental checks on officer use of discretion include constraints coming from interest groups and are impacted by the characteristics and demeanor of citizens in the community in which an officer works (M. K. Brown, 1988). Thus, the impact of environmental constraints often depends on the social and economic status of the community (M. K. Brown, 1988). As officers cannot be supervised in all encounters, citizen complaints about particular incidents and officers constitute the majority of incidents that are reviewed, resulting in officers feeling like oversight is arbitrary (J. Q. Wilson, 1978). As such, some have attributed limited community influence on officer discretion to particularistic concerns with specific police activities, for example, whether an individual ticket is fair, not whether the ticketing practice as a whole is fair (J. Q. Wilson, 1978). For their part, the police suggest that citizens are unqualified to review officer behavior, advocating instead for internal review and regulation of discretion (J. Q. Wilson, 1978).

As the above section illustrates, regulating officer discretion is challenging because it is difficult to establish policies to govern the complex and varied situations that officers encounter and the autonomous nature of patrol. These barriers to internal regulation of discretion are also challenging for community members and organizations external to the police department. The introduction of BWCs into police departments has the potential to change these mechanisms by enabling the review of officer activities in specific incidents. This ability for supervisors and community members to review officer

behavior could impact police use of discretion through increasing the potential for officers who violate policies to be identified and disciplined for those violations. These possibilities are further addressed in the next section.

2.6 Body-Worn Cameras

The rapid adoption of BWCs in police agencies across the US is often attributed to high profile police use of force incidents, many of which have involved the deaths of unarmed black males. Several of these incidents were captured on video (many of the early incidents were recorded on citizen cell phones), which resulted in increased calls for police transparency (Parry, Moule, & Dario, 2017). The high level of publicity these incidents received fueled public support for the adoption of BWCs to increase police accountability through generating a record of all police-citizen encounters (Sousa, Miethe, & Sakiyama, 2017; Todak, Gaub, & White, 2018). The ability to review officer behavior in specific incidents using BWC footage increases the likelihood of the police department and the public identifying and addressing officer (and citizen) misbehavior when it occurs.

In addition to public support for the adoption of BWCs, the large amount of federal funding provided to police departments to deploy BWCs (*Department Of Justice*, 2016; 2015) and consent decrees and judicial rulings that have mandated some agencies to adopt BWCs in response to federal investigations finding police discrimination (*United States of America v. City of Newark*, 2016) have resulted in the widespread adoption of BWCs. Available funding resulted in the rapid adoption of BWCs in police agencies across the country. This expansion was quickly followed by evaluations of the impact of

BWCs on various outcomes. The results of these studies suggest that BWCs impact citizen perceptions of the police (Goodison & Wilson, 2017; Sousa et al., 2017; Todak, Gaub, et al., 2018), complaints filed against the police (Ariel, 2016; Ariel et al., 2015; Ariel, Sutherland, Henstock, Young, Drover, et al., 2017; Headley et al., 2017; Hedberg et al., 2017), police proactivity (Headley et al., 2017; Peterson et al., 2018; Ready & Young, 2015; Wallace et al., 2018), citations and arrests (Braga, Sousa, Coldren, & Rodriguez, 2018; Katz et al., 2014; Ready & Young, 2015; Wallace et al., 2018), and police use of force (Ariel et al., 2015; Braga et al., 2017; Headley et al., 2017; Jennings et al., 2015; White, Gaub, & Todak, 2018). However, findings in each of these areas have been mixed (Huff, Gaub, White, & Malm, 2020; Lum, Stoltz, Koper, & Scherer, 2019; White, Gaub, & Padilla, 2019).[4] Given the focus of the current study, prior research examining the ability of BWCs to affect police discretion and the impact of BWCs on police proactivity, arrest, and use of force will be discussed.

2.6.1 Impact of BWCs on Police Discretion and Administrative Oversight.

One of the oldest ways for citizens to voice concerns with police practices in specific incidents is through filing formal citizen complaints against officers. This process was designed as an accountability mechanism for citizens to bring police misbehavior to the attention of the agency the officer works for. Research examining the impact of BWCs on the volume of citizen complaints has the potential to tap into the ability of BWCs to result in improved officer behavior (or, alternatively, decrease citizens filing frivolous

[4] Researchers are beginning to assess the impact of BWC footage on criminal justice processes as well, including the utility of BWC footage in police training (Koen, Willis, & Mastrofski, 2018) and the impact of BWCs on outcomes of court cases (Morrow et al., 2016; White, Gaub, Malm, & Padilla, 2019).

complaints). However, the research examining how BWCs impact the outcomes of complaint processing is also relevant to understanding the impact of BWCs on police oversight and accountability.[5]

Researchers have found that complaints against officers wearing BWCs were more likely to be unfounded (Katz, Kurtenbach, Choate, & White, 2015) and to be resolved more quickly (Braga et al., 2017) than complaints filed against officers who were not wearing cameras. Decreased complaint processing time has also been linked to substantial cost savings for agencies (Braga et al., 2017). However, some researchers found that the benefits of BWCs in reducing citizen complaints only occur when officers actually turn the camera on (Hedberg et al., 2017). This suggests that the availability of BWC footage can increase officer accountability, as internal affairs units within police agencies can quickly review officer activities in specific incidents and make determinations about whether the officer violated departmental policy. Thus, the existence of this technology does increase the potential for and ease of administrative oversight internal to police organizations, though the impact of this technology is likely tied to the agency actually reviewing the footage.

The availability of this footage also exposes officers to the potential for these videos to be released publicly, and thereby increases external accountability to the communities that officers work within. Some researchers have suggested that the

[5] Several evaluations have indicated that BWCs can reduce citizen complaints against the police (Ariel et al., 2015; Braga et al., 2017; Hedberg et al., 2017; Peterson et al., 2018); though these findings are not universal (White, et al., 2018). Results from several reviews of the research support these general declines in complaints associated with the adoption of BWCs (Lum et al., 2019; Maskaly, Donner, Jennings, Ariel, & Sutherland, 2017).

availability of footage can improve officer (and citizen) behavior as a function of deterrence, with BWCs suggested to have a stronger deterrent effect when officer discretion to activate BWCs in citizen encounters is low (Ariel, Sutherland, Henstock, Young, & Sosinski, 2017). This again highlights the importance of the camera being activated, instead of just present during an encounter.

Some police officers have expressed concerns that BWCs will be used by supervisors to discipline officers for minor policy violations (Braga et al., 2017; Headley et al., 2017; Huff, Katz, & Webb, 2018; Pelfrey & Keener, 2016). This has resulted in several suggestions that the increased administrative oversight afforded police agencies as a function of BWCs will limit officer use of discretion and result in more legalistic policing (Ready & Young, 2015). The combined potential for supervisors to use BWCs to review officer behavior and for citizens to gain access to footage through Freedom of Information Act requests could result in officers becoming risk-averse (Ready & Young, 2015). Some have suggested that this increased oversight could lead to officers disengaging from their jobs entirely to avoid getting involved in controversial incidents. This argument has been referred to as the 'Ferguson Effect' (Dewan, 2017; Schmidt & Apuzzo, 2015), though researchers have yet to clearly establish that such depolicing is occurring (Pyrooz, Decker, Wolfe, & Shjarback, 2016). This possibility has also been referred to as 'inertia' when officers become so concerned about potential punishment that they begin to avoid engaging in citizen encounters altogether (Ariel, Sutherland, Henstock, Young, & Sosinski, 2017). Other researchers have referred to this as 'camera-induced passivity', though they found no evidence of it in their study of officers in

Spokane (Wallace et al., 2018). In short, some have suggested that BWCs could result in depolicing, which would be indicated by reduced officer proactivity.

Though the adoption of BWCs is primarily driven by calls for increased police transparency and accountability, it is also essential to establish whether the adoption of this technology changes officer behavior. If BWCs are associated with differential policing outcomes, these differences could be attributable to officer perceptions that their ability to use discretion is limited due to increased oversight provided by BWCs. This oversight could result in officers engaging in more 'equitable' enforcement behaviors when wearing BWCs. Officers who feel like each encounter they engage in is subject to scrutiny through the use of BWC footage could become more legalistic and adhere more strongly to policies and procedures, limiting the impact of extralegal considerations on officer behavior.

2.6.2 Impact of BWCs on Proactivity. As noted above, BWCs could result in depolicing if officers react to the potential for increased supervision through BWCs by engaging in fewer proactive contacts with citizens. Evaluations of the impact of BWCs on officer proactivity have had mixed results (Huff et al., 2020; Lum et al., 2019). Scholars examining the impact of BWCs in Spokane (WA) found that BWC officers were significantly more likely to self-initiate contacts with citizens, compared to control officers (Wallace et al., 2018). Researchers similarly found that BWC officers were more likely to initiate encounters in Mesa (AZ) and that neither voluntary assignment nor discretionary activation policies impacted these findings (Ready & Young, 2015). Findings from an evaluation of BWCs in Hallandale Beach (FL) also indicated that

BWCs could increase officer proactivity, which the researchers measured as the number of field contacts, though the increase was not statistically significant (Headley et al., 2017). These findings using activity measures are also supported by survey research conducted in Orlando (FL), as the majority of officers in that study (84%) reported that BWCs would not decrease their likelihood of responding to calls for service (Jennings, Fridell, & Lynch, 2014).

However, researchers in Tempe (AZ) did not identify any differences in officer proactivity after the implementation of BWCs (White, Todak, & Gaub, 2018). Similar null effects were identified in Louisville (KY) (Hughes, Campbell, & Schaefer, 2020). Researchers in Milwaukee (WI) found that BWC officers were significantly less likely to conduct subject stops than control officers, but identified no differences in traffic stops between control and treatment officers (Peterson et al., 2018). The Milwaukee (WI) research team suggested that their findings could indicate that BWC officers are more selective in whom they choose to apprehend, based on decreased subject stops, but are not less likely to cite and arrest individuals engaging in illegal activities (Peterson et al., 2018). In a later study, the Milwaukee researchers explicitly suggest that BWC officers could avoid engaging in discretionary contacts as a result of the potential for these incidents to be reviewed internally and externally (Lawrence & Peterson, 2019). It is important to note that the adoption of BWCs in Milwaukee was motivated by the police shooting of Dontre Hamilton (Lawrence & Peterson, 2019), which could render the findings in Milwaukee somewhat unique compared to other cities. Given the mixed findings, the impact of BWCs on officer proactivity is not universal to all departments.

These results suggest that the causal mechanisms, in addition to the measures of proactivity, should be further examined to understand the impact of BWCs on officer willingness to proactively initiate citizen contacts.

2.6.3 Impact of BWCs on Arrests. Researchers examining the impact of BWCs on citations and arrests have similarly identified mixed findings, with some researchers finding increases, others finding decreases, and still others finding no significant differences in these outcomes associated with the use of BWCs (Huff et al., 2020; Lum et al., 2019). Researchers in Las Vegas (NV) found that BWC officers were significantly more likely to write citations and conduct arrests than control officers (Braga et al., 2017). Researchers examining the use of BWCs in Mesa (AZ) found that officers wearing cameras were significantly more likely to write citations, but were not more likely to conduct arrests (Ready & Young, 2015). BWC officers in Hallandale Beach (FL) were less likely to conduct arrests (a large effect size) but were more likely to administer traffic citations (a moderate effect size) than control officers, though the differences between groups were insignificant (Headley et al., 2017).

BWC officers in Phoenix (AZ) increased their arrest activities to a significantly greater extent than officers assigned to a control group (Katz et al., 2015), with researchers also finding increased arrests in domestic violence cases after the adoption of BWCs (Morrow et al., 2016). Further research in Phoenix indicated that neither BWC presence nor BWC activation, was associated with arrests (Hedberg et al., 2017). Similarly, Wallace et al. (2018) did not find an effect of BWCs on arrests in Spokane (WA) and Hughes et al. (2020) did not identify a relationship between BWCs and arrests

in Louisville (KY). Researchers in Milwaukee (WI) found that arrests significantly decreased after BWCs were adopted for both BWC and control officers (Peterson et al., 2018).

Ready and Young (2015) suggest that BWC officers could be concerned about potential discipline for not citing an offender when video evidence shows the citizen breaking the law. Thus, officers wearing cameras could be more hesitant to engage in actions that pose civil liability to the department and personal liability to the officer, given the potential for their actions to be reviewed (Ready & Young, 2015). Researchers in Las Vegas called for future studies to examine whether increased arrest activity associated with BWCs was attributable to decreased officer discretion, or due to the increased potential to use BWC footage as evidence (Braga et al., 2017). Those studies that have found decreased arrests for BWC officers could also be seeing reduced proactivity, which would result in fewer opportunities for officers to conduct arrests. The potential explanations provided for these mixed findings highlight the need for further research on the impact of BWCs on citations and arrests.

2.6.4 Impact of BWCs on Police Use of Force. Evaluations examining the impact of BWCs on officer use of force have also had mixed results, with some researchers finding significant reductions in officer use of force and others finding no differences (Lum et al., 2019; White, Gaub, & Padilla, 2019). One of the first and most heavily cited evaluations of BWCs found that use of force incidents were significantly less likely to occur during shifts that were randomly assigned BWCs in Rialto (CA) (Ariel et al., 2015). Reductions in officer use of force were also found in Las Vegas (NV)

(Braga et al., 2017) and Tampa (FL) (Jennings, Fridell, Lynch, Jetelina, & Reingle Gonzalez, 2017). Use of force incidents were also significantly less likely to occur and less severe forms of force were used during BWC treatment shifts in the West Midlands Police in the UK (Henstock & Ariel, 2017). Those authors suggested that their findings were primarily driven by types of force at the lower end of use of force continuums, and suggest that researchers finding increased use of force associated with BWCs could be seeing increased reporting of lower levels of force that were previously being used, but that were not being reported (Henstock & Ariel, 2017).

Researchers in Hallandale Beach (FL) found that use of force declined for all officers after the adoption of BWCs, but that differences between BWC and control officers were insignificant (Headley et al., 2017). Researchers in Orlando (FL) similarly identified significant overall reductions in force, but those reductions did not significantly differ between BWC and control officers (Jennings et al., 2015). Researchers who evaluated BWCs in Milwaukee (WI) and Spokane (WA) identified no significant differences in use of force between BWC and control officers (Peterson et al., 2018; White, Gaub, et al., 2018). Of officers surveyed before the adoption of BWCs in Orlando (FL), only 3% agreed that BWCs would reduce their use of force (Jennings et al., 2014), suggesting that these behavioral outcomes are consistent with officer expectations about the impact of BWCs on their actions.

Researchers using data collected from ten BWC trials argue that the mixed findings in the BWC and use of force research are attributable to officer compliance with activation policies and experimental protocols (Ariel et al., 2016a). They found that the

agencies in their sample could be split into those that: 1) maintained compliance with the experimental protocol (full BWC activation for all citizen contacts in the treatment condition; n=3 trials), 2) those that deviated from protocol in the treatment conditions (officers had the discretion to activate BWCs in the treatment condition; n=3 trials), and, 3) those that did not adhere to the experimental protocol at all (treatment and control conditions were not implemented or maintained; n=4 trials). Their findings suggest that trials with high compliance with experimental protocol were more likely to see reductions in use of force, those trials that deviated from protocol in treatment conditions (allowed officers discretion in activation) had increased use of force, and those trials that did not adhere to the experimental protocol at all had null effects on use of force outcomes (Ariel et al., 2016a). Thus, whether BWCs are deployed and activated as intended impacts the relationship between BWCs and use of force.

In sum, BWCs are suggested to provide an additional avenue of officer oversight by both the department the officer works for and the community the officer works within. As such, the adoption of BWCs could be particularly important for examining variation in officer behavior in different types of places. Only one study to date has examined the influence of BWCs on police behavior in different neighborhoods. Hughes et al. (2020) found that BWCs significantly increased proactivity in neighborhoods with large black populations. They further found that the use of BWCs was associated with a significant decrease in felony arrests (but not low-level arrests) in neighborhoods with large black populations, as such, examining the influence of BWCs on different types of behaviors

across neighborhoods is important.[6] As noted by Kane (2002), "The very communities likely in need of the most protection by the police due to conditions favoring deviance also may be in need of the greatest protection from the police due to conditions favoring deviance" (p. 891). Examining the potential for BWCs to provide this protection and to foster equitable outcomes across situations, officers, and social-ecological environments is important given the rapid deployment of this technology in agencies across the U.S.

2.7 Current Study

Scholars have proposed several theoretical frameworks to evaluate the relationship between situational factors, officer characteristics, neighborhood context and policing. As the above discussion illustrates, police use of discretion and the amount of oversight to which different police behaviors are subjected to varies. Proactive police contacts involve high levels of discretion and low levels of supervision – arrests and use of force are more regulated behaviors that are subject to higher levels of review. In addition to variation in oversight depending on what an officer is doing, factors operating at multiple levels influence the way officers use their discretion. Specifically, situational, officer, and neighborhood-level factors impact police use of discretion, as different officers respond to individual situations in different types of neighborhoods.

Officer behavior is influenced and regulated through mechanisms internal to the agency the officer works within, as well as forces external to the police department, depending on how discretion is used. The adoption of BWCs has been promoted to

[6] This study was published very near the completion of this dissertation. Hughes et al. (2020) examine the impact of BWCs on policing in different neighborhood contexts using aggregate counts of police behavior at the census tract level. Though their research questions are similar to those posed in the current study, the methodological approach and unit of analysis are very different.

improve police accountability and transparency both internally and externally through facilitating review of officer actions in specific encounters. As such, BWCs could result in officers using their discretion in different ways due to the increased potential for their actions to be reviewed.

In the current study, I examine how situational, officer, and social-ecological factors impact proactivity, arrests, and use of force. Though prior researchers have largely focused on situational and officer-level predictors of police behavior, I incorporate all three levels of explanation (situational, officer, and neighborhood) to extend our understanding of police use of discretion. To do so, I first examine the impact of situational, officer, and social-ecological characteristics on proactivity, arrests, and use of force before BWCs were deployed. I then examine the same factors and outcomes after BWCs were deployed, in addition to the direct impact of BWCs on each outcome and the potential for BWCs to moderate the influence of neighborhood context.

The inclusion of situational, officer, and neighborhood factors enables an examination of multiple competing arguments related to differential police behavior. First, it addresses the argument that officers behave differently depending on the characteristics of the specific situation, regardless of officer and neighborhood characteristics. Second, it addresses the argument that different officers handle situations in different ways, even when addressing similar incidents occurring in the same neighborhoods. Finally, it assesses the argument that the police are more punitive in some neighborhoods because the incidents that they encounter in some areas are more severe. In short, I attempt to disentangle situational, officer, and neighborhood-level effects on

police use of discretion by examining the impact of factors at each of these levels simultaneously.

I further examine the influence of BWCs on the relationship between situational, officer, and neighborhood factors on police use of discretion. As such, this portion of the study examines whether BWCs impact officer proactivity, arrest, and use of force. I then move beyond the question of whether BWCs affect these outcomes directly to whether BWCs change the relationship between neighborhood structure and the outcomes of individual police encounters. This has implications for the conversation surrounding the potential for BWCs to increase equitable police behavior across different types of neighborhoods.

3. DATA AND METHODS

3.1 Overview

The purpose of the current study is to examine the impact of context and BWCs on officer use of discretion. I examine two interrelated research questions using data obtained as part of a three-year evaluation of BWCs in the PPD from November 24, 2015 to November 23, 2018. I first assess proactivity, arrest, and use of force as a function of situational, officer, and social-ecological context using data from the first 18 months of the evaluation (November 24, 2015 to May 23, 2017, herein referred to as Time 1). Second, I examine how BWCs influence these outcomes using data collected for the 18 months following the deployment of BWCs to randomly selected officers (May 24, 2017 to November 23, 2018, herein referred to as Time 2). I use the same analytical strategy to address each question, with the addition of an independent variable to account for BWC activation and interaction terms between the BWC activation and neighborhood racial/ethnic context measures in my second research question. As such, none of the officers had BWCs in the Time 1 data used to address my first research question and some of the officers had BWCs in the Time 2 data used to address my second research question.

It is important to note that this dissertation is not an evaluation of the direct effects of BWCs, rather it is an assessment of the potential for BWCs to moderate the influence of neighborhood racial/ethnic context on officer behavior. I do not intend to evaluate whether BWCs are effective, instead, I examine whether they serve as a form of oversight and/or accountability that changes the way officers use their discretion. This

section details the research setting, data used, assignment of BWCs, variables of interest, and my analytical strategy.

3.2 Research Setting

Phoenix is the capital and largest city in the state of Arizona with a population of roughly 1.6 million residents over 516.7 square miles (U.S. Census Bureau, 2017). Phoenix is bordered by the cities of Tempe, Mesa, Scottsdale, Surprise, and Glendale, Arizona. The majority of the population is white (72.6%; 44.4% non-Hispanic white), 6.8% of the population is black, and 41.8% of the population is Hispanic of any race (U.S. Census Bureau, 2016). Phoenix has a large population of college students (over 100,000 undergraduates) spread between multiple campuses (Arizona State University, the University of Arizona, Northern Arizona University, and Grand Canyon University; Sunnucks, 2014) and a sizable population of retirees (Reagor, 2018). Phoenix also hosted over 43 million tourists in 2017 (Floyd & Rodberg, 2018).

According to the Federal Bureau of Investigation (2016), Phoenix had higher violent and property crime rates than the national average: 674.39 and 3,690.38 per 100,000 residents compared to 386.3 and 2,450.7 per 100,000 residents, respectively. In relation to other major cities, Phoenix had a higher violent crime rate per 100,000 residents than New York City (573.42) and a lower violent crime rate per 100,000 residents than Chicago (1,105.48) and Los Angeles (719.00). Phoenix had a higher property crime rate per 100,000 residents than New York City (1,462.35), Chicago (3,191.01), and Los Angeles (2,473.89). As such, crime in Phoenix is relatively similar to other large cities.

The PPD is responsible for providing police services to the city of Phoenix. The PPD employs almost 3,000 sworn officers and is geographically split into seven precincts. Precincts range from 18 square miles in the Central City precinct to 182 square miles in the Black Mountain precinct. Precincts vary in the number of residents served, from 91,500 in Central City to 311,770 residents in the Desert Horizon precinct (City of Phoenix, 2018). Five precincts have a substation responsible for a subsection of the precincts jurisdiction. Substations have the same precinct commander but are geographically and physically separate from the main precinct. Precincts are further broken down geographically into 92 individual beats (ranging from 7 beats in Central City to 17 beats in Mountain View).

Officers in each precinct are assigned to a squad, with each squad having a different shift assignment. Day shift officers generally work from 5AM to 3PM, swing shift officers work from 1:30PM to 11:30PM, and night shift officers work from 8PM to 6AM, with some squads having start and end times thirty minutes later (e.g., 5:30AM to 3:30PM) to stagger the number of officers starting and completing their shifts at the same time. Each precinct has at least two squads assigned to each shift. Central City, the smallest precinct geographically and in number of officers, has six squads. The Black Mountain precinct, which is the largest geographically and has a separate substation, has eighteen squads (with twelve squads assigned to the main precinct and six assigned to the substation).

3.3 Data Sources

I collected administrative data for all patrol officers for the study period. I use Time 1 data to assess the relationship between situational factors, officer characteristics, and social ecology and police behavior (prior to BWC deployment). After identifying the situational, officer, and neighborhood factors that influence police discretion, I then evaluate whether BWC activation moderates the relationships between neighborhood structure and these outcomes. To do so, I use data from Time 2, following the deployment of BWCs to some officers within the department. The data used to address both research questions include information on officer activities and demographic characteristics, drawn from the following sources: CAD, arrest records, official use of force reports, personnel records, and BWC activation data. I supplemented the PPD data with U.S. Census data to examine neighborhood context. Each of these data sources are discussed.

3.3.1 CAD Data. The PPD maintains two separate CAD files, one to collect information related to incidents and the other to collect information related to responding units (patrol cars). Collectively, these data include administrative records of all officially recorded police-citizen contacts PPD officers were involved in during the study period. The incidents file contains a single row for each incident and includes information about the source of the incident (e.g., 911 call, self-initiated, etc.), the call code (e.g., strong-armed robbery, assault), and geographic location (XY coordinates) of the incident. The file does not contain any demographic or behavioral information about the citizens involved in the incident. The units file contains a single line for each unit that responded

to an incident and contains an identification number of each responding officer from the responding unit (which could have either one or two officers, depending on the unit). Because multiple officers from the same unit, or multiple officers from separate units could respond to the same incident, the units file contains multiple lines for the same incident when multiple units responded to that incident. I reshaped the units file from a long file to a wide file to retain all responding unit and officer information for each incident in a single line. I then merged the reshaped units file with the incidents file using the incident number to create a master CAD file containing information from both the incident and unit files.

3.3.2 Arrest Data. The PPD maintains arrest records separately from the CAD data. These data include all incidents resulting in a subject being cited and released or booked into jail within 24 hours of the incident being reported. The arrest data are limited to the incident number associated with the arrest and the charges filed. These data do not provide any information about the characteristics of the citizen involved in the arrest. I linked the arrests to the CAD data using the incident number. As such, these data indicate that an arrest (either a cite and release or a booking into jail) was associated with an incident.

3.3.3 Use of Force Reports. I also collected official use of force reports and merged them with the CAD data. The use of force reporting guidelines in the *PPD Info Center Operations Orders* (2017) require all use of force reports to be completed by the involved officers' supervisor. The initiation of a use of force report is dependent on the type of force used and the outcome of the force incident. If an officer uses a method of

force on the lower end of the force continuum, like soft empty-hand techniques (e.g., wrist locks, joint locks, pressure points), restraining devices (e.g., handcuffs, ankle cuffs), or a chemical agent (e.g., OC spray), a use of force report will only be completed by a supervisor when an alleged injury occurs. Supervisors are required to complete a use of force report in all incidents involving the use of an ECD, intermediate control techniques (hard empty-hand techniques, baton, flashlights, canines, stunbag shotguns, direct impact munitions), carotid control techniques, and deadly use of force incidents (the use of a firearm or vehicle) (*PPD Info Center Operations Orders*, 2018). Due to potential reporting differences for use of force occurring at the lower end of the spectrum, the data used in the current study only include force that resulted in a mandatory use of force report being completed by an officers' supervisor.[7]

3.3.4 Personnel Data. I collected employee personnel data from the City of Phoenix Human Resources Department to obtain officer demographic characteristics. These data included officer sex, age, race/ethnicity, and educational attainment. Employee rosters were collected from precinct commanders to obtain accurate information regarding officer squad, shift, and precinct assignments. The combination of these data sources enabled the creation of variables measuring job-related characteristics, including years of service and precinct assignment.

3.3.1 BWC Metadata. To examine the impact of BWCs on the outcomes of citizen encounters, I obtained BWC activation data from the vendor used for the PPD

[7] Officers are additionally required to report all uses of force (regardless of injury) and details of the use of force in the narrative section of incident reports. These narratives were not collected as part of the current study.

BWC evaluation. These data contain a record of every time a BWC was turned on during the study period. These records are automatically created when an officer activates their BWC and include the date and time of the activation and the duration of the footage captured. Officers were responsible for manually entering an incident number for each BWC video they created in the activation data. I merged the activation data with the CAD master data using the incident report number. Thus, these data establish whether a BWC was activated during an individual incident.

3.3.2 Census Data. Census tract data were collected from the 2016 5-year estimates of the American Community Survey of the US Census. Several indicators of neighborhood structure and population characteristics were captured from the census data. These characteristics included measures of social disorganization, racial/ethnic population distributions, and population density. Justifications for using the census tract as a proxy for neighborhoods are discussed in the next section (Section 3.4). The specific variables collected and the construction of social-ecological measures from these variables are discussed in detail in the social-ecological variables section (Section 3.7.3), below.

3.4 Phoenix Neighborhoods

Census tracts are used as the spatial unit of analysis to examine neighborhoods in the current study. PPD beat boundaries align with census tract boundaries almost perfectly. As a result, these spatial units have substantive meaning to officers working in these areas. Census tract shapefiles were spatially joined to PPD beat boundary shapefiles in ArcMap 10.4 to identify all census tracts within PPD jurisdiction (n=391 census tracts,

those incidents occurring in tracts outside of PPD jurisdiction were excluded from the analysis). To examine police behavior in individual incidents in the context of these geographical units, all official data were geocoded in ArcMap 10.4 and spatially joined to the 2016 US Census tract shapefiles within PPD jurisdiction. There were a total of 1,794,571 incidents in the master CAD dataset and it was possible to geocode and spatially join 1,783,028 (99.4%) of the incidents to census tracts falling within PPD jurisdiction. Those incidents that were missing XY coordinates and/or address information in the CAD data and could not be geocoded (n=10,959; 0.6%), or that fell outside of PPD jurisdiction (n=584; 0.03%), were excluded from the current analysis (n=11,543; 0.6% of incidents were excluded).

Census tracts have been used as proxy measures for neighborhoods in numerous prior studies (e.g., Lautenschlager & Omori, 2018). Though some researchers argue that census tracts are inadequate measures of neighborhoods due to the potential for individuals to define neighborhood boundaries in ways that diverge from census boundaries (Coulton, Korbin, Chan, & Su, 2001; Logan, 2012), the ready availability of administrative data collected by public agencies has resulted in the continued use of these administratively defined spatial units (Hipp, 2007; Sampson & Groves, 1989).[8]

[8] Selecting an appropriate unit of aggregation should be guided by both methodological and theoretical considerations, as using different units can impact the findings of an evaluation (Hipp, 2007). In his evaluation comparing block perceptions of physical disorder, social disorder, and crime as a function of neighborhood structure at both the block and census tract level, Hipp (2007) found that there is no single best level of aggregation. Examining neighborhood factors from both social disorganization and routine activities theories, he found that racial/ethnic heterogeneity had strong impacts on perceptions of social disorder, physical disorder, and crime at both the block and tract level, though the effects were stronger at the tract level. However, the impact of economic considerations on these outcomes was more localized to the block level, with higher income blocks having lower perceptions of disorder but higher perceived crime. The impact of broken families had mixed effects, with broken households having localized effects

Importantly in this study, PPD beats closely approximate US census tracts, which mitigates these concerns because officers are well aware of when they cross the boundaries between one police beat and another.

Prior studies that examine citizen perceptions of neighborhoods have resulted in concerns that citizen definitions of the area that constitutes 'their neighborhood' differ from the spatial unit of analysis in a study. Though the current study does not suffer from these limitations due to the use of spatial units that have substantively meaningful boundaries for officers who are the subject of this study, it is important to note that neighborhoods in Phoenix differ from those in other communities. Phoenix does not have strongly defined neighborhoods that could diverge from administrative boundaries, unlike other major metropolitan cities. The lack of defined neighborhoods in Phoenix is largely because Phoenix is a relatively new city. In 1950 Phoenix had a population of 106,000 residents spread across 17.1 square miles (Barney, Goldwater, & Williams, n.d.), compared to its current population of 1.6 million residents over 516.7 square miles (U.S. Census Bureau, 2017). Chicago, on the other hand, had a population of 3.6 million residents in 1950 ("Chicago, Illinois Population 2018," 2018), highlighting the limited time Phoenix has had to develop distinct neighborhood identities compared to older cities with more stable populations and geographic areas. Given the growing nature of Phoenix,

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on perceptions of social disorder at the block level and a broader effect on perceptions of crime at the tract level. Though he highlights the differences in findings associated with different units of aggregation, he suggests using blocks (a smaller unit) is the safest approach, given that aggregating heterogeneous blocks to a higher level of aggregation could mask differences across subunits; conversely, aggregating homogenous units to a higher level of aggregation will result in similar findings (Hipp, 2007). Census tracts are used as neighborhood boundaries in the current study for two reasons: the ease of accessing census data and the substantial overlap between Phoenix census tracts and PPD beat boundaries. As such, census tracts enable me to readily identify the substantive meaning of these units for officers working in the Phoenix PD.

in terms of both population and space, it likely experienced changes in neighborhood trajectories over time that inhibited the development of stable neighborhood identities (see Delmelle, 2015 for a discussion of neighborhood transitions in different types of cities depending on their growth patterns). It is important to note that this study is not overly concerned with distinct neighborhood identities, or the boundaries between different neighborhoods, but rather with the influence of neighborhood structure on police behavior.

Further, because the current study examines the impact of social context on patrol officer behavior, using census tracts as a proxy for neighborhoods is reasonable given the size of these units (M=2.26 square miles; SD=8.99 square miles) and their congruence with PPD administrative beat boundaries. Officers are additionally responsible for engaging in contacts in multiple census tracts during the performance of their duties. As a result, officers could behave differently in different incidents, depending on the neighborhood context of the individual incident to which they are responding. Using a relatively small geographic unit of analysis to examine the impact of social ecology on officer behavior enables the comparison of incidents handled by the same officer in different locations.

3.5 Assignment of Body-Worn Cameras

Because the data used for the current project were collected as part of a larger evaluation of BWCs, and given the focus on BWCs in my second research question, the assignment of BWCs merits some discussion. The purpose of the PPD BWC project was to examine the impact of BWCs on officer attitudes, officer activities, officer use of

force, citizen complaints, and compliance with activation policies using a randomized controlled trial of BWCs in six of the seven PPD precincts. One precinct that had previously mandated all officers to wear BWCs was excluded from the current evaluation due to its' longstanding BWC program, which could result in differences between officers using BWCs in that precinct compared to other precincts where the use of BWCs is more recent (see Katz, Kurtenbach, Choate, & White, 2015; see Appendix A for a map of PPD jurisdiction).

The PPD BWC experiment began with a pretest survey designed to capture officer self-reported attitudes toward BWCs. Surveys were administered during pre-shift briefings in March-April 2017. Respondents were notified that their participation was voluntary and that their survey responses would be linked to their employee records. A total of 841 patrol officers were eligible for participation in the pretest survey. Due to officer absences, 668 officers were approached and 467 participated, resulting in a 69.9% response rate of approached officers. A random sample of patrol officers was selected from those who participated in the pretest survey and was asked to volunteer to wear a BWC as part of the study. Randomly selected officers who were asked to wear a BWC and agreed to do so are referred to as volunteers (n=47). Officers who were asked to wear a BWC and declined are referred to as BWC resistors (n=97). Officers who declined to wear a BWC were replaced by another randomly selected officer who was then asked to volunteer to wear a BWC (see Huff, Katz, & Webb, 2018 for a discussion of differences

between BWC volunteers and resistors).[9] Due to time constraints and in order to quickly deploy BWCs, the PPD mandated 73 officers to wear a BWC, regardless of whether they participated in the pretest survey or not. Of the 73 BWCs mandated by PPD, 56 were randomly assigned to officers according to a revised study protocol that randomly selected patrol officers from the original list of survey eligible officers. These officers were then required to wear a BWC without the option to decline. The remaining 17 BWCs were nonrandomly assigned by precinct commanders, which violated the study protocol.[10] Due to changes in officer assignments over the course of the study period, 3

[9] Identified differences were limited, with results suggesting that BWC resistors were less likely to have a four-year college degree and were less likely to believe that BWCs positively impact citizen behavior, compared to BWC volunteers. No significant differences in self-reported perceptions of the evidentiary value of BWCs, perceptions of organizational justice, attitudes toward procedural justice, or noble cause beliefs were identified. There were no significant differences in activity measures created from administrative data, such as self-initiated activities, use of force, or citizen complaints between BWC volunteers and resistors.

[10] During the BWC assignment process, a member of the senior patrol staff (in violation of protocol and unbeknownst to the research team) told each precinct commander that they could select two officers to receive BWCs, with some commanders selecting more than two officers. Informal discussions with precinct commanders indicate that some of them chose their best officers to receive BWCs and others chose their "bad apples". Given the large nature of the study, which had 841 eligible patrol officers and command staff from multiple levels of the organization involved in the implementation of the project, eliminating all potential for implementation failure was extremely challenging. Prior researchers have discussed this issue, and suggest that randomization failure and implementation failures are not uncommon (though likely underreported) in large criminal justice experiments due to the challenges in designing and managing the administration of these experiments (Mears, 2010; Weisburd et al., 1993). The Repeat Offender Program experiment in Washington D.C. is a good example of randomization manipulation, as officers responsible for randomly allocating offenders to treatment or control conditions using a coin toss admitted to manipulating the results in some cases to ensure that individuals they wanted in the treatment group would be assigned to that group (Martin & Sherman, 1986). The potential for this randomization manipulation to impact the outcomes of the experiment was examined by the authors who estimated treatment effects as a whole and including statistical controls to correct for randomization manipulations. They found limited differences using the two analytical strategies, indicating that the randomization manipulations likely had limited impact on the outcome of the evaluation (Martin & Sherman, 1986). The importance of agency cooperation to avoid implementation failure is further supported by qualitative research based on interviews of officers involved in the Milwaukee Domestic Violence Experiment, who reported the role of agency supervision was instrumental to the success of the experiment (Weiss & Boruch, 1996). The results of that study further suggested, "experiments that eliminate a rule for the officers (e.g.; introduce discretion where it had not existed) are more feasible than those that impose a burden" (Weiss & Boruch, 1996, p. 51), highlighting the additional challenges facing evaluations of BWCs, which have received some resistance from officers.

additional officers were randomly selected and mandated to wear a BWC during the evaluation. This resulted in a total of 123 officers wearing a BWC at some point during the trial. See Appendix APPENDIX B

PPD BWC experimental DESIGN for a visual representation of the final study design.

It is important to remember that though the data used for this study were collected as part of a larger evaluation of BWCs in PPD, I am not examining the impact or effectiveness of BWCs. I am not examining change in officer behavior over time, before and after the receipt of a BWC either. The results of the PPD BWC evaluation examining the impact of BWCs on officer behavior over time will be reported elsewhere. In this study, I include the activation of a BWC as an additional element in my examination of cross-sectional differences in the influence of situational, officer, and neighborhood context on officer use of discretion. By accounting for the influence of BWCs on proactivity, arrest, and use of force, I extend the BWC literature beyond examining whether or not BWCs "work" to whether or not BWCs impact officer behavior in individual incidents, while accounting for the broader context of a police-citizen encounter. I then take this a step further by examining whether BWC activation moderates the effect of neighborhood context on proactivity, arrest, and use of force. This is an important contribution to the research given arguments that BWCs will result in more equitable policing.

3.6 Dependent Variables

In order to examine the relationship between social ecology and different forms of officer behavior at the incident level, I examine three separate dependent variables: proactivity, arrests, and use of force. All dependent variables are treated as dummy variables for each incident examined. See Table 3.1 for a description and coding of all study variables.

3.6.1 Officer Proactivity. I created a proactivity variable using incident source information from the CAD data. Incidents with a source listed as 'self-initiated' in the CAD data are considered proactive. The remainder of incidents are considered reactive, and come from various sources, including: non-emergency crime reports collected online or using a non-emergency phone number, 911 calls, alarms, or other sources. The examination of proactive contacts is important because these incidents are highly discretionary and could differentially impact different types of citizens in different locations (Davis, 1969). These incidents also serve as a measure of police vigor (Black, 1980; Klinger, 1997). Prior researchers have also used self-initiated calls reported in CAD as a measure of proactivity (Lawrence & Peterson, 2019; Wallace et al., 2018; Wu & Lum, 2017).

3.6.2 Arrest. I created the arrest variable by merging the arrest data with the CAD data using the incident number. If the incident number was associated with an arrest record, the incident was coded as resulting in arrest. Those incidents that were not associated with an arrest record are coded as no arrest. Arrests are subject to higher levels of oversight and external review than proactive police contacts, but they still involve

officer use of discretion in determining whether to conduct an arrest and which charges to file (Bittner, 1967; Black, 1976; Walker, 1993). An arrest also has long-term consequences for the arrestee, as an arrest results in that person being formally entered into the criminal justice system for potential prosecution (Goldstein, 1963). As such, an arrest also constitutes a measure of police use of law or vigor (Black, 1980). The potential for officers to arrest different types of people in different places renders arrest an important outcome to examine. Arrest records have been used in numerous prior studies (Kirk & Matsuda, 2011; Wallace et al., 2018).

3.6.3 Use of Force. I similarly created the use of force variable by merging the use of force data with the CAD data. If the incident number was associated with an official use of force report, the incident is coded as involving officer use of force. If the incident number is not associated with a use of force report, the incident is coded as not involving officer use of force. Given the heightened attention that use of force incidents receive, and concerns that these incidents disproportionately involve citizens of racial/ethnic minority groups (Paoline et al., 2018; Terrill & Mastrofski, 2002; Terrill & Reisig, 2003), use of force is an important outcome to assess. Administrative use of force reports have been commonly used in prior research (Alpert & MacDonald, 2001; Ariel et al., 2015; Atherley & Hickman, 2014; Paoline et al., 2018). Official use of force reports are considered more reliable in those departments that require supervisors to complete use of force reports (Alpert & MacDonald, 2001; Terrill, Alpert, Dunham, & Smith, 2003), like the PPD.

Table 3.1 Description of Study Variables

Variable	Description	Time 1 Mean (SD)	Time 2 Mean (SD)
Dependent variables [ac]		0.14 (0.35)	0.17 (0.38)
Proactive	Dummy variable (0=Citizen-initiated contact; 1=Proactive contact)	0.24 (0.43)	0.27 (0.45)
Arrest	Dummy variable (0=No arrest; 1=Arrest)	0.00 (0.02)	0.00 (0.02)
Use of force	Dummy variable (0=No use of force; 1=Use of force)		
Independent and control variables			
Situational [ab]			
BWC activated	Dummy variable (0=No BWC activation; 1=BWC activation)	-	0.15 (0.36)
Incident type	*A series of dummy variables*		
Violent	Dummy variable (0=Not violent; 1=Violent)	0.18 (0.38)	0.17 (0.37)
Property	Dummy variable (0=Not property; 1=Property)	0.26 (0.44)	0.26 (0.44)
Subject/vehicle stop	Dummy variable (0=Not subject/vehicle stop; 1=Subject/vehicle stop)	0.19 (0.40)	0.22 (0.41)
Other incident type	Dummy variable (0=Not other incident type; 1=Other incident type)	0.37 (0.48)	0.36 (0.48)
Contamination			
n. officers	Continuous variable (number of officers present)	2.35 (1.14)	2.38 (1.16)
Multiple BWC activations	Dummy variable (0=zero or one officers activated a BWC; 1=more than one officer activated a BWC)	-	0.16 (0.40)
Officer [d]			
Male officer	Dummy variable (0=Female; 1=Male)	0.89 (0.32)	0.89 (0.32)
White officer	Dummy variable (0= Nonwhite; 1=White)	0.73 (0.44)	0.73 (0.44)
College education	Dummy variable (0=No Bachelor's degree; 1=Bachelor's degree+)	0.32 (0.47)	0.32 (0.47)

Officer tenure	Continuous variable (years of service)	10.23 (7.33)	10.19 (7.28)
Officer precinct	*A series of dummy variables for officer precinct assignment*		
Black Mountain	Dummy variable (0=Not Black Mountain; 1=Black Mountain)	0.14 (0.35)	0.14 (0.35)
South Mountain	Dummy variable (0=Not South Mountain; 1=South Mountain)	0.16 (0.37)	0.16 (0.37)
Central City	Dummy variable (0=Not Central City; 1=Central City)	0.06 (0.23)	0.06 (0.23)
Desert Horizon	Dummy variable (0=Not Desert Horizon; 1=Desert Horizon)	0.22 (0.41)	0.22 (0.41)
Mountain View	Dummy variable (0=Not Mountain View; 1=Mountain View)	0.21 (0.41)	0.22 (0.41)
Cactus Park	Dummy variable (0=Not Cactus Park; 1=Cactus Park)	0.21 (0.41)	0.21 (0.41)
Social ecological [ae]			
Economic disadvantage (factor variable created using exploratory factor analysis of the below indicators)		0.003 (0.85)	0.003 (0.85)
% Poverty	Percentage of residents who live under the poverty level		
% Unemployment	Percentage of residents over 16 years of age who are unemployed		
% Public assistance	Percentage of residents receiving public assistance		
Residential instability			
% Residential instability	Continuous variable (% of residents who have moved into their current residence after 2010)	0.52 (0.15)	0.52 (0.15)
Foreign born			
% Foreign born	Continuous variable (% of residents who are foreign-born)	0.18 (0.10)	0.18 (0.10)
Racial/ethnic population distributions			
% Hispanic	Continuous variable (% of residents who are Hispanic)	0.38 (0.27)	0.38 (0.27)
% Black	Continuous variable (% of residents who are black)	0.06 (0.07)	0.06 (0.07)
Other ecological measures			
Violence rate	Continuous variable (number of violent incidents/100,000 residents in each census tract)	20,397.59 (25,319.27)	20,397.59 (25,319.27)

Population density	Continuous variable (n. residents/square miles)	5,359.25 (3,418.02)	5,359.15 (3,418.15)

[a] from CAD/RMS and arrest data; [b] from BWC metadata; [c] from use of force data; [d] from employee data; [e] from the 2016 American Community Survey

3.7 Independent and Control Variables

As the purpose of this study is to examine the influence of factors at the situational, officer, and social-ecological levels, independent and control variables at each of these levels were included. The situational variables were drawn from the CAD data, officer-level variables were drawn from the personnel data and employee rosters, and the social-ecological variables were drawn from the US Census data.

3.7.1 Situational Variables. Offense severity has long been linked to officer behavior (M. K. Brown, 1988; J. Q. Wilson, 1978) and has been used as an independent/control variable in several studies (Crow & Adrion, 2011; Sobol et al., 2013; Terrill & Mastrofski, 2002). A series of dummy variables for call type are used as control variables at the situational level. These variables were generated based on incident call codes in the CAD data. There were 361 unique call codes in the data that were recoded into one of the following categories: *violent*, *property*, *subject/vehicle stops*, and *other*. Violent offenses include offenses such as assaults, domestic violence, and robbery. Property offenses include crimes such as burglaries and theft. Subject/vehicle stops include all incidents coded as officers stopping subjects or vehicles. A full list of call codes associated with each incident type is provided in Appendix B.

A control variable for the *number of officers* present at the incident is included. This variable was created by counting the total number of officers that responded to each incident using the master CAD datafile. The vast majority of calls involved one to five officers (96.06%), therefore, this variable was truncated to five. It is important to account for the number of officers present because officers could behave more legalistically in the

presence of other officers, compared to when they respond to incidents alone, due to increased oversight of their activities (Lawton, 2007). Other researchers have found associations between groups of officers and increased severity of force (Terrill & Mastrofski, 2002). The relationship between the number of officers present and the outcome of an incident is complex, as a higher number of officers could encourage either legalistic behavior or misconduct. Further, a higher number of officers present could be indicative of a more serious incident; or a higher number of officers could suggest that officers are more fearful of certain situations as they unfold in certain places. As such, the number of officers likely impacts the dynamics of a situation, regardless of which of the above explanation applies to a particular incident.

3.7.2 Officer-Level Variables. Officer demographic characteristics and job-related factors are included as independent variables at the officer level. Demographic characteristics include gender, race/ethnicity, and educational attainment. Most officers were *male*. I used a dummy variable to measure officer race/ethnicity, using white officers as the reference category. Most officers were non-Hispanic *white* (73.0%) and 23.0% were nonwhite. I also used a *college educated* dummy variable to account for an officer's educational attainment. All officers who had less than a four-year degree were used as the reference group and those who had a four-year or advanced degree were considered college-educated. Officer demographic characteristics are often used as independent and control variables, with some researchers finding associations between officer demographics and behavior (Alpert & Dunham, 2004; Brandl & Stroshine, 2012; Crow & Adrion, 2011; Paoline et al., 2018; Sun et al., 2008; Terrill & Mastrofski, 2002).

I also included job-related measures as control variables at the officer level, such as *years of service* and *precinct assignment*. Researchers have reported that officers with more years of service could behave differently than officers who have fewer years of experience (Lawton, 2007; Paoline et al., 2018; Terrill & Mastrofski, 2002; Wallace et al., 2018; White & Kane, 2013). As officer assignment has been linked to informal workgroup rules about vigor (Klinger, 1997) and use of force (Brandl & Stroshine, 2012; Ingram et al., 2018), this is also an important control variable. Officer precinct assignment was accounted for using a series of dummy variables: *Black Mountain*, *South Mountain*, *Central City*, *Desert Horizon*, and *Mountain View*. The *Cactus Park* precinct is used as the reference category.

3.7.3 Social-Ecological Variables. Social disorganization theory suggests that neighborhood levels of economic disadvantage, residential instability, and racial/ethnic heterogeneity undermine the ability of residents to exercise informal social control and engage in collective efficacy. As noted above, social disorganization has also been associated with variation in police behavior across different neighborhood contexts. The following census variables were collected to tap into the economic disadvantage element of the social disorganization model: percent below the poverty line, percent unemployed, and percent receiving public assistance. I used exploratory factor analysis to determine whether these variables loaded sufficiently onto a single factor. All of the variables loaded onto one factor with factor loadings over 0.63 (see Table 3.2). Both a scree test and the Kaiser criteria (eigenvalue>1) suggested that all three measures loaded onto a single factor. This factor variable is referred to as *economic disadvantage*.

Table 3.2 Exploratory Factor Analysis of Economic Disadvantage Variables

	Factor loadings
% Poverty	0.75
% Unemployed	0.76
% Public assistance	0.63
Eigenvalue	*1.52*

Principal factor estimation used to account for skewed variables

I account for the population mobility element of social disorganization using a measure of residential instability. *Residential instability* is a continuous variable representing the percentage of residents who have moved in the past five years.

Several separate measures are used to account for racial/ethnic population distributions at the neighborhood level. Due to longstanding concerns surrounding police treatment of racial and ethnic minorities and differential police enforcement in minority neighborhoods (Black, 1976, 1980; Blalock, 1967) and more recent contention surrounding the events in Ferguson and the Black Lives Matter movement, isolating the effects of racial/ethnic populations is important. Neighborhood percent *foreign-born* is included as standalone variable to account for the percentage of residents born outside of the U.S. Continuous measures of *percent black* and *percent Hispanic* residents at the census-tract level are also included to account for any potential race/ethnicity effects independently of other structural factors. Other scholars have similarly evaluated the impact of racial/ethnic residential populations on police misconduct and crime separately from other structural factors (Kane, 2002; Krivo & Peterson, 1996). Though some researchers have included measures of racial/ethnic populations in measures of concentrated disadvantage (Katz & Schnebly, 2011; Kubrin & Weitzer, 2003), given the

focus of the current study on the impact of social ecology and technology on police behavior, evaluating racial/ethnic population distributions separately from the other elements of social disorganization is important.

I additionally control for *population density* for each census tract, measured as the total population/square miles. This measure controls for differential exposure of census tracts and residents within census tracts to police activity. For instance, a census tract with a very low residential population has fewer residents that could be exposed to police action than a more densely populated census tract (Kane et al., 2013). Similarly, a census tract that is only one square mile has less geographic exposure to police intervention than a tract that is ten square miles (Kane et al., 2013; Lum, 2011). This variable is also included because population density was an important consideration in early conceptions of social disorganization theory, with some researchers finding that population density can foster anonymity and opportunities to offend (Roncek, 1981). Collectively, these indicators of neighborhood structure are consistent with those used in prior research examining the impact of neighborhood structure on police behavior (Kane, 2002; Kane et al., 2013; Lum, 2011) and are grounded in theoretical models of social disorganization (Shaw & McKay, 1942).

Given the long noted differences in police behavior in high crime versus low crime neighborhoods (Black, 1980; Herbert, 1997), and the centrality of crime levels to some theories of police behavior (Klinger, 1997), neighborhood crime is an important control variable. 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

over the three-year study period by the population for each census tract, standardized to a rate per 100,000 residents (i.e., violent crime rate = $\frac{n.violent\ calls}{population} x100{,}000$). Similar measures of violent crime have been used to account for neighborhood crime in prior studies (Katz & Schnebly, 2011; Lum, 2011; Sobol et al., 2013).

Several checks for multicollinearity were performed to examine relationships between the social-ecological measures. First, pairwise correlations were examined. The results indicated that percent Hispanic and percent foreign-born were highly correlated (0.84). I then examined variance inflation factors (VIFs). The VIFs similarly suggested some concerns about multicollinearity among the measures of social ecology (VIF for percent Hispanic was 4.34). Finally, condition indices were examined. The condition indices were less than 15, which is not suggestive of multicollinearity. Due to strong correlations between percent Hispanic and percent foreign-born, I reexamined multicollinearity among the social ecological variables, excluding percent Hispanic. There were no concerns surrounding multicollinearity. I also reexamined collinearity among the social ecological variables, excluding percent foreign-born, and there were no concerns surrounding multicollinearity. As a result, separate models will be run for each outcome variable (proactivity, arrest, use of force), one including percent foreign-born (excluding Hispanic) and another including percent Hispanic (excluding foreign-born). After separating these variables, none of the VIFs exceeded 4, indicating limited concerns related to multicollinearity (Hair, Anderson, Tatcham, & Black, 1998).[11] I also examined

[11] VIFs excluding percent Hispanic: economic disadvantage (2.22), population mobility (1.57), foreign born (1.72), percent black (1.30), violent crime rate (1.59), and population density (1.41). VIFs excluding

the condition number to further assess multicollinearity. The condition number (13.0) was below 15, further indicating limited concerns related to multicollinearity (Thompson, Kim, Aloe, & Becker, 2017). Pairwise correlations for all of the social-ecological variables are provided in Table 3.3. Taken as a whole, these diagnostics are not indicative of multicollinearity once foreign-born and Hispanic residents are examined in separate models.

foreign born: economic disadvantage (2.83), population mobility (1.56), percent Hispanic (2.06), percent black (1.29), violent crime rate (1.65), and population density (1.33). It is important to note that there are conflicting critical thresholds for VIFs in the literature. For instance, some authors suggest 10 is the critical threshold for VIFs (Dormann et al., 2013). As the VIFs in this study are all well below that threshold, multicollinearity does not appear to be a concern.

Table 3.3 Pairwise Correlations for All Census Variables

		1	2	3	4	5	6	7
1	Economic disadvantage	1.0000						
2	Residential instability	0.4145*	1.0000					
3	Foreign-born	0.5740*	0.3252*	1.0000				
4	Hispanic	0.6726*	0.3022*	0.8398*	1.0000			
5	Black	0.3587*	0.4261*	0.1892*	0.2346*	1.0000		
6	Violence rate	0.5453*	0.3891*	0.1870*	0.2006*	0.2154*	1.0000	
7	Population density	0.3615*	0.3604*	0.4719*	0.4039*	0.1851*	0.0875	1.0000

* $p<0.01$

3.7.1 Body-Worn Camera Variables. To examine the potential for BWCs to impact the relationship between neighborhood context and police behavior, *BWC activated* is included as a key independent variable in the second research question. This is a dummy variable I created by merging the BWC activation data with the CAD data. *BWC activated* accounts for whether a BWC was turned on during an incident, resulting in BWC footage of the police-citizen encounter. Because many incidents involve multiple officers, and could therefore result in multiple BWC activations, a separate control variable to account for potential contamination in incidents involving multiple officers activating BWCs was included. *Multiple BWC activations* is a dummy variable measuring whether more than one officer activated a BWC during an encounter.

Prior researchers have found that BWCs can increase proactivity (Ready & Young, 2015; Wallace et al., 2018), increase arrests (Braga et al., 2017), and decrease use of force (Ariel et al., 2015; Braga et al., 2017; Jennings et al., 2015), though these findings are far from conclusive (Lum et al., 2019). Most prior BWC studies examine the impact of BWCs based on whether or not officers were assigned to wear a camera. This is a notable limitation because it is not possible to establish whether officers activated their BWC in all of the incidents they responded to. The use of a BWC activation variable (as opposed to a measure of BWC assignment) is particularly important because officer compliance with activation policies could affect the impact of BWCs on policing outcomes (Hedberg et al., 2017). As such, the use of a BWC activation variable in this study improves upon studies that solely examine whether an officer was wearing a BWC at the time of an incident. This is particularly important given identified variation in

BWC activation across individual officers (Lawrence, McClure, Malm, Lynch, & La Vigne, 2019).

3.8 Analytical Strategy

Prior research examining police behavior is often limited to considerations of factors at a single level of analysis, despite recognition that the outcomes of police encounters are influenced by factors operating at multiple levels. 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 officers and neighborhood context impacts the outcomes of individual incidents. In order to account for situational, officer, and social-ecological factors, I use cross-classified random effects models to account for all of these factors simultaneously. In this section, I begin with a broad introduction of cross-classified random effects models. I then explain how I specifically use this strategy to address my research questions. I first describe the unconditional models I use to assess each of my outcomes of interest. Because both research questions use the same methodology, the unconditional models are the same. As such, I discuss the unconditional models for each research question together and then detail the conditional models for each research question separately.

Many multilevel models are fit under the assumption that data are strictly nested. However, individual observations are not always classified into categories that are hierarchically nested (Rasbash, 2005). According to Raudenbush and Bryk (2002),

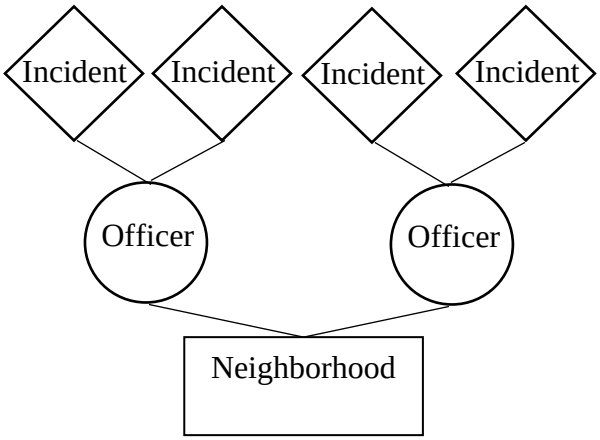
“cross-classification arises when lower-level units (e.g., students) share memberships in a unit of one factor (e.g., a neighborhood) and can belong to different units of a second factor (e.g., different schools)” (p. 396). Sommet and Morselli (2017) explain cross-classification another way, as occurring when “pupils in a given cluster (school or neighborhood) are not ‘sub-classified’ by the other type of cluster (i.e. pupils do not necessarily attend to the school of their neighborhood)” (p. 215). That is, unlike some data structures that are inherently hierarchical (e.g., students within classrooms within schools), cross-classified structures are appropriate when classification in one level does not predict classification in another level (i.e., students in the same class cannot be in different schools, but students in the same neighborhoods can attend different schools). Thus, cross-classified models are appropriate when researchers want to examine the effects of multiple levels of explanation that are not hierarchically structured or perfectly nested on a particular outcome. Criminal justice researchers have used cross-classified models to examine the influence of prosecutor-judge dyads on court outcomes (Kim, Spohn, & Hedberg, 2015) and case processing for indicted terrorists (B. D. Johnson, 2012).

Given the structure of my data, which include officers who respond to incidents in multiple neighborhoods, it is not possible to use hierarchical models, which would require perfect nesting of incidents (level 1) within officers (level 2) and of officers (level 2) within neighborhoods (level 3). As shown in Figure 3.1, my data are cross-nested because officers respond to incidents in multiple neighborhoods. This requires the use of a cross-classified model to account for the random effect of both the officer and the

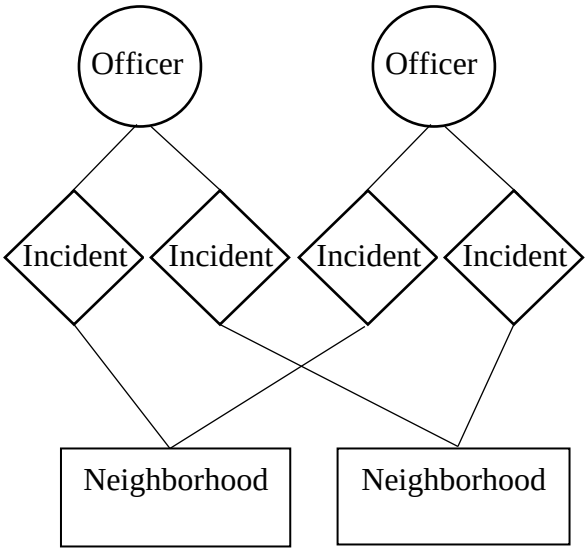
neighborhood on the outcome of the individual incident. In short, using cross-classified models enables an examination of the outcomes of individual incidents while simultaneously accounting for both the officer who responded to the incident and the neighborhood the incident occurred within. This complex relationship between officers and neighborhoods cannot be assessed using two-level models examining incidents nested in officers or incidents nested in neighborhoods.

Figure 3.1. Possible Data Structures

Three-level nested data structure



Cross-classified data structure



In this study, I use cross-classified random effects models to examine the impact of situational, officer-level, and social-ecological context on police proactivity, arrests, and use of force. Given that each outcome is a dummy variable, logistic regression equations are employed for all general models. An unconditional cross-classified model is estimated for each dependent variable, represented by the following equation:

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

where Y_{ijk} is the outcome (proactivity, arrest, use of force) of incident *i* in officer *j* and neighborhood *k*, β_0 is the intercept for the outcome, u_j is the random effect of the officer, u_k is the random effect of the neighborhood, and e_{ijk} is the residual, or the unique effect of the ith incident by the jth officer in the kth neighborhood.

Using the cross-classified model, I partition the variability in the outcomes (proactivity, arrests, and use of force) into a within-cell component examining variation between incidents (σ^2). Three between-cell components are estimated to examine variance between officers (τ_{b00}), variance between neighborhoods (τ_{c00}), and residual variance (τ_{d00}). The conditional models, which include additional predictors for each research question, are detailed below.

3.8.1 Research Question 1. In order to examine the impact of situational, officer, and social-ecological factors on proactivity, arrests, and use of force, I use police-citizen contact data from Time 1, prior to the deployment of BWCs. As noted above, I first estimate an unconditional model without predictors to examine the variance components for each of the dependent variables: proactivity, arrest, use of force. I then

compare the unconditional model to a full model including situational, officer, and social-ecological variables for each outcome, 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 for the outcome, λ_q is the effect of the *q*th predictor *S* for call *i* by officer *j* in 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, or the unique effect of the ith incident by the jth officer in the kth neighborhood. Situational predictors include the call type variables and the number of officers present. The officer-level variables include demographic (gender, race/ethnicity, educational attainment) and job-related (years of service, precinct assignment) characteristics. Finally, the social-ecological predictors include the measures of economic disadvantage, residential instability, percent foreign-born, percent Hispanic, percent black, the violent crime rate, and population density for each census tract. This modeling strategy enables me to examine the impact of situational, officer, and neighborhood characteristics simultaneously on proactivity, arrests, and use of force.

3.8.2 Research Question 2. In order to examine whether BWCs moderate the relationship between social-ecological context on police behavior accounting for the influence of situational and officer characteristics, I use police-citizen contact data for Time 2, after the deployment of BWCs. I again examine the impact of these factors on police proactivity, arrests, and use of force. As this portion of the study is focused on the influence of BWCs on the relationship between social-ecological context and police behavior, all of the variables included in the first part of the study are also included in the

second part (see Table 3.1 and Section 3.8.1). The key distinction between the methods used to answer each question is the introduction of the BWC activation independent variable, as well as interaction terms between BWC activation and the following neighborhood-level variables in the second research question: economic disadvantage, percent foreign-born, percent Hispanic, percent black, and violent crime rate.

As in the first research question, an unconditional model is first estimated for proactivity, arrest, and use of force. Because the data used to address each research question are different (Time 1 data used for research question 1 and Time 2 data used for research question 2), there could be differences in the results of the unconditional models for each research question. I then estimate a conditional model including the remainder of the situational, officer, and social-ecological variables, with the inclusion of the BWC independent variable and the interaction terms, represented by the following equation:

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

which can again be interpreted the same way as the conditional equation used in research question 1. If BWCs directly impact officer use of discretion, the *BWC activation* variable will be significantly associated with the dependent variable. This would represent a direct effect of BWCs on these outcomes. To examine the potential for BWCs to *moderate* the impact of neighborhood context on police use of discretion, I will also estimate a conditional model including interaction terms between the BWC variable and the neighborhood measures of neighborhood context (economic disadvantage, foreign-born, Hispanic, black, and violence rate). If these interaction terms are significant, it would suggest that BWCs moderate the influence of that variable on that outcome. For

example, if a BWC activation*percent Hispanic interaction term is significant, it would suggest that officers behave differently in neighborhoods with varying sizes of Hispanic populations, depending on whether a BWC is activated.

As the presence of a BWC could impact officer decision-making, I expect the BWC variable to be directly associated with each of the outcomes of interest. I further anticipate that the inclusion of the BWC activation variable will increase the variance explained at the situational level and reduce the variance explained at the neighborhood level. I will examine the potential for BWCs to reduce the influence of neighborhood racial/ethnic context on proactivity, arrest, and use of force by comparing the variance components in the unconditional models to the full models including all of the predictors.

3.9 Summary

The culmination of data collected through the PPD BWC experiment enable an examination of proactivity, arrests, and use of force. These data were specifically organized to understand officer behavior as a function of situational factors, officer characteristics, and social-ecological context. Using a cross-classified multilevel modeling strategy, I assess the impact of factors operating at multiple levels of explanation on police behavior in individual citizen contacts. I use data from the first 18 months of the study to assess the relationship between situational factors, officer characteristics, and social ecology on police behavior more broadly, prior to the deployment of BWCs. I then evaluate whether the activation of a BWC influences these relationships using data collected for the 18 months following the deployment of BWCs to some officers in PPD. This strategy enables me to address two gaps in prior research

through first examining a comprehensive model of the impact of context on three forms of police behavior with varying levels of oversight. Second, I apply this comprehensive strategy to examine the potential influence of BWCs on officer use of discretion, accounting for the features of different situations, officers, and social-ecological environments. This enables me to examine whether BWC activation reduces disparities in police behavior in neighborhoods with different racial/ethnic compositions.

4. EXAMINING SITUATIONAL, OFFICER, AND SOCIAL-ECOLOGICAL INFLUENCES ON POLICE USE OF DISCRETION

4.1 Introduction

In this section, I present the results of my first research question: how do situational, officer, and neighborhood factors influence police proactivity, arrest, and use of force? Through examining the impact of factors at multiple levels on separate police behavioral outcomes, the results of this question provide a comprehensive view of police use of discretion. I briefly review the methodology before presenting the results.

4.2 Methods

In order to examine the situational, officer, and neighborhood influences on police use of discretion, I use Time 1 data from the PPD BWC experiment. All of these data were collected prior to the deployment of BWCs. These data include 876,256 individual police-citizen encounters responded to by 826 individual officers in 388 unique neighborhoods. Because my dependent variables – proactivity, arrest, and use of force – are binary measures, I use logistic regression for all of the models.

As noted above, I first estimate an unconditional cross-classified model including only the dependent variable and the classification variables (officer and neighborhood intercepts), without any of the situational, officer, or neighborhood predictors. I use the results of the unconditional model to examine the variance components for each of the dependent variables: proactivity, arrest, use of force. The variance components in the unconditional models are used to establish whether cross-classified modeling accounting for the simultaneous effects of officers and neighborhoods is necessary. The variance

components from the unconditional models also provide a baseline assessment of the strength of the relationship between the officer and neighborhood-level features on each outcome. If the variance components are significant, I then compare the unconditional model to a fully conditional cross-classified model including all of the situational, officer, and social-ecological variables for the outcome. If the variance components in the unconditional model are not statistically significant, this suggests that cross-classified models accounting for the simultaneous effects of individual officers and neighborhoods are not necessary to explain variance in the outcome. In the event that the variance components in the unconditional cross-classified models are not significant, separate hierarchical logistic models will be estimated to account for variance in the outcome as a function of incidents nested in officers and incidents nested in neighborhoods.

For each outcome, two conditional cross-classified models are estimated to examine the influence of neighborhood characteristics. Model 1 includes all of the situational, officer, and neighborhood-level factors, except for neighborhood percent Hispanic because of the high correlation between percent Hispanic and percent foreign-born. Model 2 includes all of the situational, officer, and neighborhood-level factors, but includes percent Hispanic and excludes percent foreign-born. Similarly, for those outcomes without significant cross-classification, separate hierarchical logistic models examining incidents nested in neighborhoods are estimated. Model 1 includes percent foreign-born and Model 2 includes percent Hispanic. Because not all immigrants are Hispanic, and not all Hispanics are immigrants, separating these factors is important to examine whether police behavior differs in immigrant communities and Hispanic

communities. All of the continuous variables in the models are grand mean centered. This means that any significant effect of a continuous variable on an outcome can be interpreted as 'in relation to the average incident, officer, or neighborhood', depending upon the variable.

4.3 Results

The variance components obtained from the unconditional models are presented in Table 4.1.[12] The variance components for proactivity and arrest are significant, suggesting that proactivity and arrest were significantly related to the simultaneous effect of individual officers and neighborhoods, rendering the use of cross-classified random effects models appropriate ($p<0.001$). The variance components for proactivity suggest that proactive incidents were more strongly associated with officer-level factors (VC=0.35) than neighborhood (VC=0.27) factors. The variance components for arrest similarly suggest the variation in arrest was more strongly associated with officer (VC=0.20) than neighborhood-level (VC=0.06) factors. However, the variance components for the unconditional use of force model are not significant. This suggests that a cross-classified model is not necessary to understand variation in police use of force across different officers ($p>0.5$; VC=0.37) and different neighborhoods ($p=0.27$; VC=0.09) simultaneously. These are interesting findings in and of themselves. The results suggest that both proactivity and arrest vary significantly among different officers and in different neighborhoods. However, use of force does not vary significantly across

[12] Intra-class correlation coefficients (ICCs) are not presented due to the binary nature of the dependent variables examined. See footnote 12 in Wallace et al. (2018) for a thorough discussion of the inappropriateness of estimating ICCs for binary outcomes such as police self-initiated contacts and arrests, which cannot be considered as discrete measures that represent an underlying continuous latent variable.

officers or neighborhoods. Given that the variance components for officers and neighborhoods were significant for proactivity and arrest, fully conditional cross-classified models will be estimated for each of those outcomes. Because the inclusion of random intercepts for both individual officers and individual neighborhoods is not statistically necessary to understand use of force, separate hierarchical logistic models examining use of force as a function of officers and neighborhoods will be estimated.

Table 4.1 Variance Components for All Dependent Variables – Unconditional Cross-Classified Logistic Models

	Officer			Neighborhood		
	$\chi 2$	VC	p	$\chi 2$	VC	p
Proactivity	46,921.52	0.35	<0.001	14,956.68	0.27	<0.001
Arrest	23,360.15	0.20	<0.001	5,134.32	0.06	<0.001
Use of force	818.01	0.37	>0.500	403.51	0.09	0.27

Note: VC=variance component

4.3.1 Proactivity Results. The results of the fully conditional proactivity models, including all situational, officer, and neighborhood covariates are presented in Table 4.2. The results presented in Model 1 include neighborhood percent foreign-born and exclude percent Hispanic. At the situational level, subject/vehicle stops were significantly more likely to be proactive (OR=20.33; p<0.001), relative to other offense types. Incidents involving violent offenses (OR=0.31; p<0.001), property offenses (OR=0.49; p<0.001), and a greater number of officers (OR=0.77; p<0.001) were significantly less likely to be proactive. These results are not surprising given the types of incidents that are visible to officers conducting proactive patrols. Specifically, officers are less likely to ‘happen upon’ a violent or property offense than they are a suspicious person or vehicle. Turning to officer-level factors, officer tenure was negatively related to

proactivity (OR=0.97; p<0.001). This suggests that the odds of a proactive incident decreased by 2.3% with each additional year of service.[13] There were also some significant differences in proactivity across precincts, with officers in the Black Mountain (OR=0.76; p<0.001) and Desert Horizon (OR=0.85; p<0.05) precincts being significantly less likely to conduct proactive contacts compared to those in Cactus Park. Officers in the South Mountain precinct were significantly more likely to conduct proactive stops than officers assigned to Cactus Park (OR=1.16; p<0.05). Finally, turning to neighborhood-level influences, proactive contacts were significantly more likely to occur in neighborhoods with higher rates of violence, though the results suggest that the magnitude of this relationship was very small (OR=1.00; p<0.001).

Model 2 includes percent Hispanic and excludes percent foreign-born. The findings are largely similar to the results in Model 1. Proactivity was significantly more likely to occur in subject/vehicle stops (OR=20.34; p<0.001), and significantly less likely to occur in violent offenses (OR=0.31; p<0.001), property offenses (OR=0.49; p<0.001), and incidents involving higher numbers of officers (OR=0.77; p<0.001). At the officer level, proactive contacts were again significantly more likely to be conducted by officers assigned to the South Mountain precinct (OR=1.17; p<0.05). Proactive contacts were significantly less likely to be conducted by officers with more years of service (OR=0.97; p<0.001), officers assigned to Black Mountain (OR=0.76; p<0.001), and officers assigned to Desert Horizon (OR=0.85; p<0.05). As in Model 1, the only significant

[13] Calculated as: (odds ratio-1)*100. For example, (0.971-1)*100=2.3% reduction in the likelihood of a proactive contact for each increase in officer years of service.

neighborhood-level predictor of proactivity was the violence rate. This relationship was again very small (OR=1.00; $p<0.001$).

Table 4.2 Cross-Classified Logistic Models Predicting Proactivity

	Model 1				Model 2			
	β	SE	OR	p	β	SE	OR	p
Situational								
Violent	-1.172	0.020	0.310	<0.001	-1.172	0.020	0.310	<0.001
Property	-0.722	0.014	0.486	<0.001	-0.722	0.014	0.486	<0.001
Subject/vehicle stop	3.012	0.010	20.335	<0.001	3.012	0.010	20.336	<0.001
# responding officers	-0.258	0.004	0.773	<0.001	-0.258	0.004	0.773	<0.001
Officer								
Male	0.016	0.069	1.016	0.820	0.016	0.069	1.016	0.818
White	0.030	0.048	1.030	0.538	0.029	0.048	1.030	0.543
College educated	0.049	0.046	1.050	0.289	0.049	0.046	1.050	0.287
Tenure	-0.030	0.003	0.971	<0.001	-0.030	0.003	0.971	<0.001
Black Mountain	-0.276	0.075	0.759	<0.001	-0.278	0.075	0.757	<0.001
South Mountain	0.152	0.074	1.164	0.039	0.154	0.074	1.167	0.037
Central City	0.106	0.103	1.112	0.301	0.107	0.103	1.113	0.296
Desert Horizon	-0.161	0.067	0.851	0.016	-0.162	0.067	0.851	0.015
Mountain View	0.129	0.068	1.137	0.058	0.130	0.068	1.139	0.056
Neighborhood								
Economic disadvantage	-0.039	0.049	0.962	0.429	0.017	0.056	1.018	0.754
Residential instability	0.104	0.238	1.109	0.663	0.135	0.237	1.144	0.570
Foreign-born	0.400	0.356	1.492	0.262	-	-	-	-
Hispanic	-	-	-	-	-0.131	0.148	0.877	0.376
Black	-0.379	0.477	0.685	0.427	-0.449	0.476	0.638	0.346
Violence rate	0.000	0.000	1.000	<0.001	0.000	0.000	1.000	<0.001
Population density	0.000	0.000	1.000	0.899	0.000	0.000	1.000	0.725

Intercept		-3.053	0.088	0.047	<0.001	-3.053	0.088	0.047	<0.001
Number of officers		826				826			
Number of neighborhoods		388				388			
VC for the officer		0.347				0.347			
	$\chi 2$	26,433.458				26,508.177			
	p	<0.001				<0.001			
VC for the neighborhood		0.265				0.266			
	$\chi 2$	12,072.593				12,184.217			
	p	<0.001				<0.001			

Note: VC=variance component; incidents nested in both officers and neighborhoods

4.3.2 Arrest Results. The results of the fully conditional arrest models, including all situational, officer, and neighborhood covariates are presented in Table 4.3. Model 1 again includes all situational, officer, and neighborhood-level variables, with the exception of neighborhood percent Hispanic, and Model 2 includes all of the same variables, but includes percent Hispanic and excludes neighborhood percent foreign-born. As shown in Model 1, arrests were significantly more likely to occur in violent (OR=2.23; $p<0.001$) and property incidents (OR=3.03; $p<0.001$), and were significantly less likely to occur in subject/vehicle stops (OR=0.72; $p<0.001$). This is consistent with prior literature finding that offense severity is the strongest predictor of arrest (D. A. Smith & Visher, 1981). The results further suggest that arrests were significantly more likely to occur when a greater number of officers was present at an incident (OR=1.22; $p<0.001$). The odds of an incident resulting in arrest increased by 21.7% with each additional officer present. At the officer-level, arrests were significantly more likely to involve officers with a college degree (OR=1.09; $p<0.05$). Arrests were significantly less likely to be conducted by male officers (OR=0.87; $p<0.01$), those with more years of service (OR=0.98; $p<0.001$), and officers assigned to the South Mountain precinct (OR=0.85; $p<0.01$). Turning to social-ecological influences, arrests were significantly more likely to occur in neighborhoods with larger foreign-born populations (OR=1.36; $p<0.05$) and larger black populations (OR=1.58; $p<0.01$). Namely, arrests were 36.1% more likely to occur in neighborhoods with larger Hispanic populations and were 57.6% more likely to occur in neighborhoods with larger black populations. Though arrests were significantly more likely to occur in neighborhoods with higher violent crime rates

(OR=1.00; $p<0.01$) and higher population density (OR=1.00; $p<0.001$), the results suggest that these relationships were very small.

The results in Model 2 are very similar to the results in Model 1. Arrests were again significantly more likely to occur in violent offenses (OR=2.23; $p<0.001$), property offenses (OR=3.03; $p<0.001$), and incidents involving a greater number of officers present (OR=1.22; $p<0.001$). Arrests were significantly less likely to occur in subject/vehicle stops (OR=0.72; $p<0.001$). At the officer-level, arrests were again significantly more likely to involve college-educated officers (OR=1.09; $p<0.05$). Incidents involving male officers (OR=0.87; $p<0.01$), officers with fewer years of experience (OR=0.98; $p<0.001$), and those assigned to the South Mountain precinct were significantly less likely to result in arrest (OR=0.85; $p<0.01$). At the neighborhood level, arrests were significantly more likely to occur in neighborhoods with larger Hispanic populations (OR=1.33; $p<0.001$) and larger black populations (OR=1.65; $p<0.001$). Incidents occurring in Hispanic neighborhoods were 32.6% more likely to result in an arrest. Incidents occurring in black neighborhoods were 64.8% more likely to result in arrest. Arrests were again significantly more likely to occur in neighborhoods with higher violent crime rates (OR=1.00; $p<0.05$) and higher population density (OR=1.00; $p<0.001$), though the differences were substantively small.

Table 4.3 Cross-Classified Logistic Models Predicting Arrest

	Model 1				Model 2			
	β	SE	OR	p	β	SE	OR	p
Situational								
Violent	0.802	0.007	2.230	<0.001	0.802	0.007	2.229	<0.001
Property	1.107	0.007	3.026	<0.001	1.107	0.007	3.026	<0.001
Subject/vehicle stop	-0.328	0.009	0.720	<0.001	-0.328	0.009	0.720	<0.001
# responding officers	0.197	0.002	1.217	<0.001	0.197	0.002	1.217	<0.001
Officer								
Male	-0.136	0.049	0.873	0.005	-0.136	0.049	0.873	0.005
White	-0.038	0.034	0.963	0.267	-0.037	0.034	0.963	0.279
College educated	0.083	0.033	1.086	0.012	0.082	0.033	1.086	0.012
Tenure	-0.020	0.002	0.980	<0.001	-0.020	0.002	0.980	<0.001
Black Mountain	-0.021	0.053	0.979	0.691	-0.014	0.053	0.986	0.786
South Mountain	-0.157	0.052	0.854	0.002	-0.167	0.052	0.847	0.001
Central City	-0.091	0.073	0.913	0.210	-0.097	0.073	0.908	0.183
Desert Horizon	0.029	0.047	1.029	0.539	0.031	0.047	1.031	0.518
Mountain View	0.007	0.048	1.007	0.878	0.003	0.048	1.003	0.955
Neighborhood								
Economic disadvantage	0.012	0.018	1.012	0.513	-0.032	0.020	0.968	0.114
Residential instability	0.079	0.087	1.083	0.361	0.085	0.085	1.089	0.318
Foreign-born	0.308	0.130	1.361	0.018	-	-	-	-
Hispanic	-	-	-	-	0.282	0.056	1.326	<0.001
Black	0.455	0.174	1.576	0.009	0.499	0.171	1.648	0.004
Violence rate	0.000	0.000	1.000	0.005	0.000	0.000	1.000	0.042
Population density	0.000	0.000	1.000	<0.001	0.000	0.000	1.000	<0.001

Intercept		-1.406	0.060	0.245	<0.001	-1.405	0.060	0.245	<0.001
Number of officers		826				826			
Number of neighborhoods		388				388			
VC for the officer		0.178				0.179			
	$\chi 2$	23,257.646				23,404.555			
	p	<0.001				<0.001			
VC for the neighborhood		0.031				0.030			
	$\chi 2$	3,746.899				3,639.935			
	p	<0.001				<0.001			

Note: VC=variance component; incidents nested in both officers and neighborhoods

4.3.3 Use of Force Results. The insignificant variance components for use of force in the unconditional cross-classified model suggest that using cross-classified models to account for the simultaneous influence of officers and neighborhoods on use of force in individual incidents is statistically unnecessary. As a result, separate hierarchical logistic models are examined for incidents nested in officers and for incidents nested in neighborhoods. As such, the use of force models are presented in separate officer-level and neighborhood-level tables. First, Table 4.4 presents the variance components from the unconditional models for incidents nested in officers and for incidents nested in neighborhoods. As shown in Table 4.4, understanding use of force does not statistically require nesting individual incidents within responding officers (p=0.223), nor does it depend on nesting individual incidents within individual neighborhoods (p=0.057).

Table 4.4 Variance Components for Use of Force – Unconditional Hierarchical Logistic Models

	VC	$\chi 2$	p
Officer	0.378	855.668	0.223
Neighborhood	0.118	431.823	0.057

Note: VC=variance component

Nevertheless, given my interest in understanding variation in use of force as a function of officer and neighborhood-level factors, hierarchical logistic models are estimated to examine the influence of each of these levels on use of force. Table 4.5 presents the conditional hierarchical logistic results for incidents nested in officers. Table 4.6 presents the hierarchical logistic results with incidents nested in neighborhoods. Table 4.6 is again separated into two models. Model 1 presents a fully conditional model including neighborhood percent foreign-born (excluding percent Hispanic) and Model 2

presents a fully conditional model including neighborhood percent Hispanic (excluding neighborhood percent foreign-born).

The officer-level results presented in Table 4.5 suggest that use of force was significantly more likely to occur in violent offenses (OR=1.41; $p<0.001$), property offenses (OR=1.47; $p<0.001$), and subject/vehicle stops (OR=1.41; $p<0.01$), relative to other types of incidents. Use of force was also significantly more likely to occur in incidents with a greater number of responding officers (OR=1.73; $p<0.001$). The odds of force being used during an incident increased 72.7% for each additional responding officer. Turning to officer-level factors, force was significantly more likely to involve officers with more years of experience (OR=1.04; $p<0.001$), with each additional year of service increasing the odds of force being used by 4.4%. Incidents resulting in use of force were significantly less likely to involve officers assigned to the Black Mountain precinct (OR=0.73; $p<0.05$).

Table 4.5 Hierarchical Logistic Model Predicting Use of Force Nested in Officers

		β	SE	OR	p
Situational					
	Violent	0.346	0.101	1.413	<0.001
	Property	0.388	0.108	1.474	<0.001
	Subject/vehicle stop	0.340	0.125	1.406	0.007
	# responding officers	1.727	0.064	1.727	<0.001
Officer					
	Male	0.145	0.135	1.156	0.284
	White	0.123	0.094	1.131	0.192
	College educated	-0.125	0.097	0.883	0.201
	Tenure	0.043	0.006	1.044	<0.001
	Black Mountain	-0.312	0.156	0.732	0.046
	South Mountain	-0.057	0.143	0.944	0.689
	Central City	0.067	0.150	1.069	0.655
	Desert Horizon	-0.135	0.136	0.873	0.320
	Mountain View	-0.086	0.115	0.918	0.457
Intercept		-10.142	0.204	0.000	<0.001
Number of officers		826			
VC for the officer		0.205			
	$\chi 2$	786.427			
	p	>0.500			

Note: VC=variance component; incidents nested in officers

Next, Table 4.6 examines incidents nested in neighborhoods. Similar to the officer-level results, Model 1 suggests that force was significantly more likely to occur in incidents involving violent offenses (OR=1.38; p<0.01), property offenses (OR=1.50; p<0.01), subject/vehicle stops (OR=1.40; p<0.05), and incidents involving a greater number of officers (OR=5.54; p<0.001). None of the social-ecological variables in Model 1 were significantly associated with use of force. Finally, Model 2 again suggests that force is significantly more likely to be used in violent offenses (OR=1.38; p<0.01), property offenses (OR=1.50; p<0.01), subject/vehicle stops (OR=1.40; p<0.05), and

incidents involving a greater number of officers (OR=5.51; $p<0.001$). The only neighborhood-level factor that was significantly related to use of force was neighborhood percent Hispanic. The results suggest that force was significantly more likely to be used in incidents that occur in neighborhoods with large Hispanic populations (OR=1.77; $p<0.05$). The odds of force being used increased by 76.6% in neighborhoods with large Hispanic populations. The finding that force was significantly more likely to be used in incidents occurring in Hispanic neighborhoods, but not in neighborhoods with large foreign-born populations, reinforces the importance of examining immigrant and Hispanic neighborhoods separately.[14]

[14] Though force is 66.9% more likely to be used in incidents occurring in neighborhoods with larger foreign-born populations, this difference is not statistically significant.

Table 4.6 Hierarchical Logistic Models Predicting Use of Force Nested in Neighborhoods

	Model 1				Model 2			
	β	SE	OR	p	β	SE	OR	p
Situational								
Violent	0.324	0.119	1.383	0.007	0.319	0.120	1.375	0.008
Property	0.406	0.126	1.501	0.001	0.404	0.128	1.498	0.002
Subject/vehicle stop	0.338	0.141	1.402	0.016	0.335	0.142	1.398	0.018
n. officers	1.712	0.078	5.538	<0.001	1.707	0.079	5.515	<0.001
Neighborhood								
Economic disadvantage	0.056	0.051	1.058	0.274	-0.029	0.070	0.971	0.676
Residential instability	0.339	0.512	1.404	0.508	0.439	0.513	1.551	0.392
Foreign-born	0.512	0.474	1.669	0.281	-	-	-	-
Hispanic	-	-	-	-	0.568	0.232	1.766	0.015
Black	-1.292	0.727	0.275	0.076	-1.208	0.748	0.299	0.107
Logged violence rate	0.010	0.066	1.010	0.881	0.033	0.062	1.034	0.597
Population density	0.000	0.000	1.000	0.864	0.000	0.000	1.000	0.782
Intercept	-10.052	0.201	0.000	<0.001	-10.075	0.205	0.000	<0.001
Number of neighborhoods	388				388			
VC for the neighborhood	0.035				0.024			
$\chi 2$	366.844				369.265			
p	>0.500				>0.500			

Note: VC=variance component; incidents nested in neighborhoods

4.4 Summary of Results

The results of this section indicate that a cross-classified modeling strategy accounting for the simultaneous effects of officers and neighborhoods is appropriate for examining proactivity and arrest, but is not necessary for understanding police use of force (see Table 4.1). For both proactivity and arrest, situational predictors had the most consistent influence on these outcomes across models. Proactive incidents were significantly more likely to involve subject/vehicle stops ($p<0.001$) and fewer responding officers ($p<0.001$). Arrests, on the other hand, were significantly more likely to involve violent offenses ($p<0.001$), property offenses ($p<0.001$), and a greater number of responding officers ($p<0.001$). These differences highlight the importance of examining separate outcomes when attempting to understand officer use of discretion.

Officer-level features were also associated with proactivity and arrest. Officers with fewer years of service were significantly more likely to conduct proactive contacts and arrests than those with more years of service ($p<0.001$). There was also significant variation in proactivity and arrests across precincts. Finally, at the neighborhood-level, the factors that influenced proactivity and arrests again differed. Proactive contacts were significantly more likely to occur in neighborhoods with higher violent crime rates, though the relationship was very small. There was no relationship between proactivity and any of the other social-ecological constructs examined, suggesting that proactivity is not more likely to occur in socially disorganized or minority neighborhoods. Arrests, on the other hand, were significantly more likely to occur in neighborhoods with large immigrant populations ($p<0.05$), large Hispanic populations ($p<0.001$), and large black

populations ($p<0.01$). This suggests that arrests were more influenced by neighborhood racial/ethnic context than proactive police contacts, even when controlling for offense type and officer-level variables. As a result, understanding the potential for BWCs to moderate the relationship between arrest and neighborhood racial/ethnic composition is particularly important. These relationships will be assessed in the next chapter.

Finally, these results collectively suggest that understanding police use of force does not require accounting for the simultaneous influence of officer and neighborhood factors (Table 4.1). Further, understanding influences on officer use of force does not statistically require examining incidents nested in officers, nor does it require examining incidents nested in neighborhoods (Table 4.4). As in the proactivity and arrest models, use of force incidents were more consistently associated with incident-level factors. Force was significantly more likely to be used in violent offenses ($p<0.001$), property offenses ($p<0.001$), subject/vehicle stops ($p<0.01$), and when a greater number of responding officers were present ($p<0.001$). The results in Table 4.5 suggest that officers with more years of service were significantly more likely to use force ($p<0.001$). As shown in Table 4.6, the only significant neighborhood predictor of use of force was percent Hispanic ($p<0.05$), suggesting that officers were significantly more likely to use force in incidents that occurred in neighborhoods with larger Hispanic populations. The identified differences in use of force across neighborhoods, depending on the size of the Hispanic population, further highlights the importance of examining the impact of BWCs on police behavior across different neighborhood racial/ethnic contexts.

In sum, these results suggest that the factors that influence proactivity, arrest, and use of force vary across different situations, different officers, and different ecological contexts. Further, the factors that influence each of these outcomes individually differ depending on the specific outcome being examined. Though situational factors relating to offense type and number of officers present were strongly associated with each outcome (albeit in opposing directions for some outcomes), officer- and neighborhood-level characteristics were inconsistently associated with proactivity, arrest, and use of force. In terms of officer characteristics, proactivity and arrests were significantly more likely to involve officers with fewer years of service, while use of force was significantly more likely to involve officers with more years of service. Using neighborhood percent black as an example, for instance, there was no significant relationship between proactivity and use of force and the size of the black population, though there was a significant relationship between arrest and neighborhood percent black. This suggests that understanding the factors that influence officer use of discretion depend on the specific behavioral outcome being predicted. This is an important finding for theories designed to explain officer behavior.

5. THE INLFUENCE OF BODY-WORN CAMERAS ON POLICE BEHAVIOR IN DIFFERENT NEIGHBORHOODS

5.1 Introduction

In this section, I present the results of my second research question. How do BWCs influence the relationship between social-ecological factors on police proactivity, arrest, and use of force, controlling for situational, officer, and neighborhood factors? Building on the findings from the first research question, I examine whether BWCs moderate the influence of neighborhood context on police use of discretion using data collected after BWCs were deployed to some officers in the Phoenix Police Department. I briefly review the methodology before presenting the results.

5.2 Methods

In order to examine whether BWCs influence the relationship between situational, officer, and neighborhood influences on police use of discretion, I use data from Time 2 (May 24, 2017 to November 23, 2018), after the deployment of BWCs to 123 officers in Phoenix PD. These data include 876,565 individual police-citizen encounters responded to by 818 individual officers in 388 neighborhoods.

I first estimate an unconditional model including only the dependent variable (proactivity, arrest, use of force) and the officer and neighborhood intercepts, without any of other predictors. The unconditional models are used to examine the variance components for each of the dependent variables and to assess whether multilevel modeling is statistically necessary to predict each outcome. The unconditional models are also used to assess the magnitude of the relationships between officer and neighborhood-

level factors and the outcomes. If the variance components in the unconditional model are not statistically significant, this suggests that cross-classified models accounting for the random effects of individual officers and neighborhoods are not necessary to explain variance in the outcome. If the variance components in the unconditional cross-classified models are not statistically significant, separate hierarchical logistic models will be estimated to account for variance in the outcome as a function of incidents nested within officers and for incidents nested within neighborhoods.

If the variance components in the unconditional model are significant, I then compare the results of the unconditional model to two conditional models including the BWC activation variable and all of the situational, officer, and social-ecological variables for each outcome (again running separate models to examine neighborhood percent foreign-born and percent Hispanic). The first conditional model examines the direct effect of BWC activation on the outcome (Model 1) and the second examines potential moderating effects between BWC activation and neighborhood context for each outcome examined (Model 2).

The conditional results for each outcome are separated by whether the models include neighborhood percent foreign-born or neighborhood percent Hispanic. Model 1 in each table examines the direct effect of BWC activation, situational factors, officer characteristics, and neighborhood context on each of the outcomes. I examine whether BWCs moderate the influence of neighborhood context by estimating a second conditional model that includes the same variables included in Model 1, in addition to interaction terms between BWC activation and the following social-ecological measures:

economic disadvantage, percent foreign-born, percent Hispanic, percent black, and the violence rate. The model containing the interaction effects is referred to as Model 2 in the tables. This enables a comparison of whether the influence of neighborhood context on the outcome variable changes depending upon whether a BWC was activated in an individual incident.

5.3 Results

The variance components for the unconditional models are presented in Table 5.1. The variance components for both the officer and the neighborhood an incident occurred within were significant across all dependent variables ($p<0.001$). This suggests that the use of cross-classified models to predict proactivity, arrest, and use of force, accounting for officer and neighborhood features is appropriate. Further, the variance components suggest that each outcome was more strongly associated with officer-level characteristics than neighborhood context. The variance components in the unconditional proactivity model indicate that proactive contacts were more strongly associated with individual officers (VC=0.52; $p<0.001$) than individual neighborhoods (VC=0.32; $p<0.001$). Similar patterns were identified for arrest, though the variance components for both officers (VC=0.17; $p<0.001$) and neighborhoods (VC=0.11; $p<0.001$) were smaller in magnitude, relative to the proactivity model. Finally, use of force was much more closely associated with the responding officer (VC=0.53; $p<0.001$) than the individual neighborhood (VC=0.16; $p<0.001$), though both factors significantly influenced use of force. Given variation in each of these outcomes as a result of both responding officers and

neighborhoods, identifying those factors that contribute to each of these outcomes across the situational, officer, and neighborhood level is important.

Table 5.1 Variance Components for All Dependent Variables – Unconditional Cross-Classified Logistic Models

	Officer			Neighborhood		
	$\chi 2$	VC	p	$\chi 2$	VC	p
Proactivity	70,316.64	0.52	<0.001	20,475.97	0.32	<0.001
Arrest	25,243.61	0.17	<0.001	6,228.02	0.11	<0.001
Use of force	1,139.50	0.53	<0.001	493.04	0.16	<0.001

Note: VC=variance component

5.3.1 Proactivity Results. Table 5.2 presents the conditional proactivity results, including neighborhood percent foreign-born and excluding neighborhood percent Hispanic. Table 5.3 shows the conditional results predicting proactivity including neighborhood percent Hispanic and excluding neighborhood percent foreign-born. The results for each table are presented in two models. Model 1 presents the direct effects and Model 2 examines the interaction effects between BWC activation and measures of neighborhood context.

Model 1 in Table 5.2 shows that proactive incidents were significantly less likely to involve the activation of a BWC (OR=0.71; p<0.001). The odds of an incident being self-initiated by an officer were 28.7% lower when a BWC was activated. Proactive contacts were significantly more likely to occur in subject/vehicle stops (OR=21.87; p<0.001) and significantly less likely to occur in violent (OR=0.30; p<0.001) and property offenses (OR=0.52; p<0.001), relative to other call types. Proactive contacts involved significantly fewer officers than dispatched calls for service (OR=0.77; p<0.001). However, proactive contacts were significantly more likely to involve multiple

BWC activations (OR=1.21; p<0.001). Turning to officer level factors, proactive contacts were significantly less likely to involve officers with more years of service (OR=0.96; p<0.001). There was also significant variation in proactive contacts across officer precinct assignment, with officers assigned to South Mountain being significantly more likely to engage in proactive contacts than officers in Cactus Park (OR=1.36; p<0.001). Officers assigned to Black Mountain (OR=0.76; p<0.01) and Desert Horizon (OR=0.70; p<0.001) were significantly less likely to engage in proactive contacts than officers assigned to Cactus Park. Turning to neighborhood level factors, proactive contacts were significantly more likely to occur in neighborhoods with larger foreign-born populations (OR=3.82; p<0.01). Increases in the foreign-born population were associated with a 281.8% increase in the odds of a proactive contact. Though proactive contacts were significantly more likely to occur in neighborhoods with higher violent crime rates, the findings suggest that the magnitude of this relationship is small (OR=1.00; p<0.05).

The interaction effects presented in Model 2 of Table 5.2 are largely consistent with the direct effects. Proactive incidents were significantly less likely to involve a BWC activation (OR=0.67; p<0.001), to occur in violent offenses (OR=0.30; p<0.001), property offenses (OR=0.52; p<0.001), and when multiple officers were present (OR=077; p<0.001). Proactive contacts were significantly more likely to involve subject/vehicle stops (OR=21.87; p<0.001) and multiple BWC activations (OR=1.20; p<0.001). The officer-level factors were also largely consistent between Model 1 and Model 2. Proactive contacts were significantly less likely to involve officers with more years of service (OR=0.97; p<0.001), officers assigned to Black Mountain (OR=0.76;

$p<0.01$), and officers assigned to Desert Horizon (OR=0.70; $p<0.001$). Proactive contacts were significantly more likely to involve officers assigned to South Mountain (OR=1.36; $p<0.001$). Finally, the neighborhood effects were also largely consistent across models. Proactive incidents were significantly more likely to occur in neighborhoods with larger foreign-born populations (OR=3.58; $p<0.01$), though the direct effect of neighborhood violence rate became insignificant.

The interaction effects between BWC activation and the neighborhood context variables suggest that BWCs did not eliminate the relationship between percent foreign-born and proactivity. In fact, the interaction effect between BWC activation and percent foreign-born was significant and positive (OR=1.68; $p<0.001$). This suggests that for those incidents that involved a BWC activation, for every one unit increase in the foreign-born population in a neighborhood, there was a subsequent 1.68 increase in the odds of proactivity. For example, in a neighborhood with 30% of the population being foreign-born, when a BWC was activated, the odds of proactivity increased by 50.43. Though the interaction between BWC activation and the violent crime rate was also positive and statistically significant, the results suggest that the magnitude of this interaction effect was very small (OR=1.00; $p<0.001$).

Table 5.2 Cross-Classified Logistic Models Predicting Proactivity – Including Foreign-Born, Excluding Hispanic

	Model 1				Model 2			
	β	SE	OR	p	β	SE	OR	p
Situational								
BWC activated	-0.338	0.016	0.713	<0.001	-0.398	0.018	0.672	<0.001
Violent	-1.205	0.020	0.300	<0.001	-1.205	0.020	0.300	<0.001
Property	-0.648	0.013	0.523	<0.001	-0.648	0.013	0.523	<0.001
Subject/vehicle stop	3.085	0.009	21.868	<0.001	3.085	0.009	21.874	<0.001
# responding officers	-0.259	0.004	0.771	<0.001	-0.260	0.004	0.771	<0.001
Multiple BWC activations	0.189	0.044	1.208	<0.001	0.178	0.044	1.195	<0.001
Officer								
Male	-0.006	0.082	0.994	0.942	-0.005	0.082	0.995	0.954
White	0.041	0.059	1.042	0.485	0.041	0.059	1.042	0.484
College educated	0.077	0.056	1.080	0.165	0.078	0.056	1.081	0.160
Tenure	-0.035	0.004	0.965	<0.001	-0.035	0.004	0.965	<0.001
Black Mountain	-0.273	0.094	0.761	0.004	-0.271	0.094	0.762	0.004
South Mountain	0.310	0.093	1.363	<0.001	0.310	0.093	1.363	<0.001
Central City	0.098	0.126	1.103	0.434	0.099	0.126	1.104	0.431
Desert Horizon	-0.357	0.082	0.700	<0.001	-0.357	0.082	0.700	<0.001
Mountain View	0.155	0.084	1.167	0.064	0.152	0.084	1.165	0.069
Neighborhood								
Economic disadvantage (ED)	0.052	0.056	1.054	0.351	0.054	0.056	1.056	0.336
Residential instability	0.244	0.272	1.277	0.369	0.243	0.272	1.275	0.372
Foreign-born	1.340	0.407	3.818	0.001	1.274	0.407	3.575	0.002
Black	-0.195	0.407	0.823	0.721	-0.148	0.547	0.863	0.787

Violence rate		0.000	0.000	1.000	0.033	0.000	0.000	1.000	0.055
Population density		0.000	0.000	1.000	0.601	0.000	0.000	1.000	0.598
BWC interactions									
ED*BWC						-0.014	0.019	0.986	0.450
Foreign-born*BWC						0.517	0.133	1.678	<0.001
Black*BWC						-0.279	0.200	0.757	0.164
Violence rate*BWC						0.000	0.000	1.000	<0.001
Intercept		-2.916	0.106	0.054	<0.001	-2.910	0.106	0.054	<0.001
Number of officers		818				818			
Number of neighborhoods		388				388			
VC for the officer		0.519				0.519			
	$\chi 2$	41,336.295				41,376.609			
	p	<0.001				<0.001			
VC for the neighborhood		0.345				0.344			
	$\chi 2$	15,406.637				15,377.126			
	p	<0.001				<0.001			

Note: VC=variance component; incidents nested in both officers and neighborhoods

Table 5.3 presents the conditional results of the proactivity models, including neighborhood percent Hispanic and excluding neighborhood foreign-born. The direct effects are again presented in Model 1 and the interaction effects are presented in Model 2. Beginning with Model 1, proactive contacts were significantly less likely to involve a BWC activation (OR=0.71; $p<0.001$). Proactive contacts were also less likely to occur during violent offenses (OR=0.30; $p<0.001$) and property offenses (OR=0.52; $p<0.001$). Proactive contacts were significantly more likely to occur during subject/vehicle stops (OR=21.87; $p<0.001$). Proactive contacts were significantly less likely to occur when a greater number of officers were present (OR=0.77; $p<0.001$), but were associated with a significantly higher likelihood of multiple BWC activations (OR=1.21; $p<0.001$). The officer-level factors again suggest that proactive contacts were significantly less likely to involve officers with more years of service (OR=0.97; $p<0.001$), officers assigned to Black Mountain (OR=0.76; $p<0.01$), and officers assigned to Desert Horizon (OR=0.70; $p<0.001$). Proactive contacts were significantly more likely to involve officers assigned to the South Mountain precinct (OR=1.36; $p<0.001$). Finally, at the neighborhood level, proactive contacts were significantly more likely to occur in neighborhoods with larger Hispanic populations (OR=1.62; $p<0.01$) and higher violent crime rates (OR=1.00; $p<0.05$), though the results suggest the impact of violence on proactivity is relatively small.

Table 5.3 Model 2 presents the proactivity results, including interaction terms between BWC activation and the neighborhood context measures. These results are again largely consistent with the direct effects presented in Model 1. Proactive incidents were

significantly less likely to involve a BWC activation (OR=0.67; $p<0.001$), a violent offense (OR=0.30; $p<0.001$), a property offense (OR=0.52; $p<0.001$), and multiple officers (OR=0.77; $p<0.001$). Proactive incidents were significantly more likely to involve a subject/vehicle stop (OR=21.87; $p<0.001$) and multiple BWC activations (OR=1.19; $p<0.001$). Proactive contacts were also significantly less likely to involve officers with more years of service (OR=0.97; $p<0.001$), officers assigned to Black Mountain (OR=0.77; $p<0.01$), and Desert Horizon (OR=0.70; $p<0.001$). Proactive contacts were significantly more likely to involve officers assigned to South Mountain (OR=1.36; $p<0.001$). At the neighborhood level, proactive contacts were again significantly more likely to occur in neighborhoods with larger Hispanic populations (OR=1.56; $p=0.01$) and higher violent crime rates (OR=1.00; $p<0.05$).

The interaction terms between BWC activation and the neighborhood context variables suggest that BWCs did not eliminate variation in proactivity across different types of neighborhoods. The interaction between BWC activation and percent Hispanic is positive and significant (OR=1.41; $p<0.001$), suggesting that those incidents that involved a BWC activation involved a 1.41 increase in the odds of proactivity with every one unit increase in the Hispanic population. For example, in a neighborhood that is 30% Hispanic, when a BWC was activated, the odds of proactivity increased by 20.20. The interaction term between BWC activation and violence rate was also positive and significant, though the results again suggest that the magnitude of this relationship was small (OR=1.00; $p<0.001$).

Table 5.3 Cross-Classified Logistic Results Predicting Proactivity – Including Hispanic, Excluding Foreign-Born

	Model 1				Model 2			
	β	SE	OR	p	β	SE	OR	p
Situational								
BWC activated	-0.338	0.016	0.713	<0.001	-0.398	0.018	0.672	<0.001
Violent	-1.205	0.020	0.300	<0.001	-1.205	0.020	0.300	<0.001
Property	-0.648	0.013	0.523	<0.001	-0.648	0.013	0.523	<0.001
Subject/vehicle stop	3.085	0.009	21.867	<0.001	3.085	0.009	21.872	<0.001
# responding officers	-0.260	0.004	0.771	<0.001	-0.260	0.004	0.771	<0.001
Multiple BWC activations	0.189	0.044	1.208	<0.001	0.177	0.044	1.194	<0.001
Officer								
Male	-0.006	0.082	0.994	0.944	-0.003	0.083	0.997	0.967
White	0.041	0.059	1.042	0.482	0.041	0.059	1.042	0.487
College educated	0.077	0.056	1.080	0.165	0.079	0.056	1.082	0.158
Tenure	-0.035	0.004	0.965	<0.001	-0.035	0.004	0.965	<0.001
Black Mountain	-0.270	0.094	0.764	0.004	-0.268	0.094	0.765	0.004
South Mountain	0.305	0.093	1.357	0.001	0.304	0.093	1.355	0.001
Central City	0.096	0.126	1.100	0.448	0.096	0.126	1.101	0.446
Desert Horizon	-0.356	0.082	0.701	<0.001	-0.357	0.082	0.700	<0.001
Mountain View	0.153	0.084	1.165	0.067	0.150	0.084	1.162	0.073
Neighborhood								
Economic disadvantage	0.028	0.064	1.028	0.664	0.033	0.064	1.033	0.609
Residential instability	0.296	0.271	1.344	0.276	0.294	0.271	1.342	0.279
Hispanic	0.483	0.547	1.620	0.005	0.443	0.172	1.557	0.010

Black	-0.256	0.547	0.774	0.640	-0.212	0.547	0.809	0.699
Violence rate	0.000	0.000	1.000	0.025	0.000	0.000	1.000	0.043
Population density	0.000	0.000	1.000	0.925	0.000	0.000	1.000	0.913
BWC interactions								
ED*BWC					-0.043	0.021	0.958	0.039
Hispanic*BWC					0.341	0.070	1.407	<0.001
Black*BWC					-0.195	0.202	0.823	0.334
Violence rate*BWC					0.000	0.000	1.000	<0.001
Intercept	-2.914	0.106	0.054	<0.001	-2.908	0.106	0.055	<0.001
Number of officers	818				818			
Number of neighborhoods	388				388			
VC for the officer	0.519				0.520			
χ^2	41,868.275				41,970.039			
p	<0.001				<0.001			
VC for the neighborhood	0.346				0.345			
χ^2	15,079.624				15,055.138			
p	<0.001				<0.001			

Note: VC=variance component; incidents nested in both officers and neighborhoods

Comparing the results across Table 5.2 and Table 5.3 suggests limited differences in the situational, officer, and neighborhood-level influences on police proactivity. However, the odds of proactivity were much higher in foreign-born neighborhoods (OR=3.82) relative to Hispanic neighborhoods (OR=1.62). This suggests that the odds of a proactive contact increase by 282% in neighborhoods with large foreign-born populations and by 62% in neighborhoods with large Hispanic populations (comparing Model 1 across each table). The significantly higher likelihood of proactivity in both foreign-born and Hispanic neighborhoods persisted, even controlling for interactions between BWC activation and these neighborhood factors.

5.3.2 Arrest Results. Turning to arrest, the results are again presented in two separate tables. Table 5.4 presents the cross-classified logistic regression results predicting arrest including percent foreign-born (excluding percent Hispanic). Table 5.5 presents the cross-classified logistic regression results predicting arrest including percent Hispanic (excluding percent foreign-born). In each table, Model 1 again presents the direct effects and Model 2 presents the interaction effects.

As shown in Table 5.4 Model 1, arrests were significantly more likely to involve a BWC activation (OR=2.11; $p<0.001$). Arrests were also significantly more likely to occur in violent offenses (OR=2.31; $p<0.001$), property offenses (OR=2.49; $p<0.001$), incidents involving a greater number of officers (OR=1.25; $p<0.001$), and incidents involving multiple activations (OR=1.62; $p<0.001$). Arrests were significantly less likely to occur in subject/vehicle stops (OR=0.75; $p<0.001$). Turning to officer-level factors, arrests were significantly less likely to involve male officers (OR=0.81; $p<0.001$) and were

significantly more likely to involve college-educated officers (OR=1.08; $p<0.05$). There were also significant differences in arrest across officer precinct assignment, with incidents involving officers assigned to Black Mountain (OR=0.82; $p<0.001$), South Mountain (OR=0.80; $p<0.001$), Central City (OR=0.77; $p<0.01$), and Desert Horizon (OR=0.84; $p<0.01$) all being significantly less likely to result in arrest. Finally, the only significant neighborhood-level predictor of arrest was percent foreign-born, with incidents occurring in neighborhoods with larger foreign-born populations being 81.0% more likely to result in arrest (OR=1.81; $p<0.001$).

The interaction results presented in Model 2 largely mirror the direct effects results. Those incidents involving a BWC activation (OR=2.07; $p<0.001$), violent offense (OR=2.31; $p<0.001$), property offense (OR=2.49; $p<0.001$), a greater number of officers (OR=1.25; $p<0.001$), and multiple BWC activations (OR=1.62; $p<0.001$) being significantly more likely to result in arrest. Incidents involving male officers were significantly less likely to result in arrest (OR=0.81; $p<0.001$) while those involving college-educated officers were more likely to result in arrest (OR=1.08; $p<0.05$). Incidents involving officers assigned to Black Mountain (OR=0.82; $p<0.001$), South Mountain (OR=0.80; $p<0.001$), Central City (OR=0.77; $p<0.01$), and Desert Horizon (OR=0.84; $p<0.01$) were all significantly less likely to result in arrest compared to incidents involving officers assigned to Cactus Park. At the neighborhood level, the direct effect of percent foreign-born remained positive and significant (OR=1.76; $p<0.001$), suggesting that incidents in neighborhoods with larger immigrant populations were more likely to result in arrest.

The interaction effects between BWC activation and neighborhood percent foreign-born was positive and significant (OR=1.18; $p<0.05$). This suggests that for those incidents that involved a BWC activation, for every one unit increase in the foreign-born population in a neighborhood, there is a subsequent increase in the odds of arrest of 1.18. For example, in a neighborhood with 30% of the population being foreign-born, when a BWC is activated, there is a 21.54 increase in odds of arrest. Though the direct effect of neighborhood violence was not significantly associated with arrest, the interaction between BWC activation and violence rate suggests that incidents occurring in neighborhoods with higher violent crime rates were significantly more likely to result in arrest when a BWC was activated (OR=1.00; $p<0.05$), though the magnitude of the effect remains very small.

Table 5.4 Cross-Classified Logistic Results Predicting Arrest – Including Foreign-Born, Excluding Hispanic

	Model 1				Model 2			
	β	SE	OR	p	β	SE	OR	p
Situational								
BWC activated	0.745	0.011	2.106	<0.001	0.727	0.012	2.068	<0.001
Violent	0.837	0.007	2.309	<0.001	0.837	0.007	2.309	<0.001
Property	0.912	0.006	2.489	<0.001	0.912	0.006	2.489	<0.001
Subject/vehicle stop	-0.286	0.008	0.751	<0.001	-0.286	0.008	0.751	<0.001
# responding officers	0.221	0.002	1.247	<0.001	0.221	0.002	1.247	<0.001
Multiple BWC activations	0.485	0.025	1.624	<0.001	0.482	0.025	1.619	<0.001
Officer								
Male	-0.216	0.054	0.806	<0.001	-0.215	0.054	0.806	<0.001
White	0.010	0.038	1.010	0.797	0.010	0.038	1.010	0.797
College educated	0.075	0.036	1.078	0.039	0.076	0.036	1.078	0.038
Tenure	0.004	0.002	1.004	0.062	0.004	0.002	1.004	0.058
Black Mountain	-0.205	0.061	0.815	<0.001	-0.204	0.061	0.816	<0.001
South Mountain	-0.230	0.060	0.795	<0.001	-0.230	0.060	0.795	<0.001
Central City	-0.259	0.082	0.772	0.002	-0.260	0.082	0.771	0.002
Desert Horizon	-0.176	0.054	0.839	0.001	-0.176	0.054	0.839	0.001
Mountain View	-0.007	0.055	0.993	0.893	-0.009	0.055	0.991	0.874
Neighborhood								
Economic disadvantage (ED)	0.040	0.023	1.041	0.081	0.037	0.023	1.037	0.113
Residential instability	0.203	0.110	1.225	0.065	0.201	0.110	1.223	0.068
Foreign-born	0.593	0.165	1.809	<0.001	0.566	0.166	1.760	<0.001
Black	0.344	0.165	1.411	0.120	0.385	0.222	1.469	0.084

Violence rate		0.000	0.000	1.000	0.154	0.000	0.000	1.000	0.123
Population density		0.000	0.000	1.000	0.065	0.000	0.000	1.000	0.068
BWC interactions									
ED*BWC						0.021	0.012	1.022	0.063
Foreign-born*BWC						0.168	0.084	1.183	0.045
Black*BWC						-0.177	0.084	0.838	0.128
Violence rate*BWC						0.000	0.000	1.000	0.015
Intercept		-1.194	0.067	0.303	<0.001	-1.191	0.067	0.304	<0.001
Number of officers		818				818			
Number of neighborhoods		388				388			
VC for the officer		0.222				0.221			
	$\chi 2$	34,200.340				34,201.094			
	p	<0.001				<0.001			
VC for the neighborhood		0.051				0.051			
	$\chi 2$	4,976.009				4,986.596			
	p	<0.001				<0.001			

Note: VC=variance component; incidents nested in both officers and neighborhoods

Moving to Table 5.5, the results largely mirror the findings in Table 5.4. Model 1 again shows that incidents involving BWC activation (OR=2.11; p<0.001), violent offenses (OR=2.31; p<0.001), property offenses (OR=2.49; p<0.001), a higher number of responding officers (OR=1.25; p<0.001), and multiple BWC activations (OR=1.62; p<0.001) were significantly more likely to result in arrest. Those incidents involving subject/vehicle stops were significantly less likely to result in arrest (OR=0.75; p<0.001). Incidents involving male officers were less likely to result in arrest (OR=0.81; p<0.001) and those involving college-educated officers were significantly more likely to result in arrest (OR=1.08; p<0.05). Those incidents responded to by officers assigned to Black Mountain (OR=0.83; p<0.01), South Mountain (OR=0.78; p<0.001), Central City (OR=0.76; p<0.01), and Desert Horizon (OR=0.84; p<0.01) were all significantly less likely to result in arrest compared to incidents responded to by officers assigned to Cactus Park. Incidents occurring in neighborhoods with higher levels of residential instability (OR=1.24; p<0.05) and larger Hispanic populations (OR=1.64; p<0.001) were significantly more likely to result in arrest.

The interaction results presented in Table 5.5 Model 2 are largely consistent with the direct effects results presented in Model 1. Those incidents involving BWC activation (OR=2.07; p<0.001), violent offenses (OR=2.31; p<0.001), property offenses (OR=2.49; p<0.001), a greater number of officers (OR=1.25; p<0.001), and multiple BWC activations (OR=1.62; p<0.001) were significantly more likely to result in arrest. Subject/vehicle stops were significantly less likely to result in arrest (OR=0.75; p<0.001). Incidents responded to by male officers were significantly less likely to result in arrest

(OR=0.81; $p<0.001$) and those involving college-educated officers were significantly more likely to result in arrest (OR=1.08; $p<0.05$). Again, incidents responded to by officers assigned to Black Mountain (OR=0.83; $p<0.01$), South Mountain (OR=0.78; $p<0.001$), Central City (OR=0.76; $p<0.01$), and Desert Horizon (OR=0.84; $p<0.01$) were significantly less likely to result in arrest compared to incidents responded to by officers assigned to Cactus Park. Incidents occurring in neighborhoods with higher levels of residential instability (OR=1.23; $p<0.05$) and larger Hispanic populations (OR=1.62; $p<0.001$) were significantly more likely to result in arrest. After including the interaction terms, the direct effect of neighborhood percent black also became significant, suggesting that incidents occurring in neighborhoods with larger black populations were 57.5% more likely to result in arrest (OR=1.58; $p<0.05$).

The interaction terms between BWC activation and the neighborhood context variables suggest that BWCs did not reduce the greater likelihood of arrest in Hispanic neighborhoods. The interaction between BWC activation and Hispanic was positive and significant (OR=1.12; $p<0.05$). This suggests that for those incidents that involved a BWC activation, for every one unit increase in the Hispanic population in a neighborhood, there was a subsequent 1.12 increase in the odds of arrest. For example, in a neighborhood with 30% of the population being Hispanic, when a BWC was activated, there was a 17.22 increase in odds of arrest. The interaction term between BWC and neighborhood violence is also positive and significant, though the magnitude of the relationship remains small (OR=1.00; $p<0.05$). The interaction between BWC activation and neighborhood percent black was not significant (OR=0.87; $p=0.25$), suggesting that

arrests did not vary across neighborhoods with different levels of black populations depending on whether a BWC was activated.

Table 5.5 Cross-Classified Logistic Results Predicting Arrest – Including Hispanic, Excluding Foreign-Born

	Model 1				Model 2			
	β	SE	OR	p	β	SE	OR	p
Situational								
BWC activated	0.745	0.011	2.106	<0.001	0.727	0.012	2.068	<0.001
Violent	0.837	0.007	2.309	<0.001	0.837	0.007	2.309	<0.001
Property	0.912	0.006	2.489	<0.001	0.912	0.006	2.489	<0.001
Subject/vehicle stop	-0.287	0.008	0.751	<0.001	-0.287	0.008	0.751	<0.001
# responding officers	0.221	0.002	1.247	<0.001	0.221	0.002	1.247	<0.001
Multiple BWC activations	0.485	0.025	1.624	<0.001	0.482	0.025	1.619	<0.001
Officer								
Male	-0.215	0.054	0.807	<0.001	-0.214	0.054	0.807	<0.001
White	0.011	0.038	1.011	0.776	0.011	0.038	1.011	0.779
College educated	0.075	0.036	1.078	0.039	0.076	0.036	1.079	0.038
Tenure	0.004	0.002	1.004	0.057	0.005	0.002	1.005	0.054
Black Mountain	-0.189	0.061	0.827	0.002	-0.188	0.061	0.829	0.002
South Mountain	-0.249	0.060	0.780	<0.001	-0.249	0.060	0.780	<0.001
Central City	-0.269	0.082	0.764	0.001	-0.270	0.082	0.764	0.001
Desert Horizon	-0.169	0.054	0.844	0.002	-0.169	0.054	0.844	0.002
Mountain View	-0.015	0.055	0.985	0.785	-0.016	0.055	0.984	0.763
Neighborhood								
Economic disadvantage (ED)	-0.033	0.025	0.967	0.191	-0.036	0.026	0.965	0.162
Residential instability	0.212	0.106	1.236	0.047	0.210	0.106	1.234	0.049
Hispanic	0.496	0.215	1.642	<0.001	0.480	0.071	1.617	<0.001
Black	0.417	0.215	1.517	0.053	0.454	0.216	1.575	0.036

Violence rate		0.000	0.000	1.000	0.695	0.000	0.000	1.000	0.600
Population density		0.000	0.000	1.000	0.086	0.000	0.000	1.000	0.091
BWC interactions									
ED*BWC						0.012	0.013	1.012	0.350
Hispanic*BWC						0.109	0.118	1.115	0.016
Black*BWC						-0.136	0.118	0.873	0.253
Violence rate*BWC						0.000	0.000	1.000	0.011
Intercept		-1.191	0.067	0.304	<0.001	-1.189	0.067	0.304	<0.001
Number of officers		388				388			
Number of neighborhoods		818				818			
VC for the officer		0.222				0.221			
	$\chi 2$	34,415.278				34,401.510			
	p	<0.001				<0.001			
VC for the neighborhood		0.048				0.048			
	$\chi 2$	4,893.801				4,903.983			
	p	<0.001				<0.001			

Note: VC=variance component; incidents nested in both officers and neighborhoods

Comparing the results in Table 5.4 and Table 5.5 reveals largely similar findings. As in the models predicting proactivity, neighborhood levels of foreign-born residents (OR=1.81) have a larger impact on arrests than neighborhood levels of Hispanic residents (OR=1.64), though both populations significantly increased the likelihood of arrest (Model 1 in each table). Further, including interaction terms between BWC activation and these population measures did not reduce these relationships. This suggest that BWCs did not eliminate variation in police arrest decisions across neighborhoods with different racial/ethnic compositions. In fact, when BWCs were activated, the likelihood of arrest increased with each additional unit increase in the foreign-born population and with each additional unit increase in the Hispanic population. Collectively, these results suggest that arrests were associated with situational characteristics, officer-level factors, and social-ecological context. BWCs were associated with an increased likelihood of arrest.

5.3.3 Use of Force Results. Though the significant variance components presented in Table 5.1 suggest that use of force was simultaneously related to individual officers and neighborhoods, once the situational variables were included in the model, the random effect of the neighborhood was no longer significant (p=0.44), as shown in Table 5.6. As a result, the use of force findings are presented in separate hierarchical logistic regression models estimating incidents nested within officers (Table 5.8) and incidents nested within neighborhoods(Table 5.9 and Table 5.10). This presentation is consistent with the use of force results presented in Research Question 1 (see Section 4.3.3).

Table 5.6 Cross-Classified Logistic Results Predicting Use of Force Including Situational Factors

		β	SE	OR	p
Situational					
BWC activated		0.869	0.119	2.385	<0.001
Violent		0.381	0.120	1.464	0.002
Property		0.330	0.129	1.391	0.011
Subject/vehicle stop		0.456	0.141	1.578	0.001
# responding officers		1.544	0.059	4.683	<0.001
Multiple BWC activations		1.059	0.162	2.884	<0.001
Intercept		-9.974	0.164	0.000	<0.001
Number of officers		818			
Number of neighborhoods		388			
VC for the officer		0.766			
	$\chi 2$	1,069.662			
	p	<0.001			
VC for the neighborhood		0.119			
	$\chi 2$	390.431			
	p	0.442			

Note: VC=variance component; incidents nested in both officers and neighborhoods

Unconditional hierarchical logistic regression models were estimated to examine whether use of force significantly varied across incidents nested within individual officers and incidents nested within individual neighborhoods. The unconditional results are presented in Table 5.7. The variance components suggest that using hierarchical logistic regression models to examine incidents nested within officers and incidents nested within neighborhoods is statistically appropriate ($p<0.001$).

Table 5.7 Variance Components for Use of Force – Unconditional Hierarchical Logistic Models

	VC	$\chi 2$	p
Officer	0.561	1,276.514	<0.001
Neighborhood	0.245	737.825	<0.001

Note: VC=variance component

Beginning with incidents nested in officers, use of force was significantly more likely when a BWC was activated (OR=2.37; $p<0.001$). Those incidents that involved a BWC activation were 137.0% more likely to result in police use of force. Force was also significantly more likely to occur during violent offenses (OR=1.45; $p<0.001$), property offenses (OR=1.36; $p<0.001$), subject/vehicle stops (OR=1.58; $p<0.001$), when a greater number of officers were involved (OR=4.46; $p<0.001$), and when multiple BWCs were activated (OR=2.68; $p<0.001$). Force also varied across officer characteristics. Incidents involving officers with more years of service were significantly more likely to result in use of force (OR=1.04; $p<0.001$). There was also some variation across precinct assignment, with incidents involving officers assigned to the Central City (OR=1.94; $p<0.001$) and Mountain View (OR=1.30; $p<0.05$) precincts being significantly more likely to result in force.

Table 5.8 Hierarchical Logistic Model Predicting Use of Force Nested in Officers

		β	SE	OR	p
Situational					
	BWC activated	0.863	0.076	2.369	<0.001
	Violent	0.370	0.069	1.448	<0.001
	Property	0.308	0.070	1.361	<0.001
	Subject/vehicle stop	0.454	0.079	1.575	<0.001
	# responding officers	1.495	0.034	4.457	<0.001
	Multiple BWC activations	0.986	0.097	2.679	<0.001
Officer					
	Male	0.127	0.150	1.135	0.400
	White	0.113	0.083	1.120	0.173
	College educated	-0.145	0.080	0.865	0.069
	Tenure	0.043	0.005	1.044	<0.001
	Black Mountain	-0.011	0.134	0.989	0.934
	South Mountain	-0.105	0.121	0.900	0.385
	Central City	0.661	0.174	1.938	<0.001
	Desert Horizon	-0.036	0.125	0.964	0.772
	Mountain View	0.264	0.113	1.302	0.019
Intercept		-9.837	0.174	0.000	<0.001
Number of officers		818			
VC for the officer		0.597			
	$\chi 2$	1,051.800			
	p	<0.001			

Note: VC=variance component; incidents nested in officers

Table 5.9 presents the hierarchical logistic results predicting use of force nested in neighborhoods, including percent foreign-born and excluding percent Hispanic. Model 1 presents the direct effects of BWC activation and Model 2 presents the interaction effects. Use of force was again strongly influenced by situational characteristics. Starting with Model 1, force was significantly more likely to be used in incidents involving BWC activation (OR=1.57; p<0.001), violent offenses (OR=1.50; p<0.001), property offenses (OR=1.45; p<0.01), subject/vehicle stops (OR=1.63; p<0.001), when a greater number of

officers were involved (OR=4.70; p<0.001), and when multiple BWCs were activated (OR=2.65; p<0.001). Turning to neighborhood effects, force was significantly more likely to be used in neighborhoods with higher levels of economic disadvantage (OR=1.17; p<0.01) and residential instability (OR=4.68; p<0.01). Force was significantly less likely to be used in neighborhoods with larger black populations (OR=0.20; p<0.05).

The interaction effects presented in Model 2 largely mirror the direct effects. However, the direct effect of BWC activation on use of force became non-significant (OR=1.11; p=0.53). Force was significantly more likely to occur during violent offenses (OR=1.50; p<0.001), property offenses (OR=1.44; p<0.01), subject/vehicle stops (OR=1.63; p<0.001), when a higher number of officers were present (OR=4.69; p<0.001), and when multiple BWCs were activated (OR=2.61; p<0.001). Force was still more likely to occur in neighborhoods with higher levels of economic disadvantage (OR=1.20; p<0.01) and 342.2% more likely to occur in neighborhoods with higher levels of residential instability (OR=4.42; p<0.01). The direct effect of logged violence rate also became significant in Model 2, suggesting that force is significantly less likely to be used in neighborhoods with higher levels of violence (OR=0.82; p<0.01). The interaction between BWC activation and the logged neighborhood violence rate is also positive and significant, which suggests that when BWCs were activated, incidents that occurred in neighborhoods with high levels of violence were more likely to result in use of force (OR=1.40; p<0.01). Though the direct effect of neighborhood percent black became non-significant once interactions were included (O0.34; p=0.24), the interaction effect between percent black and BWC activation is positive and significant (OR=1.40;

$p<0.01$). This suggests that incidents that occur in neighborhoods with larger black populations are significantly more likely to result in use of force when a BWC is activated.

Table 5.9 Hierarchical Logistic Models Predicting Use of Force Nested in Neighborhoods – Including Foreign-Born, Excluding Hispanic

	Model 1				Model 2			
	β	SE	OR	p	β	SE	OR	p
Situational								
BWC activated	0.452	0.094	1.571	<0.001	0.103	0.163	1.108	0.529
Violent	0.408	0.115	1.503	<0.001	0.406	0.117	1.501	<0.001
Property	0.372	0.120	1.451	0.002	0.367	0.122	1.444	0.003
Subject/vehicle stop	0.486	0.143	1.626	<0.001	0.491	0.145	1.634	<0.001
n. officers	1.548	0.058	4.700	<0.001	1.545	0.059	4.690	<0.001
Multiple BWC activations	0.973	0.136	2.645	<0.001	0.959	0.136	2.610	<0.001
Neighborhood								
Economic disadvantage	0.156	0.050	1.168	0.002	0.179	0.055	1.197	0.001
Residential instability	1.543	0.427	4.681	<0.001	1.487	0.436	4.422	<0.001
Foreign-born	-0.696	0.551	0.499	0.207	-0.235	0.712	0.791	0.742
Black	-1.626	0.720	0.197	0.024	-1.066	0.909	0.344	0.242
Logged violence rate	-0.116	0.063	0.891	0.066	-0.204	0.072	0.815	0.005
Population density	0.000	0.000	1.000	0.301	0.000	0.000	1.000	0.312
BWC interactions								
ED*BWC					-0.102	0.096	0.903	0.289
Foreign-born*BWC					-1.442	1.007	0.237	0.152
Black*BWC					-1.462	1.521	0.232	0.336
Logged violence*BWC					0.337	0.113	1.401	0.003
Intercept	-9.798	0.166	0.000	<0.001	-9.708	0.171	0.000	<0.001
Number of neighborhoods	388				388			
VC for the neighborhood	0.151				0.134			

$\chi 2$	444.155	428.117
p	0.014	0.048

Note: VC=variance component; incidents nested in neighborhoods

Table 5.10 presents the hierarchical logistic results predicting use of force nested in neighborhoods including percent Hispanic, instead of percent foreign-born. Model 1 again presents the direct effects and Model 2 presents the interaction effects. Starting with Model 1, use of force was again closely associated with situational factors, with force being significantly more likely in incidents involving BWC activation (OR=1.57; $p<0.001$), violent offenses (OR=1.49; $p<0.001$), property offenses (OR=1.45; $p<0.01$), subject/vehicle stops (OR=1.61; $p<0.001$), a greater number of officers (OR=4.67; $p<0.001$), and multiple BWC activations (OR=2.65; $p<0.001$). Force was significantly more likely to be used in incidents that occurred in neighborhoods with higher levels of residential instability (OR=5.19; $p<0.001$). Force was significantly less likely to be used in neighborhoods with large black populations (OR=0.23; $p<0.05$).

Turning to the interaction effects presented in Model 2, the situational effects are similar to the results in Model 1, however, the direct effect of BWC activation again became insignificant (OR=1.11; $p=0.53$). Force was more likely to occur in violent offenses (OR=1.49; $p<0.001$), property offenses (OR=1.45; $p<0.01$), subject/vehicle stops (OR=1.62; $p<0.001$), incidents involving a greater number of responding officers (OR=4.66; $p<0.001$), and multiple BWC activations (OR=2.62; $p<0.001$). The direct effect of neighborhood economic disadvantage became positive and significant, suggesting that force was more likely to be used in poor neighborhoods (OR=1.13; $p<0.05$). Use of force was again more likely to occur in neighborhoods with high rates of residential instability, with the odds of force being used increasing by 390.2% in neighborhoods with higher levels of residential instability (OR=4.90; $p<0.001$). The

direct effect of neighborhood percent black identified in Model 1 became nonsignificant in Model 2. The direct effect of logged neighborhood violence became negative and significant, suggesting that force was less likely to be used in violent neighborhoods (OR=0.82; $p<0.01$). The interaction effect between BWC activation and logged violent crime rate, however, suggests that force was significantly more likely to occur in incidents that occurred in violent neighborhoods when a BWC was activated (OR=1.39; $p<0.01$).

Table 5.10 Hierarchical Logistic Models Predicting Use of Force Nested in Neighborhoods – Including Hispanic, Excluding Foreign-Born

	Model 1				Model 2			
	β	SE	OR	p	β	SE	OR	p
Situational								
BWC activated	0.452	0.093	1.572	<0.001	0.101	0.162	1.106	0.533
Violent	0.400	0.114	1.492	<0.001	0.400	0.115	1.492	<0.001
Property	0.370	0.119	1.447	0.002	0.368	0.120	1.445	0.002
Subject/vehicle stop	0.476	0.141	1.610	<0.001	0.482	0.142	1.619	<0.001
n. officers	1.541	0.057	4.669	<0.001	1.539	0.058	4.660	<0.001
Multiple BWC activations	0.976	0.134	2.653	<0.001	0.963	0.134	2.620	<0.001
Neighborhood								
Economic disadvantage	0.060	0.056	1.062	0.279	0.125	0.063	1.133	0.047
Residential instability	1.647	0.432	5.193	<0.001	1.590	0.438	4.902	<0.001
Hispanic	0.340	0.228	1.405	0.136	0.250	0.284	1.284	0.381
Black	-1.465	0.738	0.231	0.048	-0.999	0.919	0.368	0.278
Logged violence rate	-0.107	0.059	0.899	0.072	-0.200	0.067	0.819	0.003
Population density	0.000	0.000	1.000	0.052	0.000	0.000	1.000	0.055
BWC interactions								
ED*BWC					-0.194	0.112	0.823	0.083
Hispanic*BWC					-1.204	1.458	0.300	0.409
Black*BWC					0.120	0.452	1.128	0.790
Logged violence*BWC					0.330	0.109	1.391	0.002
Intercept	-9.794	0.162	0.000	<0.001	-9.697	0.166	0.000	<0.001
Number of neighborhoods	388				388			
VC for the neighborhood	0.165				0.154			

$\chi 2$	437.587	427.997
p	0.024	0.048

Note: VC=variance component; incidents nested in neighborhoods

These results collectively suggest that use of force is strongly associated with situational factors. There were fewer significant associations between use of force and either officer or neighborhood characteristics. The results suggest that incidents involving officers with more years of service are more likely to result in use of force, with each additional year of service increasing the odds of force being used by 4.4%. Incidents involving officers assigned to Central City were 93.8% more likely to result in force. It is important to note that the Central City precinct encompasses the downtown Phoenix area, and as a result, could involve higher crime rates, a greater population of citizens under the influence of drugs or alcohol, a larger population of homeless/transient citizens, and a larger population of citizens experiencing mental health issues. In terms of neighborhood-level relationships, force was significantly more likely to be used in neighborhoods with higher rates of residential instability (368.1% more likely in Table 5.9 Model 1 and 419.3% more likely in Table 5.10 Model 1). Economic disadvantage was associated with a greater likelihood of force in some, but not all of the models examined. The only significant relationship between use of force and neighborhood racial/ethnic population distributions suggests that force was less likely to be used in neighborhoods with larger black populations (Table 5.9 Model 1 and Table 5.10 Model 1). However, these significant differences did not persist once interaction terms were included. There were no significant moderating effects of BWCs on neighborhood economic disadvantage or neighborhood racial/ethnic population distributions. However, the interaction terms between BWC activation and neighborhood violence were significant, suggesting that

incidents in violent neighborhoods were significantly more likely to result in use of force when BWCs were activated ($p<0.01$; Table 5.9 Model 2 and Table 5.10 Model 2).

5.4 Summary of Results

The results presented in this section suggest that police proactivity, arrest, and use of force vary as a function of situational, officer-level, and ecological factors. Across all of the outcomes examined, situational predictors were stronger predictors of officer use of discretion than either officer-level or neighborhood factors. Officer characteristics were inconsistently related to each of these outcomes, with officers with fewer years of experience being more proactive and female and college-educated officers being more likely to conduct arrests. Officers with more years of service were more likely to be involved in use of force incidents. Further, there was significant variation in each of these outcomes depending on officer precinct assignment. This supports theories suggesting that officer workgroups, and norms within those workgroups, influence the way officers police (Klinger, 1997). Finally, the results highlight important differences in police behavior across different types of neighborhoods. Namely, officers appear to police more proactively and formally in neighborhoods with large immigrant populations and large Hispanic populations. Specifically, the police are more likely to self-initiate contacts with citizens and conduct arrests in immigrant and Hispanic neighborhoods. However, there were no significant relationships between these measures and police use of force. Given the Phoenix context, which has a large Hispanic population and is geographically close to the Mexican border, there are several potential explanations for these findings which will be explored in Chapter 6.

In discussing the influence of BWCs specifically, the activation of a BWC had a direct effect on each of the outcomes examined. Incidents involving a BWC activation were significantly less likely to be proactive, but were significantly more likely to result in arrest and use of force. This suggests that the impact of a BWC varies depending on the behavior an officer is engaged in. This could be indicative of officers wearing BWCs behaving in different ways compared to officers who are not wearing cameras, or of incidents involving BWC activation being reported differently than those incidents that did not involve a BWC activation. Namely, officers who wear BWCs could be less likely to engage in self-initiated contacts. However, officers who wear BWCs could be more likely to conduct arrests and use force (though the direct relationship between BWC activation and use of force did not persist when interaction terms were included in the neighborhood models). This could be driven by the additional evidence provided by BWC footage to support an arrest or justify the use of force. It is also possible that officers who use BWCs could be more likely to conduct arrests and file use of force reports because failing to report these incidents could result in discipline.

Finally, the interaction effects between BWC activation and neighborhood characteristics suggest that the impact of BWCs on proactivity and arrest varies across different neighborhood contexts. The direction of these interaction terms suggests that when BWCs were activated, officers were even more likely to engage in proactive contacts and conduct arrests in immigrant and Hispanic neighborhoods. This is contrary to the expectation that BWCs could result in more equitable police behavior across different types of neighborhoods. There were no significant interaction effects between

use of force and neighborhood racial/ethnic context, suggesting that BWCs did not change officer use of force in minority neighborhoods in Phoenix. However, as officer use of force was largely unrelated to the racial/ethnic characteristics of the neighborhood, this finding is not particularly surprising.

6. CONCLUSIONS

6.1 Introduction

Given the widespread implications of police use of discretion on the criminal justice system as a whole, understanding the factors that influence police behavior is imperative. Policing scholars have relied on several theories of police discretion to examine variation in officer behavior, including the normative orders of policing perspective (Herbert, 1998), the social ecology of police misconduct (Kane, 2002), the sociological theory of law (Black, 1976, 1980), and the negotiating order in patrol work perspective (Klinger, 1997). These theories implicate officer-level factors (Herbert, 1998), neighborhood context (Kane, 2002), and interactions between multiple levels of explanation including situational, officer, neighborhood, and organizational influences (Black, 1976, 1980; Klinger, 1997) on police use of discretion. As such, understanding officer behavior depends on accounting for influences that operate at different levels of explanation.

In this study, I used multilevel modeling to examine variation in officer behavior as a function of situational, officer, and neighborhood-level factors guided by several policing theories. To provide a comprehensive view of police use of discretion, I examined three separate outcomes subject to varying levels of oversight, namely proactivity, arrest, and use of force. I first examined situational, officer, and neighborhood-level influences on each of these outcomes (research question 1). I then examined the impact of BWC activation on each outcome, and whether BWCs moderated the relationship between neighborhood context and police use of discretion after BWCs

were randomly deployed to 123 officers in the Phoenix Police Department (research question 2). My findings both support and conflict with expectations grounded in theories of police discretion and prior policing research. In this section, I begin by summarizing my key findings. I discuss the situational, officer, and neighborhood-level predictors of proactivity, arrest, and use of force. Next, I discuss the policy implications of my results. I then discuss the limitations of my study. I conclude with the implications of my study for researchers examining variation in police use of discretion and a brief outline of future research directions.

6.2 Summary of Key Findings

Table 6.1 summarizes the directionality and significance of each variable examined pre-BWC implementation (research question 1) and post-BWC deployment (research question 2). BWCs significantly impacted proactivity, arrest, and use of force. However, the direction of the main effect of BWC activation varied across the outcomes examined. The results further indicate that situational, officer, and ecological characteristics all influenced proactivity, arrest, and use of force, but in different ways across outcomes. Proactivity and arrest were significantly related to both the individual officer who responded to the call and to the neighborhood the call occurred within. Use of force was not associated with either the individual responding officer or to the specific neighborhood in which the incident occurred prior to BWC deployment. As a result, cross-classified models accounting for individual officers and neighborhoods were used to examine proactivity and arrests. To examine use of force, separate hierarchical logistic regression models were used to examine incidents nested in officers and incidents nested

in neighborhoods. The variance components suggest that individual officers were more strongly associated with proactivity, arrest, and use of force than individual neighborhoods.

The directionality and significance levels of the situational variables on each outcome examined remained the same before and after BWC deployment. The influence of officer characteristics were also fairly consistent in terms of directionality and significance for each outcome using the pre-BWC and post-BWC data. However, some differences in arrest and use of force depending on officer precinct assignment emerged after BWCs were deployed. The neighborhood-level influences on each outcome were the least consistent from pre-BWC deployment to post-deployment, as several neighborhood factors were only significant in one of the time periods. This suggests that the influence of neighborhood context on police behavior changed from pre-BWC implementation to post-implementation. I further examined whether BWC activation moderated the influence of neighborhood context on proactivity, arrest, and use of force. The moderating effects suggest that, when BWCs were activated, officers did behave differently in some types of neighborhoods. Table 6.1 summarizes my results for each time period and outcome examined. I discuss each finding in context of the broader policing literature in the situational, officer, and neighborhood sections, below.

Table 6.1 Findings Summary Table

	Pre-BWC implementation			Post-BWC implementation		
	Proactivity	Arrest	Force	Proactivity	Arrest	Force
Situational						
BWC activated	NA	NA	NA	↓	↑	↑●[d]
Violent	↓	↑	↑	↓	↑	↑
Property	↓	↑	↑	↓	↑	↑
Subject/vehicle stop	↑	↓	↑	↑	↓	↑
# responding officers	↓	↑	↑	↓	↑	↑
Multiple BWC activations	NA	NA	NA	↑	↑	↑
Officer						
Male	●	↓	●	●	↓	●
White	●	●	●	●	●	●
College educated	●	↑	●	●	↑	●
Tenure	↓	↓	↑	↓	●	↑
Black Mountain	↓	●	↓	↓	↓	●
South Mountain	↑	↓	●	↑	↓	●
Central City	●	●	●	●	↓	↑
Desert Horizon	↓	●	●	↓	↓	●
Mountain View	●	●	●	●	●	↑
Neighborhood						
Economic disadvantage (ED)	●	●	●	●	●	↑●[e]
Residential instability	●	●	●	●	●↓[b]	↑
Foreign-born	●	↑	●	↑	↑	●
Hispanic	●	↑	↑	↑	↑	●
Black	●	↑	●	●	●↑[c]	↓●[f]
Violence rate	↑	↑	●	↑	●	●↓[g]
Population density	●	↑	●	●	●	●
BWC interactions						
ED*BWC	NA	NA	NA	●↓[a]	●	●
Foreign-born*BWC	NA	NA	NA	↑	↑	●
Hispanic*BWC	NA	NA	NA	↑	↑	●
Black*BWC	NA	NA	NA	●	●	●
Violence rate*BWC	NA	NA	NA	↑	↑	↑

↑=significant increase $p<0.05$; ↓=significant decrease $p<0.05$; ●=no effect; NA=not applicable

[a] $p=0.45$ Table 5.2 Model 2; $p<0.05$ Table 5.3 Model 2

[b] $p=0.7$ Table 5.4 Model 1 & Model 2; $p<0.05$ Table 5.5 Model 1 & Model 2

[c] p=0.12 Table 5.4 Model 1; p=0.08 Table 5.4 Model 2; p=0.05 in Table 5.5 Model 1; p<0.05 Table 5.5 Model 2
[d] p<0.05 Table 5.8, Table 5.9 Model 1, & Table 5.10 Model 1; p=0.53 Table 5.9 Model 2 & Table 5.10 Model 2
[e] p<0.05 In Table 5.9 Model 1, Table 5.9 Model 2, & Table 5.10 Model 2; p=0.23 Table 5.10 Model 1
[f] p<0.05 Table 5.9 Model 1 and Table 5.10 Model 1; p=0.24 Table 5.9 Model 2; p=0.28 Table 5.10 Model 2
[g] p=0.07 Table 5.9 Model 1 & Table 5.10 Model 1; p<0.05 Table 5.9 Model 2 & Table 5.10 Model 2

6.2.1 Situational Findings. Proactivity, arrests, and use of force were all significantly influenced the type of call an officer was responding to, the number of responding officers present, and BWC activation. Proactive contacts were less likely to involve violent offenses, property offenses, a greater number of responding officers, and a BWC activation, but were more likely to involve subject/vehicle stops. Arrests and use of force were more likely to involve violent offenses, property offenses, a greater number of responding officers, and a BWC activation. Arrests were less likely to occur during subject/vehicle stops, but use of force was more likely to occur during these incidents, relative to other offense types. The influence of call type and number of responding officers on each outcome did not change from pre-BWC implementation to post-BWC implementation. I discuss the influence of call type and the number of responding officers on proactivity, arrest, and use of force first. Then I discuss the direct impact of BWCs on each of these outcomes.

Proactivity, arrests, and use of force were strongly influenced by the type of call an officer was responding to. The best predictor of proactive contacts both before and after BWCs were deployed was call type. Subject/vehicle stops were substantially more likely to be self-initiated than other types of incidents. This is consistent with the expectation that certain types of offenses are more vulnerable to proactive police contacts

because they are more visible to police officers conducting routine patrol (Black, 1971, 1980). More serious offenses, like violence, are more likely to occur in 'off-street' settings and require citizen reports to draw police attention to these incidents (Black, 1971). This is also consistent with more recent research that has found that officers generally define proactivity as traffic enforcement (Lum et al., 2018). Some researchers have argued that the police proactively enforce these minor offenses in order to prevent more serious types of offending (Goldstein, 1993).

Unsurprisingly, arrest and use of force were more likely to occur during more serious incidents both before and after BWCs were deployed. A long tradition of prior research has found that offense severity is the strongest predictor of arrest (Black, 1971, 1980; Goldstein, 1963; Novak et al., 2011; D. A. Smith & Visher, 1981; Westley, 1970). This has been attributed to officers feeling additional constraints on their discretion to resolve situations using arrests when responding to serious incidents, especially when these incidents involve victims (J. Q. Wilson, 1978). Specifically, officer discretion to resolve incidents using informal methods such as a verbal communication or a warning could be viewed as insufficient when an officer responds to an incident that involves a victim. This finding is consistent with prior researchers who have found that force was more likely to be used during violent incidents (e.g., Garner, Maxwell, & Heraux, 2002; but see Crow and Adrion (2011) and Terrill and Mastrofski (2002) for conflicting findings).

My finding that arrests and use of force were more likely to occur during serious incidents is also consistent with theoretical expectations surrounding police application of

the law and use of vigor (Black, 1980; Klinger, 1997). At a very basic level, officers can only conduct arrests when an individual act has been legally defined as criminal (Black, 1980; Herbert, 1997), with these definitions being more likely to be applied to violent and property offenses that have clear victims. Klinger (1997) argues that officers must use high levels of formal legal authority when responding to very serious incidents, especially homicides and incidents that threaten officer safety, regardless of any other factors that generally influence officer behavior. Further, some scholars have suggested that officers choose not to enforce minor offenses because citizens do not take the potential harm associated with misdemeanor offenses (like traffic violations) seriously (M. K. Brown, 1981). In terms of use of force specifically, officers could be more likely to use force when responding to violent incidents in order to protect themselves and other citizens involved in the situation.

Proactive incidents were associated with significantly fewer officers. As the PPD uses single-officer patrol units, it is not surprising that these contacts generally only involved one officer. Further, given the finding that proactive contacts predominantly involved stops for minor offenses, these incidents might be less likely to require backup. Arrests and use of force, on the other hand, were more likely to occur when a greater number of officers were present. These findings are consistent with some prior researchers who have found that officers were more likely to conduct arrests (Westley, 1970) and use force (Garner et al., 2002; Terrill & Mastrofski, 2002; but see Lawton, 2007 for conflicting findings) when other officers were present. The relationship between

arrest and use of force and a higher number of responding officers could be explained in a number of ways.

First, the presence of multiple officers at an incident could alter the dynamics of the situation and result in more aggressive or formal police responses to citizens. Some scholars have suggested that the relationship between multiple responding officers and an increased likelihood of arrest occurs because officers feel increased pressure to maintain their authority when bystanders witness an incident (D. A. Smith & Visher, 1981). Herbert (1998) suggests that officers could also feel increased pressure to prove their competence in front of other officers, which could lead them to respond to incidents more formally. Some researchers have additionally found that exposure to other officers who have received excessive force complaints can increase complaints alleging excessive force for officers (Ouellet, Hashimi, Gravel, & Papachristos, 2019), suggesting that group dynamics could influence use of force. Second, the presence of multiple officers at an incident could be indicative of the severity of the event. Because the PPD uses single-officer patrol vehicles, those incidents that involve more than one officer are likely to be calls in which the responding officer requested back up. These requests could be due to the severity of the offense, or to the potential threat posed by the suspect involved in the incident. This could result in more officers being present at serious incidents that require officers to conduct arrests or forcefully subdue suspects.

BWCs are expected to influence the way officers behave through increasing their self-awareness, resulting in a deterrent effect on misbehavior (Adams & Mastracci, 2019; Ariel et al., 2018; Ariel, Sutherland, Henstock, Young, & Sosinski, 2017). As such, the

use of BWCs facilitates increased review of officer behaviors in individual police citizen interactions, providing an additional form of oversight for officer activities (Ariel, Sutherland, Henstock, Young, & Sosinski, 2017). This is particularly important in understanding police use of discretion, as policing has been considered a low visibility profession due to the nature of police-citizen interactions (Walker, 1993).

Incidents involving a BWC activation were significantly less likely to be proactive. The negative relationship between BWC activation and proactivity is consistent with researchers in Milwaukee who found that BWC officers were less likely to self-initiate contacts with citizens (Lawrence & Peterson, 2019). However, this is counter to other researchers who have found that BWCs increased the likelihood of self-initiated contacts (e.g., Wallace et al. (2018); see Huff et al. (2020) for a general review of the impact of BWCs on officer self-initiated contacts). Critics of BWCs have suggested that the additional scrutiny that officers face as a result of video footage of their contacts with citizens could result in the police disengaging from their jobs (see Wallace et al. (2018) for a discussion about BWCs and camera-induced passivity and Rushin and Edwards (2017) for a discussion about depolicing and cell phone videos). Ariel, Sutherland, Henstock, Young, and Sosinski (2017) referred to this possibility as inertia. The potential for additional scrutiny of officer behavior as a result of BWCs could manifest in officers only responding – or reacting – to dispatched calls for service. My finding that proactive incidents were significantly less likely to involve BWC activation could be evidence of this depolicing occurring.

Another potential explanation for the lower likelihood of BWC activation in proactive police-citizen contacts could be that these incidents occur too rapidly for an officer to activate their BWC. An officer could quickly transition from an informal citizen encounter to a recordable police-citizen contact.[15] In these quick events, an officer might not have time to activate their BWC. This would mean that officers wearing BWCs were engaging in the same numbers of proactive citizen contacts as officers who were not wearing BWCs, but that BWC officers might not have been recording these incidents using their BWC. In a separate study examining the impact of BWCs on officer activity levels in Phoenix, Huff et al. (in preparation) do not identify any significant differences in the likelihood of proactive contacts between incidents involving officers assigned to wear BWCs and control officers. Instrumental variables analysis was also used to examine the impact of BWC activation instrumented on BWC assignment and we again identified no differences in proactivity in that study. Nevertheless, future researchers should examine different measures of BWCs to better understand the relationship between cameras and proactivity.

I further found that incidents resulting in arrest were more likely to involve a BWC activation. These findings are consistent with prior researchers who have identified increased arrests associated with BWCs in Phoenix (Katz et al., 2014) and Las Vegas (Braga et al., 2018). However, as in proactivity, the impact of BWCs on arrests is not universal across prior studies (Huff et al., 2020). Several researchers have identified null

[15] The PPD policy requires officers to activate their BWC as soon as an officer receives a call for service. As such, officers who are not responding to dispatched calls for service, but are instead initiating contacts with citizens, might not have time to activate their cameras during those contacts.

effects of BWCs on arrest (Hedberg et al., 2017; Yokum, Ravishankar, & Coppock, 2017) and one study identified decreases in arrest associated with BWCs (McClure et al., 2017).

The positive relationship between BWCs and arrest is not surprising. When an officer witnesses an offense that either policy or law dictates should result in arrest, and then captures the proof of that offense using a BWC, the officer could feel increased pressure to conduct an arrest. This suggests two possible impacts of BWCs. First, BWCs could provide additional evidence that might make officers more confident about the evidence that they can present in court, thereby increasing their propensity to arrest (as suggested by researchers including Goodall (2007) and Rowe, Pearson, and Turner (2018), among others). Indeed, Morrow et al. (2016) found that BWCs increased arrests and ultimately improved case processing and court outcomes in domestic violence incidents. Second, it is possible that incidents that would normally not result in an arrest (i.e., incidents in which an officer would usually 'give the citizen a break') are now resulting in arrests because officers are concerned about potential discipline or liability as a result of observing an offense and failing to enforce the laws regulating that offense (as suggested by Ready & Young, 2015). The complexity associated with using arrests as a measure of police performance have long been discussed. Lipsky (1980) explains that increased arrests could be a result of several conflicting patterns, including: improved offender identification and evidence gathering, a function of increased crime, and/or changes in police policies and practices. Given these alternative explanations, future

researchers should examine whether the increase in arrests associated with BWCs is due to better evidence, constrained officer discretion, or an alternative explanation.

Anecdotally, while collecting survey data as part of the larger evaluation of BWCs in the PPD, several officers mentioned that they felt that BWCs required them to respond to incidents more legalistically. These officers noted concerns about constraints on their discretion and suggested that they used to be able to cut people some slack, but that they are no longer able to do so because of BWCs. There are some concerns that constrained discretion could negatively impact community policing, which involves using alternatives to arrest (Ariel, Sutherland, Henstock, Young, & Sosinski, 2017; Brooks, 1997). However, nonenforcement of the law could contribute to disparities in criminal justice outcomes if officers are more lenient in incidents that involve certain types of offenders (M. K. Brown, 1981; Davis, 1969; Ohlin, 1993). As such, BWCs could disproportionately impact individuals who were more likely to experience nonenforcement and level the playing field for those individuals who were likely to be formally sanctioned, regardless of the presence of witnesses. Thus, even if disparities are not occurring because officers are *more* likely to arrest racial/ethnic minorities, they could occur if officers are *less* likely to arrest whites for the same offenses. As such, while limiting officer discretion could be viewed as detrimental and likely to produce more legalistic policing, it could also eliminate disadvantages for those individuals who were unlikely to be treated leniently.

Like arrests, use of force was significantly more likely to occur when BWCs were activated. Though research examining the impact of BWCs on proactivity and arrest is

somewhat inconclusive, the research examining the influence of BWCs on use of force largely indicates that BWCs reduce or have no impact on use of force (Lum et al., 2019; White, Gaub, & Padilla, 2019), contrary to my findings. For instance, researchers in several cities have identified significant reductions in use of force after BWCs were deployed (Ariel et al., 2015; Braga et al., 2018; Jennings et al., 2015; White, Gaub, & Todak, 2017). My findings could suggest that officers were more likely to officially report using force when these incidents were captured using a BWC, especially when multiple officers recorded the incident. This is consistent with Henstock and Ariel (2017), who suggested that increases in use of force after the adoption of BWCs could be associated with changes in reporting. It is possible that officers were using the same levels of force in both time periods but that they were downplaying the force used in the pre-BWC period to avoid paperwork or discipline. However, after BWCs were deployed, officers might feel increased pressure to accurately report using force because they could get in trouble if their reports do not match the footage captured by a BWC.

In their deterrence spectrum, Ariel et al. (2017) argue that the impact of BWCs on use of force depends on the amount of discretion that officers have to activate their BWCs. They suggest that when officers have broad discretion to use their BWCs, use of force could increase if BWCs are activated midway through contentious police-citizen contacts. They suggest that activating a BWC during a heated encounter could escalate the situation if citizens react to the BWC aggressively. They alternatively suggest that when officers have less discretion and are required to activate their BWCs in all interactions, that use of force will decrease because the risk of supervisors reviewing

officer use of force is high (Ariel, Sutherland, Henstock, Young, & Sosinski, 2017). PPD officers are required to activate their BWCs in all citizen contacts. As such, my finding that BWC activation was associated with a greater likelihood of police use of force conflicts with the expectations of the deterrence spectrum.

It is also important to note that PPD experienced a widely publicized increase in police shootings in 2018 (Burkitt, 2019; Oppel, 2018), which was during the time of my study. Officers who were interviewed as part of an analysis of the increase in deadly use of force in PPD attributed the increase to a few factors: increased police interaction with individuals experiencing mental health problems, increased citizen aggression toward the police after Ferguson, and increased citizen use of violence toward the police (Rojek et al., 2019). I was not able to account for any of those potential explanations in my study. If citizens were being more antagonistic in encounters with the police, the presence of a BWC could have escalated citizen aggression even further if the citizen felt like the officer could not use force against them because of the BWC. Or, as Ariel et al. (2017) suggested, citizens could be more aggressive toward officers if an officer activates a BWC after a contentious encounter has already begun. Increased citizen aggression in response to BWC activation could require the officer to use force to subdue the citizen. Further research aimed at understanding why use of force was more likely to occur in incidents that involved BWC activation during this time period is needed.

6.2.2 Officer Findings. The influence of individual officers was significantly associated with each of the outcomes examined. This is consistent with Herbert's (1997, 1998) suggestion that individual officers have distinct orientations that influence their

behavior. He specifically suggests that policing is oriented around six normative orders (law, bureaucratic control, adventure, safety, competence, and morality), and that individual officers rank-order the importance of these orders differently. While I do not examine officer attitudes directly, I did identify differences in proactivity, arrest, and use of force as a function of officer demographic characteristics and job-related experiences. Though the influence of officer demographic characteristics on each outcome remained the same from pre-BWC deployment to post-deployment, some differences in years of service and officer precinct assignment emerged after BWCs were deployed.

In terms of demographic characteristics, female officers and college-educated officers were more likely to conduct arrests both before and after BWCs were deployed. This suggests that the introduction of BWCs did not change the relationship between officer gender and education and arrest behaviors. Though some early studies suggested that female officers were less likely to conduct arrests than males, this was likely due to the fact that female officers were initially assigned to different tasks than males (Archbold & Schulz, 2012). In more recent research, Rabe-Hemp (2008) found that female officers were less likely to conduct arrests because they were more likely to be community officers, which limited their opportunities to conduct arrests. As all of the officers in my study were assigned to patrol, these concerns are unlikely to influence my findings. Several researchers who have compared differences between male and female officers have identified limited differences between these groups using more recent data (see Archbold and Schulz (2012) and Novak et al. (2011) for detailed reviews).

My finding that female officers conducted more arrests than their male counterparts is consistent with some prior researchers who have found that females were more likely to conduct arrests than males in some situations. For example, Novak et al. (2011) found that female officers were more likely to conduct arrests when their supervisors were present and when suspects did not defer to their authority. This could be because female officers feel increased pressure to prove their law enforcement proficiency, especially in the presence of their supervisors (Novak et al., 2011). However, this counters other researchers who have found that female officers were less likely to use controlling behaviors (including arrests) in citizen interactions, relative to male officers (Rabe-Hemp, 2008). Given inconsistent findings across studies, future researchers should more fully examine the relationships between officer gender and arrest behavior.

College-educated officers were more likely to conduct arrests before and after BWCs were deployed. As such, the relationship between officer education and arrest did not change once BWCs were introduced. Prior researchers who have examined the influence of educational attainment on officer arrest have identified mixed findings (Lum et al., 2016). For instance, college-educated officers were significantly more likely to conduct arrests pursuant to traffic stops in St. Louis (Rosenfeld et al., 2018). Other researchers, however, have identified no significant relationship between officer education and arrest (Rydberg & Terrill, 2010; S. M. Smith & Aamodt, 1997). College-educated officers might be more motivated to conduct arrests to improve their performance metrics to meet promotional standards (Niederhoffer, 1967; Rosenfeld et al., 2018). It is also possible that college-educated officers are more effective at identifying

crime. Conversely, more educated officers could conduct fewer arrests if they are better able to diffuse situations in other ways based on stronger communication skills or social awareness. As such, the relationship between officer education and arrest is complex and can be explained in multiple different ways.

Officers with fewer years of service were more likely to engage in proactive contacts both before and after BWCs were deployed. Prior researchers have found that newer officers are more proactive (Sun, 2003; Worden, 1989). This finding has been fairly consistent across studies. My findings indicate that BWCs do not change this relationship. One potential explanation for the relationship between proactivity and officer tenure is that as officers advance in their careers, they could be less motivated to self-initiate encounters and might adopt a more reactive mentality to avoid engaging in incidents that could get them in trouble. Some research has found that officers with more experience are more cynical (Sobol, 2010b), which could also reduce their willingness to engage in proactivity. Those officers who adopt a less proactive approach could choose to engage in lower rates of police activity in general, or they could choose to focus on serious offenses that are more clearly defined (Terrill, Paoline, et al., 2003).

Alternatively, more senior officers could perceive proactive contacts as less effective methods of policing and might only engage in proactivity when there is strong justification to do so. In discussing the crime decline in New York City, former Police Commissioner William Bratton (1995) suggested that part of his crime reduction strategy was to refocus which officers would be responsible for problem solving. He suggested that younger officers with less experience were ill-equipped to deal with complex

problems and that more experienced officers were better suited to engage in problem solving. As a result, it is possible that more experienced officers engage in lower levels of proactive contacts because they are more focused on addressing complex social problems. Some researchers have found that officers with fewer years of experience were more likely to have complaints filed against them (McElvain & Kposowa, 2004), suggesting that these officers could still be learning how to effectively work with the public.

Officers with fewer years of service were more likely to conduct arrests before BWCs, but this difference became nonsignificant after BWCs were deployed. Prior researchers have identified mixed relationships between officer tenure and arrest behaviors in general (Riksheim & Chermak, 1993). Some researchers have found that newer officers are more likely to conduct arrests in certain situations. R. A. Brown and Frank (2006) found that black officers with fewer years of service were significantly more likely to conduct arrests, though white officers with fewer years of service were not. Other researchers examining officer responses to intimate partner violence scenarios found that officers with more years of experience were more likely to offer informal advice, compared to other potential responses including arrests (Russell & Sturgeon, 2019). In their analysis of officer responses to citizen requests, Mastrofski, Snipes, Parks, and Maxwell (2000) found that officers with more years of service were less likely to comply with citizen requests to control others, including citizen requested arrests. They suggest that this could be due to more experienced officers being more cynical about responding to citizen requests, or to more senior officers avoiding arrests because the

associated paperwork is time consuming (Mastrofski et al., 2000). I found that the difference in arrests based on officer years of service became nonsignificant after BWCs were deployed. If officers with more experience were using alternatives to arrest to resolve situations prior to BWC deployment, they could have felt increased pressure to resolve incidents formally using arrests after BWCs were deployed. This could be driven by a perceived loss of discretion, or by these officers seeking to avoid punishment for failure to enforce the law.

Officers with more years of service were more likely to use force than those with fewer years of service both before and after BWCs were deployed. This indicates that BWCs did not change the relationship between years of service and use of force. My findings counter some prior researchers who found that officers with fewer years of experience were more likely to use force (Garner et al., 2002; Terrill & Mastrofski, 2002). However, other researchers have found that younger officers use less force (Alpert & Dunham, 2004; McElvain & Kposowa, 2008). This could be related to increased attention to de-escalation in policing more broadly, which might be more salient for newer officers who went through training more recently (however recent research suggests that more experienced officers might be better able to de-escalate situations (Todak & James, 2018)).

The likelihood of proactivity, arrest, and use of force varied across officer precinct assignment. This suggests that different workgroups within a police organization could have different norms about the manner in which laws should be enforced, consistent with expectations posed by Klinger (1997) and prior research conducted by

Niederhoffer (1967). Some police leaders have suggested that variation in policing across different organizational units is a good thing, as it allows the police to respond to the unique needs of the populations that they serve and the crime problems they experience in their jurisdiction (Bratton, 1995). In terms of proactivity, the differences across precincts remained the same both before and after BWCs were deployed. However, the relationships between precinct assignment and arrests and use of force changed from pre- to post-BWC deployment. Officers in the South Mountain precinct were more likely to proactively initiate contacts, but were less likely to conduct arrests, both before and after BWCs were deployed. There were few significant differences in arrests across precincts before BWCs, but, after BWCs were implemented, the likelihood of arrests decreased for officers assigned to several precincts. There were also few differences in use of force across precincts prior to BWCs, but officers assigned to the Central City precinct were more likely to use force than those assigned to other precincts after BWCs were deployed.

Contrary to Klinger's (1997) suggestion that officer vigor will be relatively low in less serious offenses that occur in high crime areas, officers assigned to the South Mountain precinct (which is one of the higher crime precincts in the city) were more likely to be involved in proactive contacts both before and after BWCs were implemented. As proactive contacts overwhelmingly involved subject and vehicle stops, this finding conflicts with his suggestion that officers will use lower levels of formal legal authority in areas with high levels of crime, especially in minor incidents. Arrests, however, were significantly less likely to involve officers assigned to the South Mountain

precinct in both time periods. This could be indicative of workgroup norms in South Mountain that discourage officers from conducting arrests, especially for less serious offenses, so that officers remain available to serve as backup in the event that a more serious incident occurs.

Klinger (1997) suggests that officers who work in high crime precincts have higher levels of cynicism about the utility of arrest because they witness greater numbers of system failures (i.e., these officers often encounter people that they have previously arrested back out on the street), relative to officers in lower crime districts. He further argues that officers in high crime areas develop norms against conducting arrests, which are time consuming, in favor of alternative resolutions due to resource deficiencies. As such, he suggests that the higher workload in some areas could generate workgroup norms that promote leniency. Buvik (2016) identified some similar justifications among officers who avoided conducting arrests in their study. My finding that incidents involving officers from South Mountain were less likely to result in arrest is consistent with these prior researchers. My findings further suggest that the adoption of BWCs did not change the relationships between proactivity and arrest for officers assigned to the South Mountain precinct.

Though South Mountain was the only precinct significantly associated with arrest prior to BWC deployment, significant differences in arrests emerged for officers assigned to several other precincts after BWCs were deployed. For instance, officers assigned to Black Mountain and Central City were less likely to engage in arrests prior to BWC deployment, but the difference in arrests involving these officers only became statistically

significant after BWCs were deployed. The Black Mountain precinct serves the northern part of Phoenix, which includes some predominately rural areas. The Central City precinct serves downtown Phoenix. As such, these precincts are qualitatively different. It is unclear why both precincts would experience significant reductions in arrests after BWCs were deployed. Future research should further examine precinct-level factors that could have resulted in these changes over time.

Like arrests, the impact of precinct assignment on use of force changed after BWCs were deployed. For example, there were no significant differences in use of force for officers assigned to Central City prior to BWC deployment, however, Central City officers were significantly more likely to use force after BWCs were deployed. Due to the nature of the Central City precinct, those officers might respond to a greater number of incidents that necessitate the use of force. Central City officers could have been less hesitant to use force after BWCs were deployed because BWCs can be used to capture suspect behaviors that justify using force. The Central City precinct encompasses downtown Phoenix. As a result, officers assigned to Central City face different challenges compared to officers in other areas. The downtown area includes a wide range of facilities that could contribute to variations in police behavior, including homeless shelters, the basketball stadium, the baseball stadium, and a large number of hotels, bars, restaurants, public transportation stops, and the downtown Arizona State University campus. As such, Central City officers regularly interact with citizens who are homeless and those with mental health and substance abuse issues. Some prior researchers have

found that officers were more likely to use force in areas with large homeless populations in order to get people to leave the area (Black, 1980).

Central City officers also routinely provide services at special events, which bring together large crowds of people. Sporting events in particular can involve citizens who are in heightened emotional states due to the competitive nature of sports. Many of the events that occur downtown also involve drinking, which could influence citizen behaviors toward the police. Due to the large number of people that Central City police officers interact with, and the nature of these individuals who might or might not live in that area of the city, these officers could encounter a greater number of situations that necessitate the use of force. Though these officers were more likely to be involved in use of force incidents prior to BWC deployment, these differences only became statistically significant after BWCs were implemented. As such, BWCs could be associated with an increase in the ability of officers to document justifications for using force, an increase in officer reporting of use of force incidents, or increased citizen aggression toward officers who wear BWCs. Given the unique nature of Central City, these factors could differentially influence police-citizen encounters that occurred in that precinct, relative to those in other areas. It is important to note that I do not examine whether or not the force used in an individual incident was justified, as such, these results do not inherently suggest that officers assigned to Central City were wrongfully using force. Future research directly examining the causes of these differences in use of force across officer precinct assignment after BWCs were deployed could provide more meaningful implications in terms of potential training needs.

6.2.3 Neighborhood Findings. A number of theories suggest that social control (Black, 1976, 1980), police vigor (Klinger, 1997), and police misconduct (Kane, 2002) vary across different types of neighborhoods. Researchers are increasingly promoting the use of neighborhoods as a unit of analysis to examine police behavior (Rosenfeld, 2015). Consistent with these arguments, I found that proactivity and arrest were significantly associated with the neighborhood that a police-citizen contact occurred within both before and after BWCs were implemented. Use of force was not significantly related to the neighborhood an incident occurred within prior to BWCs being deployed, however, force was significantly related to neighborhoods after BWCs were deployed.

As shown in Table 6.1, the neighborhood factors that influenced proactivity, arrest, and use of force were not the same before and after BWCs were deployed. Some neighborhood factors were only significant predictors of each outcome prior to BWC deployment and some were only significant after BWC deployment. This suggests that the introduction of BWCs could change the impact of neighborhood context on police behavior in individual incidents. I examined both the direct effects of neighborhood context on police behavior and the potential for BWCs to moderate the influence of neighborhood context on proactivity, arrest, and use of force.

Due to the use of space to control racial/ethnic minorities throughout the history of policing in the U.S. (Bass, 2001), police behavior in minority communities has received substantial research attention. I found that proactivity was more likely to occur in immigrant and Hispanic neighborhoods, but only after BWCs were deployed. Arrests were more likely to occur in neighborhoods with large immigrant populations, large

Hispanic populations, and large black populations in both time periods. Use of force was more likely to occur in neighborhoods with large Hispanic populations before BWCs were deployed, though this difference became insignificant after BWCs were deployed. Neighborhood percent black was unrelated to use of force prior to BWCs being deployed. However, after BWCs were deployed, use of force was significantly *less* likely to occur in neighborhoods with large black populations. The moderating effects suggest that when BWCs were activated, incidents in immigrant and Hispanic neighborhoods were even more likely to be proactive and/or result in arrest. BWCs did not moderate the influence of neighborhood racial/ethnic composition on police use of force.

Proactivity was not associated with neighborhood racial composition before BWCs were deployed. This is consistent with prior researchers who found no relationship between neighborhood racial/ethnic composition and stop rates (Petrocelli, Piquero, & Smith, 2003), but my finding is inconsistent with other researchers who found that proactive contacts were more likely to occur in minority neighborhoods (D. A. Smith, 1986). However, after BWCs were deployed, proactive contacts were significantly more likely to occur in neighborhoods with larger foreign-born and Hispanic populations. This suggests that the adoption of BWCs changes the influence of neighborhood racial/ethnic context on police proactivity.

Only one other study to date has examined the relationship between BWCs and neighborhood characteristics on police behavior. Using data collected from the Louisville (KY) Metropolitan Police Department, Hughes et al. (2020) examined the influence of BWCs on the number of self-initiated contacts, arrests, and citations conducted at the

census tract level. Though Hughes et al. (2020) did not examine police behavior in immigrant and Hispanic neighborhoods specifically, they did find that officers were significantly more likely to self-initiate contacts in black neighborhoods after BWCs were deployed. This could suggest that officers were more proactive in minority neighborhoods after BWCs were adopted. Contrary to their findings, I did not find a significant relationship between proactivity and neighborhood percent black either before or after the deployment of BWCs in my study.

I found that arrests were more likely to occur in immigrant neighborhoods, Hispanic neighborhoods, and black neighborhoods in both time periods examined. The effect of neighborhood percent foreign-born was the largest neighborhood racial/ethnic effect on arrest, followed by Hispanic, and then black. The higher likelihood of proactivity and arrests in immigrant and Hispanic neighborhoods, compared to black neighborhoods, could be indicative of racial-minority threat and/or the defended neighborhoods perspective. Phoenix has larger Hispanic and immigrant populations than black populations. As such, incidents occurring in Hispanic and immigrant neighborhoods could trigger more formal police responses than incidents in black neighborhoods, given the lower level of perceived threat represented by the black population.

Kane et al. (2013) identified similar findings in their study of misdemeanor arrests involving minority suspects in New York City. They specifically found that the population threshold associated with increased arrests was lower in Hispanic communities than in black communities. They attributed this difference to the rapid

increase in the Hispanic population in New York City in recent years (Kane et al., 2013). Other researchers have similarly found that arrest rates were higher in cities with larger nonwhite populations (Liska & Chamlin, 1984) and that traffic citations were more likely to be issued in Hispanic and black neighborhoods (Ingram, 2007).

The moderating effects suggest that both proactive contacts and arrests were significantly more likely to occur in immigrant and Hispanic neighborhoods when a BWC was activated. The direct effects of neighborhood percent foreign-born and neighborhood percent Hispanic remained positive and significant, even when interactions between BWC activation and these measures were included in the models. This is contrary to my expectation that BWCs could reduce differential policing in minority neighborhoods. Though my findings suggest that BWCs do not moderate the influence of neighborhood percent black on arrest, Hughes et al. (2020) found that officers were significantly less likely to conduct felony arrests (but not low-level arrests) in black neighborhoods after BWCs were deployed. Given the different population characteristics in Phoenix and Louisville, it is not surprising that our results are somewhat different. For instance, Louisville has a larger black population (22% compared to 7% in Phoenix) and Phoenix has a larger population of immigrants and Hispanics. As such, minority threat in Phoenix could occur in immigrant and Hispanic neighborhoods (and not black neighborhoods), while minority threat in Louisville might manifest in differential policing in black neighborhoods. This would be consistent with the proposition that racial threat only occurs once the minority population reaches a certain threshold (Blalock, 1967).

My finding that BWC activation significantly increased the likelihood of proactivity and arrests in immigrant and Hispanic neighborhoods in Phoenix could be due to BWCs capturing footage that justify proactive contacts and arrests. Prior researchers who identified increased proactivity and arrests when BWCs were used have suggested that BWCs document suspicious behaviors and/or evidence of an offense (Ready & Young, 2015). BWCs could have especially notable impacts on police behavior in immigrant and Hispanic neighborhoods in Phoenix because of the broader attention paid to policing immigration in the state of Arizona and in Maricopa County (of which Phoenix is the county seat), specifically.

In 2010 the Governor of Arizona enacted Senate Bill 1070 (SB 1070) which required police officers to check the immigration status of any individual that the officer suspected of being in the US illegally (Sinema, 2012). SB 1070 has been contentious. Aggressive support of this measure by former Maricopa County Sheriff Joe Arpaio has negatively impacted police relationships with the Hispanic community in the broader Phoenix area (Rojek et al., 2019). Former Sheriff Joe Arpaio encouraged his deputies to enforce immigration laws during police-citizen encounters and to check an individuals' citizenship status when arrestees were brought to the Maricopa County Jail, long before SB 1070 was enacted (Allen & Sousa, 2011). These practices led to the Maricopa County Sheriff's Office being investigated by the Department of Justice and ultimately being subject to a federal consent decree (Perez, 2011).

For their part, many citizens cannot tell the difference between Maricopa County Sheriff's Deputies and Phoenix Police Officers (Rojek et al., 2019). The somewhat

strained police community relationships in immigrant and Hispanic neighborhoods in Phoenix could result in PPD officers being concerned about additional scrutiny in these types of neighborhoods, above and beyond what they normally face. As such, both the enhanced evidence of officer and citizen behavior captured by a BWC and the increased pressure for officers to respond to incidents formally in immigrant and Hispanic neighborhoods could cumulatively increase legalistic policing in these neighborhoods. Though SB 1070 initially required officers to check an individuals' immigration status, several changes to the law have resulted in this becoming a discretionary decision for the police (Duara, 2016). As such, some officers could choose to police more legalistically in certain neighborhoods in order to check the immigration status of the individuals they stop. This could explain the stronger effect of neighborhood percent foreign-born on proactivity and arrest, relative to the effect of neighborhood percent Hispanic on these outcomes. BWCs could additionally result in officers deferring to arrests in order to leave formal processing of suspected offenders in these areas to the courts (see Ariel et al. (2017) for a similar discussion of the effect of BWCs on over-deterrence).

Scholars have also suggested that increased proactivity and arrests in minority areas could be attributable to officer deployment patterns (Bittner, 1970; Kane, 2002; Withrow, 2004). Because officers are more likely to be deployed to minority neighborhoods, they have more opportunities to engage in proactive contacts and conduct arrests in these areas. Officers could additionally perceive individuals in these types of neighborhoods as being more likely to be involved in crime. Gelman et al. (2007) suggest that officers could become suspicious more easily about minority citizens and in minority

contexts. They refer to this as a social-psychological explanation for observed differences in stop rates for minorities. Herbert (1997) similarly found that some of the officers in his study justified using aggressive policing tactics in minority neighborhoods in order to assert control in those areas.

Given the strong association between proactivity and vehicle stops, it is also possible that minority neighborhoods have more vehicles that are in violation of operating laws. However, the insignificant relationship between economic disadvantage and proactivity suggests that this was not solely an issue of poverty, which is often implicated in higher rates of equipment violations involving minority citizens and neighborhoods. Further, it is unlikely that these relationships would only manifest after BWCs were deployed. It is possible that officers were more likely to document proactive contacts in immigrant and Hispanic neighborhoods and underreport proactive contacts that occurred in white neighborhoods. This is consistent with prior researchers who have found that officers sometimes do not report their proactive activities to dispatch, especially when the officer feels safe and is not concerned about potentially needing back-up (Herbert, 1998; Wu & Lum, 2017). The presence of BWCs could result in officers being more likely to officially record proactive contacts because there is documentation of these encounters occurring.

Use of force was significantly more likely to occur in Hispanic neighborhoods before BWCs were deployed. This is consistent with prior researchers who have found that use of force was more likely to occur in minority neighborhoods (Herbert, 1997; Lersch, Bazley, Mieczkowski, & Childs, 2008; Lim & Fridell, 2014; D. A. Smith, 1986).

Some researchers have identified a higher likelihood of use of force in Hispanic neighborhoods specifically (Arnio, 2019; B. W. Smith & Holmes, 2014). However, the relationship between use of force and neighborhood percent Hispanic became insignificant after BWCs were deployed. This could suggest that BWCs reduce the influence of neighborhood racial/ethnic composition on police behavior. Contrary to studies conducted by prior researchers who identified more use of force in black neighborhoods (Arnio, 2019; Klinger et al., 2016; Lautenschlager & Omori, 2018; B. W. Smith & Holmes, 2014; D. A. Smith, 1986), I did not identify a relationship between use of force and neighborhood percent black prior to the deployment of BWCs in the present study. However, I found some indication that force was significantly *less likely* to be used in black neighborhoods after BWCs were deployed in the direct effects model. The interaction effect between BWC activation and neighborhood percent black, however, was not significant. This suggests that even though force was less likely to be used in black neighborhoods after BWCs were deployed to some officers, the likelihood of force occurring in black neighborhoods did not depend on a BWC being activated during a specific incident. Further, the direct relationship between neighborhood percent black and use of force became insignificant when the interaction terms between BWCs and measures of neighborhood context were added to the model.

My finding that officers were more likely to use force in Hispanic neighborhoods before BWCs were deployed, but were less likely to use force in black neighborhoods after BWCs were deployed could again be due to higher levels of racial/ethnic threat in immigrant and Hispanic neighborhoods, relative to black neighborhoods, in Phoenix. The

finding that force was not significantly more likely to occur in Hispanic neighborhoods after BWCs were deployed could indicate that the presence of BWCs does result in more equitable policing in Hispanic neighborhoods. The lower levels of force used in black neighborhoods after BWCs were deployed could be attributable to increased public attention to police use of force against black suspects in the US. The fatal police shooting of Michael Brown in Ferguson, Missouri in 2014 resulted in national attention to police use of force incidents, especially those involving black citizens (Rosenfeld, 2015). This increased attention could result in officers being hesitant to use force against black suspects to avoid public disapproval, which could reduce officer use of force even when it is justified (James, James, & Vila, 2016). The deployment of BWCs to some officers in the PPD could have resulted in a large number of officers in the agency becoming more hesitant to use force in black neighborhoods because officers were aware of the potential for these incidents to be recorded. Given some research suggesting that BWCs could lead to increased assaults on police officers (Ariel et al., 2016b), it is important to ensure that officers are not overly deterred from using force to protect themselves and others when it is necessary.

BWC activation did not moderate the relationship between use of force and neighborhood percent black. In some ways this can be considered a positive finding. Namely, use of force was less likely to occur in black neighborhoods after BWCs were deployed to some officers, even when the specific incident examined did not involve a BWC activation. This suggests that the protective influence of BWC deployment on use of force in black neighborhoods is fairly broad and might not require the deployment of

BWCs to all officers, or the activation of BWCs in all incidents, for the reduction in force to occur. Prior researchers have found that officer perceptions of BWCs (Young & Ready, 2015) and officer use of force (Ouellet et al., 2019) are influenced by other officers in their networks. As such, officers responding to incidents in black neighborhoods could similarly be influenced by the knowledge that other officers in their networks were using BWCs, even when the individual officer was not wearing a camera themselves. In short, my findings suggest that deploying BWCs to some officers could reduce use of force in black neighborhoods in incidents involving all officers. Despite the commonly noted association between the widespread adoption of BWCs and the death of Michael Brown in Ferguson, researchers have not examined the influence of BWCs on police use of force involving black suspects, or police use of force in black neighborhoods. As a result, my finding that BWCs reduce use of force in black neighborhoods is an important contribution to the literature.

Several policing theories suggest that officers behave differently in neighborhoods with high levels of violence (Black, 1980; Herbert, 1997; Klinger, 1997). For instance, Klinger (1997) suggests that district levels of deviance influence district workload, officer attitudes, workgroup rules, and ultimately the level of formal legal authority that officers use to enforce laws. He suggests that officers in high crime districts that are subject to high workloads will generally enforce laws less vigorously than officers in lower crime areas. Black (1980) similarly suggests that officers assigned to high crime areas have little time for proactivity because they are constantly responding to citizen requests for service. However, he also argues that officers deployed to high crime

areas will have more opportunities to conduct proactive contacts, arrests, and use force because they are in these areas more often.

My results suggest that proactive contacts were more likely to occur in neighborhoods with higher levels of violence both before and after the deployment of BWCs. Incidents in violent neighborhoods were also more likely to result in arrest, but only prior to BWC deployment. Incidents were less likely to involve use of force in violent neighborhoods, but only after BWCs were deployed. As such, my findings are consistent with some theoretical expectations about the influence of neighborhood crime on police behavior, but conflict with other expectations. I further found that BWC activation significantly moderated proactivity, arrests, and use of force, with each outcome being significantly more likely to occur in violent neighborhoods when BWCs were used. [16] Consistent with my findings, Hughes et al. (2020) also identified a relationship between neighborhood crime, BWCs, and police behavior. They found that officers were significantly more likely to proactively initiate contacts, conduct felony arrests, and conduct low-level arrests in neighborhoods with higher crime rates. However, contrary to my results, they did not identify any significant interactions between BWCs and neighborhood crime on counts of proactivity, low-level arrests, or felony arrests in Louisville.

Klinger (1997) suggests that officers in high-crime areas become desensitized to minor offending and will use lower levels of formal legal authority to resolve low-level

[16] Interestingly, once interaction effects between BWC activation and the neighborhood structure variables were included in the use of force models, the direct effect of BWC activation on use of force became insignificant (OR=1.11; p=0.53 in Table 5.9 and Table 5.10).

offenses. My findings, however, indicate that the opposite could be occurring. It is worth mentioning that even though the relationship between proactivity and neighborhood violence was positive and significant, the magnitude of the effect was small (OR=1.00). My finding that proactive contacts were more likely to occur in violent neighborhoods is consistent with researchers who found that traffic stops were more likely to occur in high crime areas (Stults et al., 2010) and findings that officers use vigorous enforcement methods in areas thought of as dangerous, even when the incident in question is minor (Herbert, 1997). Herbert (1997) specifically suggests that officers working in dangerous neighborhoods sometimes use an overly broad net to stop everyone that they encounter in those areas. However, my findings counter the results of some prior researchers who have found that officers were less likely to be proactive in high crime areas (D. A. Smith, 1986).

The higher likelihood of arrest in violent neighborhoods prior to BWC deployment also refutes Klinger's (1997) argument that officers will use lower levels of legal authority in neighborhoods where crime is perceived as normative. Klinger (1997) suggests that officers become cynical about the utility of conducting arrests in high crime neighborhoods because they often come into contact with individuals that they have previously arrested in these areas. These contacts could lead officers to believe that the courts are not prosecuting these offenders, as such, they are not motivated to conduct arrests which they perceive as being unlikely to result in punishment. My finding that arrests were more likely to occur in violent neighborhoods is consistent with prior researchers who have found that arrests were more likely to occur in high crime areas

(Ingram, 2007; Kane et al., 2013; Lum, 2011; Sobol, 2010a). However, my findings are inconsistent with other researchers who have found that arrests were less likely to occur in areas with higher crime rates (Petrocelli et al., 2003). The direct effect of neighborhood violence on arrests became insignificant after BWCs were deployed. This could again indicate that BWCs could limit an officers ability to be lenient.

Though use of force was unrelated to neighborhood violence prior to BWC deployment, force was significantly less likely to be used in violent neighborhoods after BWCs were deployed. My finding that use of force was less likely to occur in neighborhoods with higher levels of violence is consistent with prior researchers who examined police shootings in St. Louis (Klinger et al., 2016). However, this finding is contrary to other researchers who have found that officers were more likely to use force in high crime areas (Arnio, 2019; Lautenschlager & Omori, 2018; Lee, Vaughn, & Lim, 2014; Lersch et al., 2008; Terrill & Reisig, 2003). Given my results and the conflicting findings identified in prior use of force studies in general, the relationship between use of force and neighborhood violence appears to depend on the jurisdiction examined, how use of force is operationalized, and the spatial unit of analysis (Shjarback, 2018). The negative relationship between neighborhood violence and use of force that I identified after BWCs were deployed could be due to officers being hypervigilant in dangerous areas. This hypervigilance could result in officers being overly cautious and strictly adhering to departmental policies in order to protect themselves (see Klinger et al. (2016) for a similar discussion). This hypervigilance and attention to policy could be especially

salient after BWCs were deployed due to the increased potential for use of force incidents to be reviewed by others when an incident is recorded using a BWC.

My findings that BWCs moderated the influence of neighborhood violence on police behavior could be attributed to perceived constraints on officer discretion as a result of potential oversight through BWCs, or to the evidence that officers can collect when they use BWCs. Klinger (1997) suggested that officers will use lower levels of formal legal authority in high crime neighborhoods due to officer cynicism and resource deficiencies. My findings could suggest that, when BWCs are activated in violent neighborhoods, officers are less likely to ignore suspicious behavior that would justify a proactive contact or an arrest. BWCs could also capture footage that justifies force. This could explain why force in general declined in violent neighborhoods after BWCs were deployed if all of the officers in the department became concerned about using force (whether they personally wore a BWC or not). However, the ability of BWCs to document dangerous suspect behavior could explain why use of force was more likely to occur in violent neighborhoods when BWCs were activated. Overall, my findings that BWC activation moderates the impact of neighborhood violence could be considered positive if officers are using proactivity, arrests, and use of force appropriately. Future research that more specifically examines the causal mechanisms between BWCs and officer use of discretion in violent neighborhoods could help identify whether BWCs can increase officer adherence to departmental policies and reduce officer hesitation to use necessary force.

6.3 Policy Implications

The findings of this study provide several important policy considerations for police agencies interested in understanding the impact of BWCs and the situational, officer, and neighborhood-level factors that influence police behavior. First, BWCs had a direct influence on proactivity, arrests, and use of force, however the direction of the effect varied across outcomes. My findings further suggest that officer use of discretion is largely driven by the characteristics of individual incidents. This is not surprising. Given the large variety of incidents that officers respond to, establishing policies to guide officer behavior in every type of situation they encounter would be impossible. However, officer and neighborhood-level factors also influenced every outcome. BWCs additionally moderated the impact of neighborhood context on police behavior, suggesting that the use of BWCs differentially impact officer behavior in different types of neighborhoods.

Proactive contacts were less likely to involve a BWC activation. There are a few potential explanations for this result, with each having unique policy implications. First, this could suggest that BWCs led to depolicing, if this finding was driven by officers wearing BWCs choosing not to contact citizens because of the BWC. If this is the case, policymakers could restructure officer performance metrics to ensure that officers continue to proactively enforce laws in order to promote public safety. Attention to the effectiveness of the proactive strategies used should be a key element of revised proactivity metrics for officers (Lum et al., 2018). Second, these results could indicate noncompliance with BWC activation policies if officers were not activating their BWCs during proactive contacts with citizens. Ensuring that officers comply with activation

policies during all types of encounters is important to achieve the intended effects of BWCs. As such, policymakers need to closely monitor officer compliance with BWC policies and hold officers accountable for noncompliance. Finally, differences in proactivity between minority and white neighborhoods could be driven by officers not reporting proactive contacts that occur in white neighborhoods to dispatch. Efforts should be made to verify that officers are officially reporting all of their activities in CAD to ensure officer safety. For example, if an officer does not record a proactive contact that becomes contentious, it could put the officer at risk if dispatchers cannot quickly coordinate backup. As such, police agencies should ensure that their officers are in constant contact with dispatch. Monitoring these behaviors could involve the use of automatic-vehicle-locator data to establish whether the activities an officer reports to dispatch are consistent with the locations of the officers' patrol car and the amount of time the officer spent at the reported location.

The increased likelihood of arrest associated with BWC activations could suggest that BWCs constrain officer discretion. Officers could feel like the increased scrutiny of their actions as a result of BWC footage requires them to conduct arrests for every offense that they witness. This would suggest that officers feel like they cannot be lenient when there is video evidence of the offense. It is important to remember that arrests are not inherently bad. We want the police to enforce laws, which requires conducting arrests. Understanding the long-term effects of these arrests on the criminal justice system is important. If officers are conducting arrests that are unlikely to be prosecuted, it could indicate needs to clarify laws or improve officer training when responding to some

types of incidents. It is also possible that the increased likelihood of an arrest occurring as a result of BWCs could ultimately create resource challenges for courts, jails, community corrections agencies, and prisons by introducing greater numbers of citizens into the criminal justice system. Some prior research has found that the use of BWCs by police agencies has required additional resources for courts to review this footage (Morrow et al., 2016; Owens & Taylor, 2018). Though this is unlikely to happen rapidly, it is important to ensure that the proper infrastructure is in place to manage increasing numbers of criminal justice impacted citizens if BWCs result in large increases in legalistic policing. Establishing whether the increase in arrests is appropriate or desirable is an important avenue for future researchers and policymakers.

Precinct assignment was the most consistent officer-level characteristic associated with variation in each outcome. Officers assigned to different precincts used proactivity, arrests, and use of force in different ways. This suggests that the norms and expectations for police behavior could be linked to workgroups within the PPD. If problematic officer behaviors are more likely to involve officers from certain precincts, regularly rotating officers throughout organizational subunits could prevent the development of norms that promote those behaviors (see M. R. Smith, Makarios, and Alpert (2006) for a similar discussion). However, it should be noted that regularly rotating officers to different areas might inhibit an officers' ability to gain a working knowledge of the people and places within their assigned areas. As such, alternative methods to address workgroup norms that promote differential policing should also be considered. It is important to note that none of my findings suggest that officers assigned to certain precincts were 'bad'.

The relationships between precinct assignment and arrest changed after BWCs were deployed. Incidents involving officers assigned to some precincts were significantly less likely to result in arrest after BWCs were deployed. This could indicate higher levels of officer resistance to BWCs in those precincts, if officers reacted to the BWC by disengaging from their enforcement role. To counter this resistance, policymakers should ensure that officers throughout the agency are aware of the benefits of using BWCs. This could alleviate officer concerns that BWCs will be used to punish officers for minor infractions. Given prior research finding that officer attitudes toward BWCs are related to the perceptions of other officers in their networks (Young & Ready, 2015), it is important to address negative attitudes toward BWCs which could have detrimental impacts on police behavior.

I further identified significant variation in police behavior across neighborhoods with different racial/ethnic population distributions. Both proactivity and arrest were more likely to occur in immigrant and Hispanic neighborhoods. Because Phoenix is in a southwestern state that borders Mexico, officers could view Hispanics as potential non-citizens (Durán & Posadas, 2016). Research conducted by *AZ Central* found that Phoenix officers contacted Immigrations and Customs Enforcement (ICE) to check a suspects immigration status an average of seven times per day between 2017 and 2019 (Garcia, 2020). Because I examine police incidents from 2015 to 2018, their findings are particularly relevant to my study. In most cases, the individuals checked were found to be in the country legally. Only 5% of cases involved individuals who were in the country illegally and 2.6% of cases resulted in ICE conducting an arrest for suspicion of being in

the country illegally (Garcia, 2020). Even when the officers themselves do not check a suspect's immigration status, the jail will check a detainees immigration status when an arrest is conducted. As such, the disproportionate use of both proactivity and arrests in immigrant and Hispanic neighborhoods could be influenced by SB 1070.

Given that a low percentage of suspects who had their immigration status checked were found to be in the country illegally, if enforcing immigration laws is motivating disparate police behaviors across neighborhoods, these tactics do not seem to be effective. These stops can also be damaging for Hispanic citizens who could feel like these contacts suggest that they are not full members of the community (Epp, Maynard-Moody, & Haider-Markel, 2014). Prior researchers have found that the use of proactive contacts as part of order-maintenance policing strategies can harm citizen perceptions of police legitimacy, especially when citizens felt that the police primarily stopped them because of their race/ethnicity (Gau & Brunson, 2010). Distrust of the police can lead to unwillingness to report crime or serve as a witness (Brunson & Wade, 2019), as such, addressing these differences is imperative.

Policymakers in several agencies have required the police to collect data about the demographic characteristics of the citizens that they interact with in order to assess racial profiling (collection of driver information in traffic stops in Missouri (Rojek, Rosenfeld, & Decker, 2004) and pedestrian information in stop-question-frisks in New York City (Gelman et al., 2007), for example). The adoption of a similar strategy in Phoenix could be used to assess potentially race-based policing. In sum, ensuring that proactivity and arrests are being used appropriately and fairly in immigrant and Hispanic neighborhoods

has important implications for police-community relations. If the differential use of proactivity and arrest in immigrant and Hispanic neighborhoods leads to diminished perceptions of police legitimacy and/or willingness to cooperate with the police, additional resources will need to be allocated to rebuild those relationships between the police and the communities that they serve.

One of the primary motivations for this study was to examine the potential for BWCs to eliminate differences in police behavior across different neighborhood contexts. I found that when BWCs were used, officers were *even more likely* to conduct proactive contacts and arrests in immigrant and Hispanic neighborhoods. Thus, BWCs did not reduce the relationship between neighborhood racial/ethnic composition and those forms of police behavior. It is possible that there is a cumulative effect that is driving these findings. Officers in immigrant and Hispanic neighborhoods could be especially legalistic due to concerns about allegations of misbehavior (which could include issues of nonenforcement) in these areas. In addition, officers could feel pressure to respond to incidents formally when using BWCs. As such, the combined effect of officers being in neighborhoods where they are cautious about behaving properly and wearing a BWC that captures video evidence of their actions and any violations that they witness could be driving these findings. Establishing whether this is the case would require qualitative data to supplement the findings presented here. This also highlights the need for continued attention to the impact of BWCs on minority communities to ensure that BWC are achieving their intended goals while avoiding unintended consequences. In short, my results suggest that BWCs alone are not eliminating variation in proactivity and arrests

across minority neighborhoods and could actually be increasing it, introducing a new potential challenge for achieving equitable policing in immigrant and Hispanic neighborhoods.

One of the most interesting findings in my study is that use of force was significantly less likely to occur in black neighborhoods after BWCs were deployed. Given that the adoption of BWCs is often associated with the police killing of Michael Brown in Ferguson and other high-profile police use of force incidents involving black suspects, this is a key finding. Over 60% of large police agencies that have adopted BWCs said that reducing use of force was one of their motivations for doing so (Hyland, 2018). Though my findings indicate that use of force was more likely to occur in individual incidents that involved a BWC activation, they also suggest that BWCs reduced use of force in some types of neighborhoods. There are a couple of potential explanations for this finding. Officers could have been more likely to use procedural justice or de-escalation tactics in black neighborhoods after BWCs were deployed because of the national attention to police use of force against blacks and the increased potential for their actions to be recorded using a BWC. If the reduction in use of force in black neighborhoods was driven by more appropriate police responses to incidents in those areas, this would undoubtedly be a positive finding and would support the continued adoption and expansion of BWCs. However, if these reductions were driven by officer hesitation to use force to avoid potential scrutiny even when force was necessary, BWCs could increase risks to officers and citizens in black communities. As such, policymakers should continue to monitor the use and impact of BWCs on police behavior

to ensure that this technology is having the desired impact, without resulting in unintended consequences.

6.4 Limitations

This study, like all research, is not without limitations. In terms of generalizability, my study involved a large police department in the southwestern U.S., as such, my findings might not be generalizable to other types of agencies or to those in other areas. Phoenix is located in a unique social context given its longstanding BWC program (Katz et al., 2014), proximity to the U.S.-Mexico border (about 2.5 hour drive), and the size of the police department. Employing around 3,000 sworn police officers, the PPD is one of the largest police forces in the U.S. The size of the agency influences the resources available to the department, as well as the organizational structure. As some scholars have suggested that regulating police discretion is more challenging in large police agencies (M. K. Brown, 1988), the use of BWCs as a monitoring tool could differ in the PPD relative to smaller agencies. This could explain the somewhat contradictory results in my study compared to BWC research conducted in smaller agencies (e.g., Wallace et al., 2018 in Spokane). Though these differences are likely influenced by a number of jurisdictional and contextual factors, further research examining the impact of BWCs in agencies of varying sizes and in different social-ecological environments will be illuminating.

The differences that I identified in police behavior in immigrant and Hispanic neighborhoods could also be due to the context of my study. Police agencies in other states might engage in similar police practices in immigrant and Hispanic neighborhoods.

Alternatively, because SB 1070 is a unique law in the state of Arizona, these findings might not be generalizable to other states that have smaller immigrant and Hispanic populations or less stringent immigration enforcement laws. The relationships between policing, immigration, and Hispanic communities could dramatically differ even for police agencies in the neighboring border state of California. Unlike Arizona, California has taken a stance against police enforcement of federal immigration laws at the state level (Raphelson, Hobson, & Bentley, 2018).

Many of the limitations of my study are related to data that were unavailable. For instance, I was unable to examine the race/ethnicity of the individual citizen that an officer interacted with in a given incident. This is an important limitation due to propositions that officers will treat citizens differently depending on the racial/ethnic background of both the officer and the citizen involved in an incident (Black, 1980). Though I found that proactive contacts, arrests, and use of force were all more likely to occur in Hispanic neighborhoods, I cannot definitively say whether these incidents were more likely to involve Hispanic citizens. It is possible that these incidents involved white citizens who were perceived as being 'out of place' by officers when they were encountered in predominantly Hispanic communities. Without knowing citizen race/ethnicity it is not possible to establish whether or not this was occurring.

It is also important to note that the data used in this study are administrative in nature and might not fully reflect all officer activities. In the case of proactivity, some researchers have found that officers do not officially record all of their proactive contacts in CAD systems (Wu & Lum, 2017). In terms of use of force, some researchers have

criticized the use of official use of force reports on the grounds that these reports could be created to justify officer behaviors after a use of force incident has already occurred, and therefore might not provide an unbiased account of the incident (Alpert & Dunham, 2004). Because I do not examine the justifiability of the force used, this concern is somewhat limited. A greater issue in the present study is the possibility that officers might have 'downplayed' the force used, and reported using a lower level of force, which might not have resulted in the creation of a mandatory official use of force report. Some researchers have suggested that increases in police use of force as a result of BWCs are driven by increased reporting of use of force incidents on the lower end of the force spectrum (Henstock & Ariel, 2017). As a result, my finding that use of force was more likely to occur when a BWC was activated could be explained by the same mechanism.

Another limitation of the current study is that it is cross-sectional in nature. I do not examine whether the introduction of BWCs changed an individual officers' behavior over time, I only examine whether the activation of a BWC influenced officer decision-making in specific incidents. I similarly did not examine whether the adoption of BWCs changed the number of proactive contacts, arrests, or use of force incidents that occurred either at the neighborhood or department level over time. I examined the influence of situational, officer, and neighborhood factors on the outcomes of individual incidents prior to BWCs being deployed, and then again after BWCs were deployed. Any observed differences in the impact of officer and/or neighborhood factors on police behavior from pre-BWCs to post-BWCs could be due to the deployment of BWCs, or to another factor that was not accounted for in the current study. As such, attributing observed changes in

officer and neighborhood-level influences on police behavior from pre-BWCs to after BWCs were deployed to BWCs alone should be made cautiously.

6.5 Future Research Directions

In this dissertation, I examined the impact of situational, officer, and neighborhood factors on proactivity, arrest, and use of force both before and after BWCs were deployed in the Phoenix Police Department. I additionally examined the direct impact of BWCs, and the potential for BWCs to moderate the influence of neighborhood context, on each of these outcomes. My use of a unique methodological approach to examine a large amount of data enabled me to examine the relationships between BWCs, situational factors, officer characteristics, and neighborhood context on multiple police behaviors. My study points to several directions for future researchers.

I examined the influence of BWCs using a measure of BWC activation. Most prior BWC research examines the effect of BWCs using a measure of whether an officer was assigned to wear a BWC during an individual incident (e.g., Ariel et al., 2015). To use a common medical analogy, measures of BWC assignment are analogous to measuring the impact of being prescribed a pill on a given outcome. Many prior researchers have not relied on BWC activation data, largely because of how voluminous these data are and the complications associated with linking activation data to calls-for-service and incident reports. My use of a BWC activation variable improves on prior research by directly examining the influence of *turning a BWC on and recording footage* on the outcomes of police encounters. As such, using a measure of BWC activation is analogous to examining the effect of taking the prescribed pill on the intended outcome.

This addresses concerns about treatment fidelity that have been raised in prior BWC research. My results suggest that measuring BWC activation and using it in evaluations is possible and should be considered in future BWC research.

Future researchers should examine the underlying mechanisms driving behavioral change associated with BWCs. For instance, behavioral change could be attributable to perceived constraints on officer discretion, enhanced ability to justify police actions due to the collection of BWC footage, or to a self-awareness effect that could result in improved officer and citizen behavior as a result of a civilizing effect. Any one of these explanations could be driving the changes in police behavior that I identified, and it is likely that a combination of these factors could have influenced my findings. Identifying the specific causes of behavioral changes when BWCs are used can maximize the effectiveness of this technology.

Given my findings that BWCs could lead to depolicing, researchers should examine the impacts of reduced police proactivity on crime and public safety outcomes. For instance, it is important to assess whether crime or traffic safety problems increase as a result of officers withdrawing from proactive enforcement activities. Researchers could alternatively examine whether those proactive contacts that were conducted were more effective through looking at hit rates. Similar studies can be conducted to examine the outcomes of arrests when BWCs are used. These evaluations should be ongoing within agencies to ensure that BWCs are not negatively impacting police effectiveness and community safety.

I further found that variation in proactivity, arrest, and use of force were all associated with officer precinct assignment. As such, future research should untangle those factors operating at the precinct level that drive these differences. For instance, officers responding more formally to incidents in some precincts could be reacting to workgroup norms to engage in formal/aggressive policing of suspicious vehicles and subjects (e.g., South Mountain officers who engaged in more proactive contacts). Officers who are less likely to conduct arrests could be influenced by resource deficiencies at the precinct level (e.g., reduced likelihood of arrests in incidents involving officers in South Mountain). This could result in these officers letting suspects off with a warning in order to remain in service to provide back-up for other officers, if needed. Untangling these potential effects has important implications for addressing organizational culture, allocating police resources effectively, and clarifying hypotheses proposed in Klinger's (1997) negotiating order in patrol perspective.

Another important research implication identified in this study is the need to examine immigrant and Hispanic populations separately to assess the impact of neighborhood effects on police behavior. My results suggest that even though both foreign-born and Hispanic populations had relatively similar impacts on police behavior across outcomes, the magnitude of the effects differed. Most prior research examining police behavior at the neighborhood level focuses on black neighborhoods. Relatively limited research attention has been paid to policing in immigrant and Hispanic neighborhoods. Future research examining differences in policing in immigrant and

Hispanic neighborhoods is needed to better understand police behavior in these different types of areas.

Given identified differences in policing in immigrant and Hispanic communities, future research should consider whether these differences are consistent with either a minority threat perspective or a defended neighborhood perspective. For instance, these differences could be especially pronounced in neighborhoods that were historically dominated by white, as opposed to minority residents. Establishing support for these perspectives would require examining change in the population characteristics of these neighborhoods over time. Using methods similar to those used by Kane et al. (2013) in their study of arrests in New York City could help clarify these relationships. Because differential policing across minority communities can negatively impact police-community relationships, identifying the causes of these differences has important implications for improving the equitable administration of justice.

Future researchers should examine the cumulative effects of police decisions on ultimate disparities in the criminal justice system. Though I examined proactivity, arrest, and use of force as distinct outcomes in police encounters, individual incidents could involve multiple combinations of these events. Future researchers should examine the relationship between these decision points and the ultimate outcomes of police citizen encounters. For instance, Ousey and Lee (2008) argue that disparities in arrest rates between blacks and whites could be driven by the manner in which police contacts were initiated. Namely, because minorities are more likely to be proactively contacted by the police, these disproportionate contacts could further enhance disparities in arrest rates for

minority, relative to white suspects. Some researchers have also found that officer-initiated contacts were more likely to result in use of force than citizen initiated-contacts (Garner et al., 2002; Terrill & Mastrofski, 2002). As such, examining the manner in which a call was initiated has implications for multiple police behaviors. Using the current data to examine relationships between proactivity, arrests, and use of force could clarify the mechanisms driving higher rates of arrest and use of force in Hispanic communities. For example, if the greater likelihood of arrest and use of force in Hispanic neighborhoods is occurring because officers are more proactive in those neighborhoods, refocusing proactive police activities could reduce these disparities.

Finally, I used a multilevel modelling strategy that allowed me to examine the impact of officers and neighborhoods on the outcomes of individual police citizen encounters. My results suggest that this is a useful approach for others in the future to test and refine theories of police discretion. Future researchers examining proactivity, arrest, and use of force as a function of situational, officer, and neighborhood factors should assess whether my finding that all of these elements are important are generalizable. Understanding variation in use of force across individual officers and neighborhoods, for example, has important implications for designing interventions to reduce use of force. If we were to accept the proposition that police use of force can only be considered in the context of the situational characteristics that led to a specific incident, it would inhibit the development of policies and practices designed to reduce use of force on a larger scale. Therefore, continued attention to factors that contribute to police behavior at multiple levels is needed. Identifying officer and neighborhood-level correlates of police use of

discretion has important implications for hiring practices, the development of early warning systems for potentially problematic officers, identifying resource deficiencies in certain neighborhoods, and guiding training efforts to ensure that officers respond to citizens in all neighborhood contexts in a consistent and fair manner.

6.6 Conclusions

In conclusion, I used a multilevel modeling strategy to examine the influence of situational factors, officer characteristics, and neighborhood context on police use of discretion. I further examined the direct impact of BWCs on proactivity, arrest, and use of force, as well as the potential for BWCs to moderate differences in police use of discretion in different types of neighborhoods. My results support prior theories of police discretion that incorporate elements operating at multiple levels of explanation to understand variation in police behavior in individual incidents. Through untangling the impacts of multiple factors on police behavior, I hoped to identify avenues that could be used to improve police effectiveness and reduce disparities.

Based on my findings, additional attention should be paid to police behavior in immigrant and Hispanic neighborhoods. Given the importance of proactivity and arrest decisions in the downstream criminal justice process, efforts should be made to ensure that these disparities do not result in unintended consequences, such as reduced police legitimacy. I further found that use of force was less likely to occur in black neighborhoods after BWCs were deployed. Identifying what is driving this reduction – whether it is improved officer behavior (e.g., procedural justice, de-escalation) or officer

hesitation to use force in certain areas to avoid scrutiny – is crucial for future researchers and for policymakers seeking to reduce police use of force in black communities.

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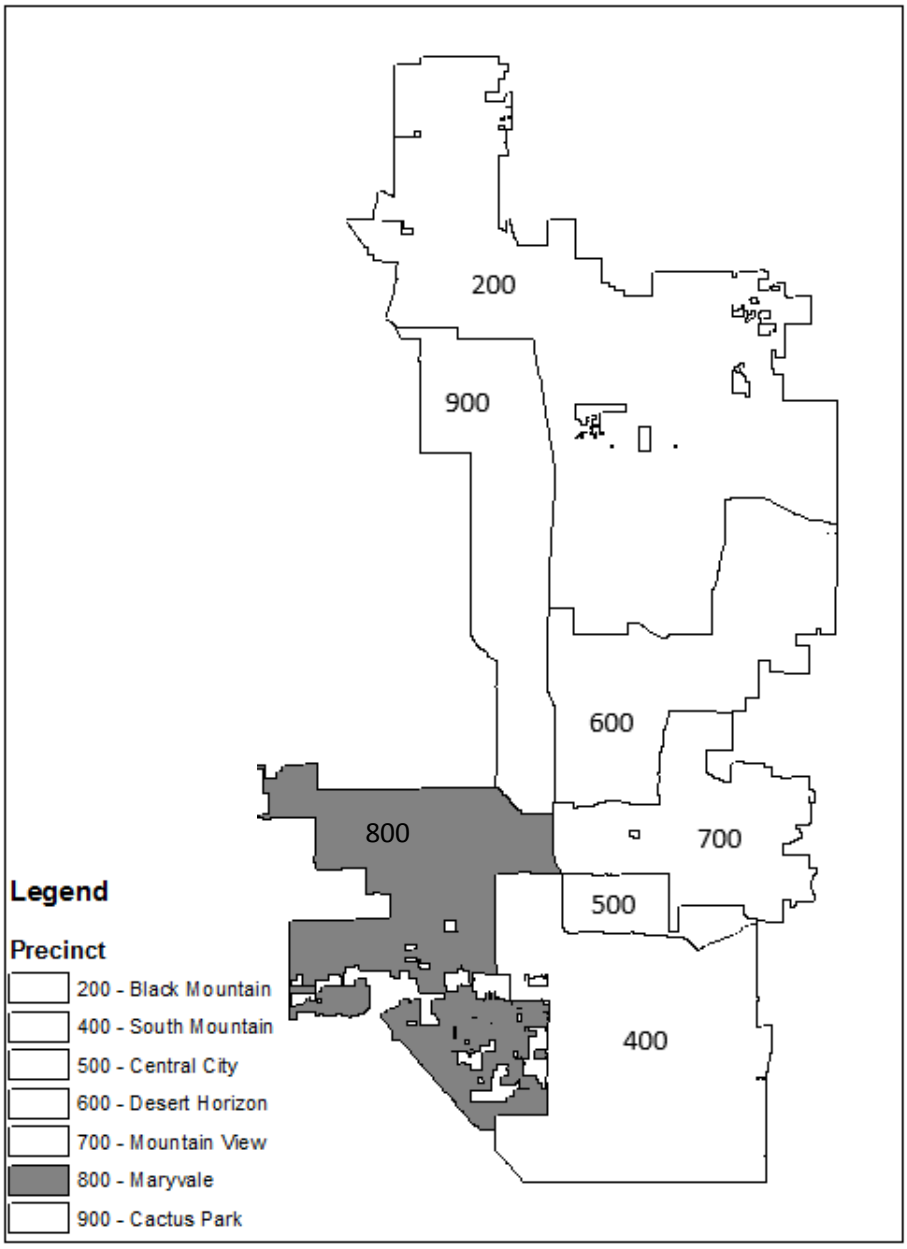
APPENDIX A

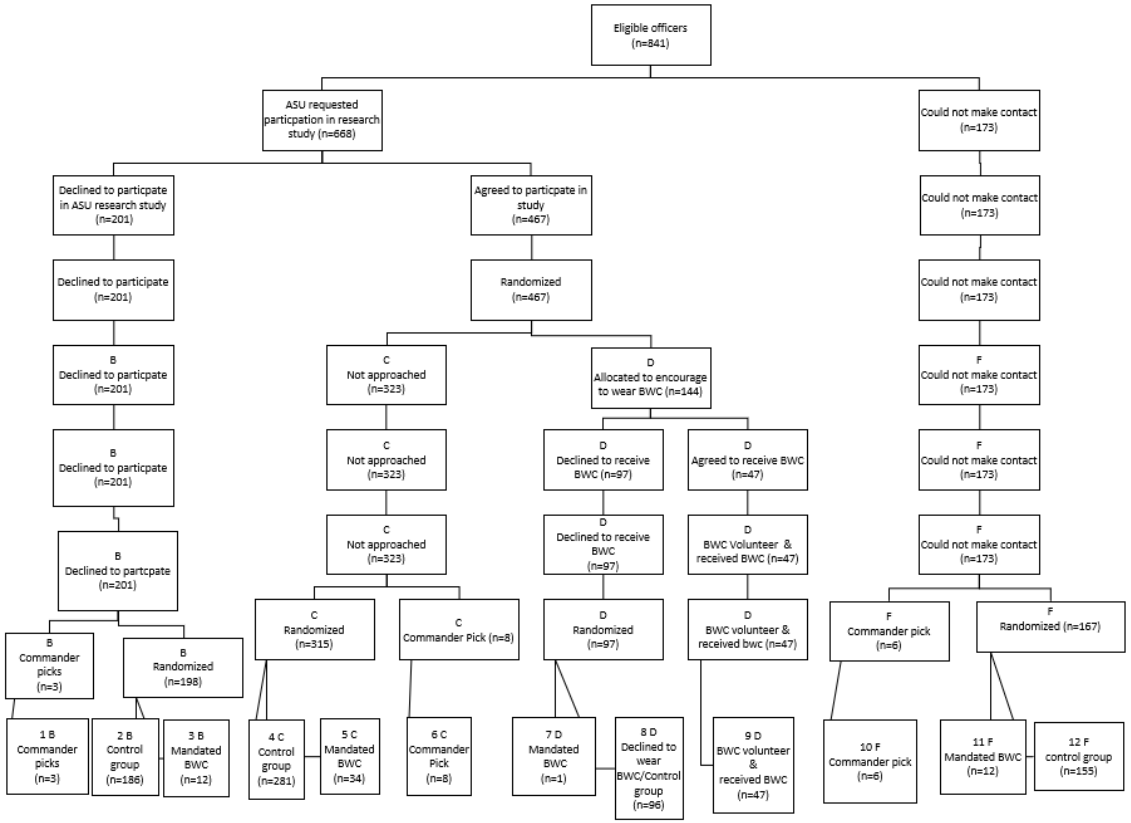
MAP OF PPD JURISDICTION

Phoenix Police Department Precinct Boundaries



APPENDIX B

PPD BWC EXPERIMENTAL DESIGN


Eligible officers (n=841)
ASU requested particpation in research study (n=668)
Could not make contact (n=173)
Declined to particpate in ASU research study (n=201)
Agreed to particpate in study (n=467)
Could not make contact (n=173)
Declined to participate (n=201)
Randomized (n=467)
Could not make contact (n=173)
B Declined to particpate (n=201)
C Not approached (n=323)
D Allocated to encourage to wear BWC (n=144)
F Could not make contact (n=173)
B Declined to particpate (n=201)
C Not approached (n=323)
D Declined to receive BWC (n=97)
D Agreed to receive BWC (n=47)
F Could not make contact (n=173)
B Declined to partcpate (n=201)
C Not approached (n=323)
D Declined to receive BWC (n=97)
D BWC Volunteer & received BWC (n=47)
F Could not make contact (n=173)
B Commander picks (n=3)
B Randomized (n=198)
C Randomized (n=315)
C Commander Pick (n=8)
D Randomized (n=97)
D BWC volunteer & received bwc (n=47)
F Commander pick (n=6)
F Randomized (n=167)
1 B Commander picks (n=3)
2 B Control group (n=186)
3 B Mandated BWC (n=12)
4 C Control group (n=281)
5 C Mandated BWC (n=34)
6 C Commander Pick (n=8)
7 D Mandated BWC (n=1)
8 D Declined to wear BWC/Control group (n=96)
9 D BWC volunteer & received BWC (n=47)
10 F Commander pick (n=6)
11 F Mandated BWC (n=12)
12 F control group (n=155)

APPENDIX C

CALL TYPE CODING

Call type	Original call code	n
Violent		*299,740*
	FIGHT	108,582
	DOMESTIC VIOLENCE	94,900
	ASSAULT	25,537
	THREAT	15,969
	SHOTS FIRED	9,218
	ARMED ROBBERY ALARM	6,834
	AGGRAVATED ASSAULT	5,757
	SUBJECT WITH A GUN	3,917
	CHILD ABUSE	3,635
	ARMED ROBBERY	3,581
	SUBJECT WITH A KNIFE	2,620
	STRONG ARMED ROBBERY	2,375
	SEXUAL ABUSE OF JUVENILE	2,230
	SEXUAL ASSAULT	2,140
	MOLESTING	1,492
	SHOOTING	1,327
	CUTTING/STABBING	1,313
	ASSAULT SUPPLEMENT	1,172
	SEXUAL ABUSE - ADULT	587
	AGGRAVATED ASSAULT SUPPLEMENT	561
	CHILD NEGLECT	545
	ARMED ROBBERY SUPPLEMENT	450
	AGGRAVATED ASSAULT ATTEMPT	438
	SUBJECT THREATENING	427
	KIDNAPPING NON-SEXUALLY MOTIVATED	340
	ASSAULT ATTEMPT	296
	ABUSE/NEG OF VULNERABLE ADULT	292
	THREAT SUPPLEMENT	256
	ARMED ROBBERY ATTEMPT	254
	WEAPON MISUSE/VIOLATION	246
	BOMB THREAT	191
	DOMESTIC VIOLENCE SUPPLEMENT	186
	SEXUAL ASSAULT ATTEMPT	171
	SHOOTING SUPPLEMENT	156
	FIGHT SUPPLEMENT	153
	STRONG ARMED ROBBERY SUPPLEMENT	151
	STRONG ARMED ROBBERY ATTEMPT	148

Call type	Original call code	n
	ROBBERY HOME INVASION	139
	SHOTS FIRED SUPPLEMENT	139
	KIDNAPPING ATTEMPT	115
	SEXUAL ASSAULT SUPPLEMENT	114
	CHILD ABUSE SUPPLEMENT	89
	ABS/NEG OF VULNERABLE ADULT DV	78
	SEX ABUSE OF JUVENILE SUPPLEMENT	76
	MOLESTING SUPPLEMENT	53
	RECKLESS ENDANGERMENT	52
	CUTTING SUPPLEMENT	48
	SEXUAL ABUSE OF JUVENILE ATTEMPT	40
	KIDNAPPING SUPPLEMENT	39
	ARMED ROBBERY ALARM BEACON	38
	FOUND EXPLOSIVES	38
	SEXUAL ABUSE OF ADULT ATTEMPT	35
	CUTTING ATTEMPT	25
	MOLESTING ATTEMPT	24
	SEXUAL ABUSE OF ADULT SUPPLEMENT	22
	CHILD NEGLECT SUPPLEMENT	18
	MISUSE OF WEAPON SUPPLEMENT	17
	LURE MINOR FOR SEX	15
	ABUSE/NEG OF VULNERABLE ADULT SUPPL	12
	SUBJECT WITH A GUN SUPPLEMENT	11
	KIDNAPPING SEXUALLY MOTIVATED	7
	ARMED ROBBERY ALARM SUPPLMENT	6
	BOMB SCARE SUPPLEMENT	6
	SUBJECT WITH A KNIFE SUPPLEMENT	6
	CHILD ABUSE ATTEMPT	4
	CONSPIRACY TO MURDER	4
	HOMICIDE	4
	RECKLESS ENDANGERMENT SUPPLEMENT	4
	CMP CHLDPORN/EXPLOIT	3
	HOMICIDE SUPPLEMENT	3
	OFFICER INVOLVED SHOOTING	3
	HOMICIDE - OTHER AGENCY ASST SUPP	2
	KIDNAP SEXUALLY MOTIVATED ATTEMPT	2
	ABS/NEG OF VULNERABLE ADULT DV SUP	1
	KIDNAP SEXUALLY MOTIVATED SUPPL	1

Call type	Original call code	n
Property		*458,935*
	TRESPASSING	136,587
	BURGLARY ALARM	99,499
	THEFT	47,975
	BURGLARY RESIDENTIAL	36,260
	CRIMINAL DAMAGE	28,144
	STOLEN VEHICLE	20,611
	BURGLARY FROM VEHICLE	18,461
	SHOPLIFTING	15,461
	BURGLARY COMMERCIAL	12,486
	THEFT BY FRAUD	8,264
	IDENTITY THEFT	4,164
	STOLEN LICENSE PLATE	3,847
	THEFT SUPPLEMENT	3,468
	BURGLARY RESIDENTIAL ATTEMPT	3,385
	BURGLARY RESIDENTIAL SUPPLEMENT	2,361
	THEFT FROM VEHICLE	2,350
	FORGERY	1,452
	STOLEN VEHICLE SUPPLEMENT	1,283
	BURGLARY FROM VEHICLE ATTEMPT	1,194
	STOLEN VEHICLE ATTEMPT	1,123
	THEFT ATTEMPT	1,120
	COUNTERFEIT CURRENCY	1,091
	BURGLARY FROM VEHICLE SUPPLEMENT	1,064
	BURGLARY COMMERCIAL SUPPLEMENT	971
	CRIMINAL DAMAGE SUPPLEMENT	876
	BURGLARY COMMERCIAL ATTEMPT	626
	THEFT OF CREDIT CARD	530
	ARSON	441
	PURSE SNATCH	380
	SHOPLIFTING SUPPLEMENT	347
	THEFT BY FRAUD ATTEMPT	320
	THEFT BY FRAUD SUPPLEMENT	294
	CRIMINAL DAMAGE ATTEMPT	260
	IDENTITY THEFT SUPPLEMENT	250
	EXTORTION	238
	BURGLARY	176
	BURGLARY OF VENDING MACHINE	153

Call type	Original call code	n
	SHOPLIFTING ATTEMPT	150
	FORGERY SUPPLEMENT	104
	TRESPASSING SUPPLEMENT	103
	THEFT OF METAL	101
	THEFT FROM VEHICLE SUPPLEMENT	99
	BURGLARY ALARM SUPPLEMENT	94
	BURGLARY ATTEMPT	83
	INTERNET COMPUTER CRIME	81
	THEFT FROM VEHICLE ATTEMPT	81
	BURG RES METAL THFT REL	58
	BURGLARY SUPPLEMENT	57
	BURG COM METAL THFT REL	53
	STOLEN PROPERTY	45
	FINANCIAL EXPLOITATION OF ELDERLY	39
	FORGERY ATTEMPT	35
	THEFT OF CREDIT CARD SUPPLEMENT	32
	FORGERY AT BANK/CREDIT UNION	29
	NONSUFFICIENT FUNDS CHECK	29
	PURSE SNATCH ATTEMPT	22
	PURSE SNATCH SUPPLEMENT	20
	STOLEN VEHICLE ATTEMPT SUPPLEMENT	20
	ARSON ATTEMPT	17
	COUNTERFEIT CURRENCY SUPPLEMENT	13
	ARSON SUPPLEMENT	11
	STOLEN POLICE CAR	7
	BURG COM METAL THFT REL SUPP	6
	BURG FRM VEH CATL CNVTR	6
	STOLEN PROPERTY SUPPLEMENT	5
	THEFT CATALYTIC CONVERTER	5
	METAL THFT REL SUPP	3
	BURG RES METAL THFT REL ATTMPT	2
	FINANCIAL EXPLOITATION - ELDERLY SUPP	2
	MONEY LAUNDERING	2
	STOLEN PROPERTY ATTEMPT	2
	THEFT OF CREDIT CARD ATTEMPT	2
	BURG COM METAL THFT REL ATTMPT	1
	BURGLARY OF VENDING MACHINE SUPPLEMENT	1

Call type	Original call code	n
	FINANCIAL EXPLOITATION - ELDERLY ATTEMPT	1
	IDENTITY THEFT ATTC SUPPLEMENT	1
	NONSUFFICIENT FUND CHECK SUPPLEMENT	1
Subject/vehicle stop		*360,508*
	VEHICLE STOP	114,341
	SUBJECT STOP	83,597
	ACCIDENT NO INJURIES	58,369
	ABANDONED VEHICLE	20,867
	TRAFFIC HAZARD	20,074
	ACCIDENT WITH INJURIES	19,380
	HIT & RUN ACCIDENT NO INJURY	18,012
	ILLEGAL PARKING	14,716
	DRUNK DRIVER	6,311
	HIT & RUN ACCIDENT WITH INJURIES	1,591
	SPEEDING/RACING	1,444
	OBSTRUCTING THOROUGHFARE	676
	HIT & RUN ACCIDENT NO INJURIES SUPP	581
	ACCIDENT WITH INJURIES SUPPLEMENT	201
	ACCIDENT NO INJURIES SUPPLEMENT	195
	HIT & RUN ACCIDENT W/ INJURY SUPPLEMENT	69
	ABANDONED VEHICLE SUPPLEMENT	32
	DRUNK DRIVER SUPPLEMENT	20
	ACCIDENT FATALITY	16
	HIT & RUN FATALITY SUPPLEMENT	6
	SPEEDING/RACING SUPPLEMENT	5
	DRUNK DRIVER ATTEMPT	2
	HIT & RUN FATALITY	2
	ACCIDENT FATALITY SUPPLEMENT	1
Other		*633,638*
	CHECK WELFARE	131,469
	SUSPICIOUS PERSON	116,633
	SUSPICIOUS PERSON IN VEHICLE	45,894
	LOUD NOISE DISTURBANCE	35,535
	CIVIL MATTER/STANDBY	25,903
	9-1-1 HANG-UP CALL	17,710
	UNKNOWN TROUBLE	14,171

Call type	Original call code	n
	FOUND PROPERTY	12,090
	NEIGHBOR DISPUTE	11,490
	UNWANTED GUEST	11,275
	MISSING JUVENILE	10,402
	JUDICIAL INTERFERENCE	9,731
	ASSIST MOTORIST	9,702
	LOUD PARTY DISTURBANCE	8,503
	OPEN DOOR, WINDOW, GATE	8,470
	MISSING PERSON	7,953
	SUICIDE ATTEMPT	7,838
	RECOVERY OF VEHICLE	7,629
	MENTALLY ILL SUBJECT TRANSPORT	7,533
	INJURED/SICK PERSON	7,344
	HARASSMENT	6,540
	PR CONTACT	6,386
	WAGON WANTED	6,237
	INCORRIGIBLE JUVENILE	5,915
	INJURED ANIMALS	5,677
	MISDEMEANOR WARRANT OUTSTANDING	4,954
	MEET	4,920
	CITY ORDINANCE OFFENSE	4,857
	MARIJUANA REPORT	4,411
	JUVENILES DISTURBING	4,385
	DRUNK DISTURBING/DOWN/CAR	4,335
	LOOSE ANIMALS	4,320
	INDECENT EXPOSURE	3,962
	NOTIFY OWNER OF VEHICLE RECOVERY	3,621
	FELONY WARRANT OUTSTANDING	3,485
	CUSTODIAL INTERFERENCE	3,399
	STOLEN BICYCLE	3,205
	DANGEROUS DRUGS	2,962
	PROWLER	2,832
	BACK-UP	2,831
	LANDLORD/TENANT DISPUTE	2,442
	ACCESS INTERFERENCE	2,341
	DEAD BODY	2,315
	LOSS REPORT	2,156
	FOUND MISSING PERSON	2,005

Call type	Original call code	n
	GRAFFITI	1,956
	TRAFFIC CONTROL	1,939
	GENERIC	1,733
	FOUND NARCOTICS	1,673
	INTENSIVE PATROL	1,078
	URINATING IN PUBLIC	1,053
	RECOVERY F.O.J./PROPERTY	1,016
	OVERDOSE VICTIM	973
	MISSING JUVENILE SUPPLEMENT	895
	CALL BY PHONE	887
	ILLEGAL DUMPING	859
	TOW REQUEST	739
	EMERGENCY MESSAGE	726
	LOITERING	582
	NARCOTICS	546
	INSANE PERSON	535
	THEFT BROADCAST	512
	HARASSING PHONE CALLS	466
	FOJ MISDEMEANOR WARRANT	384
	PICK UP PAPERS	364
	PRESCRIPTION VIOLATION	345
	SEXTING	320
	MOBILE ALARM	314
	MISSING PERSON SUPPLEMENT	313
	DUI DRIVER-BROADCAST	298
	STOLEN BICYCLE SUPPLEMENT	295
	FOUND BICYCLE	279
	PROSTITUTION	275
	SOLICITATION DOOR TO DOOR	268
	SHOTS FIRED BROADCAST	249
	STALKING	231
	SUSP PERSON IN VEHICLE BROADCAST	196
	FOJ FELONY WARRANT	195
	SPEEDING BROADCAST	193
	LIQUOR VIOLATION	186
	FEMALE OFFICER FOR SEARCH	176
	NOTIFY PARENT OF JUVENILE DETENTION	161
	RECOVERY OF VEHICLE SUPPLEMENT	155

Call type	Original call code	n
	CONTRIBUTE TO DELINQUENCY OF MINOR	130
	FELONY FLIGHT	127
	PEEPING TOM	125
	STOLEN BICYCLE ATTEMPT	115
	GENERIC BROADCAST	112
	LOSS REPORT SUPPLEMENT	109
	TRUANCY	106
	HARASSMENT SUPPLEMENT	94
	JUDICIAL INTERFERENCE SUPPLEMENT	94
	CHECK WELFARE SUPPLEMENT	93
	TRANSFER TO FIRE	93
	SUSPICIOUS PERSON SUPPLEMENT	87
	UNDERAGE LIQUOR VIOLATION	87
	INJURED/SICK PERSON BROADCAST	84
	FALSE REPORTING	63
	RECOVERED BICYCLE	63
	CYBERBULLYING	53
	INFORMATION CALL	53
	CIVIL MATTER SUPPLEMENT	48
	FOUND PROPERTY SUPPLEMENT	42
	NEIGHBOR DISPUTE SUPPLEMENT	41
	SUSPICIOUS PERSON IN VEHICLE SUPPLEMENT	39
	INJURED/SICK PERSON SUPPLEMENT	32
	CUSTODIAL INTERFERENCE SUPPLEMENT	31
	TRANSLATION DETAIL	31
	SEX OFFENDER REGISTRATION VIOLATION	30
	OVERDOSE BROADCAST	29
	OPEN DOOR, WINDOW SUPPLEMENT	24
	GRAFFITI SUPPLEMENT	23
	INDECENT EXPOSURE SUPPLEMENT	22
	INJURED ANIMALS SUPPLEMENT	21
	PRONET ALARM	21
	ACCESS INTERFERENCE SUPPLEMENT	19
	DEAD BODY SUPPLEMENT	18
	PRESCRIPTION VIOLATION SUPPLEMENT	17
	REC F.O.J./PROPERTY SUPPLEMENT	17
	DANGEROUS DRUGS SUPPLEMENT	16

Call type	Original call code	n
	FOUND MISSING PERSON SUPPLEMENT	16
	911 HU CLEARED CALL	14
	SUICIDE	14
	SOLICITING	13
	PROSTITUTION - CHILD	12
	ANIMALS DISTURBING	11
	GLUE SNIFFING	11
	IMMIGRATION MATTER	11
	INCORRIGIBLE JUVENILE SUPPLEMENT	11
	SOLICIT FOR PROSTITUTION	10
	LANDLORD/TENANT DISPUTE SUPPLEMENT	8
	LOOSE ANIMALS SUPPLEMENT	8
	PRESCRIPTION VIOLATION ATTEMPT	8
	UNDETERMINED FIRE	8
	CURFEW VIOLATION	6
	NARCOTICS SUPPLEMENT	6
	OFFICER NEEDS HELP	6
	STALKING SUPPLEMENT	6
	BARRICADE	5
	FELONY FLIGHT SUPPLEMENT	5
	FIRE FOLLOW-UP	5
	HARASSING PHONE CALLS SUPPLEMENT	5
	ILLEGAL DUMPING SUPPLEMENT	5
	JUVENILES DISTURBING SUPPLEMENT	5
	MARIJUANA REPORT SUPPLEMENT	5
	OVERDOSE VICTIM SUPPLEMENT	5
	TEST CALL	5
	CUSTODIAL INTERFERENCE ATTEMPT	4
	ETA REQUEST	4
	RESISTING ARREST	4
	INSANE PERSON SUPPLEMENT	3
	JUDICIAL INTERFERENCE ATTEMPT	3
	NO FURTHER ACTION	3
	RECOVERY OF VEHICLE ATTEMPT	3
	SOLICIT FOR PROSTITUTION ATTEMPT	3
	STREET VENDING VIOLATION	3
	TRANSFER PHONE CALL	3
	BIGAMY ADULTERY ETC ATTEMPT	2

Call type	Original call code	n
	CONTRIBUTE DELINQUENCY MINOR SUPPL	2
	CYBER STALKING/COMPUTER TAMPERING	2
	GAMBLING	2
	ILLEGAL BURNING ATTEMPT	2
	INJURED ANIMALS ATTEMPT	2
	NUCLEAR/BIOLOGICAL/CHEM SITUATION	2
	PROWLER SUPPLEMENT	2
	TRANSFER CALL TO SUPERVISOR	2
	UNWANTED GUEST SUPPLEMENT	2
	VEHICLE SEIZURE	2
	BA OPERATOR NEEDED	1
	BARRICADE SUPPLEMENT	1
	CITY ORDINANCE OFFENSE SUPPLEMENT	1
	CONTR TO DEL MINOR ATTEMPT	1
	ESCAPE	1
	FALSE REPORTING ATTEMPT	1
	FOUND NARCOTICS SUPPLEMENT	1
	HAZARDOUS MATERIALS	1
	ILLEGAL BURNING	1
	INDECENT EXPOSURE ATTEMPT	1
	INT/CMP HACK/INTRU	1
	LOCATE ONLY VEHICLE	1
	LOCATE ONLY VEHICLE SUPPLEMENT	1
	SOLICITING ATTEMPT	1
	SUICIDE SUPPLEMENT	1
	TRUANCY SUPPLEMENT	1
	UNDERAGE LIQUOR SUPPLEMENT	1