CLICK, CLICK, BOOM: A MULTI-LEVEL ANALYSIS OF REPEAT FIREARM OFFENDING IN CHATTANOOGA, TENNESSEE

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ABSTRACT

Criminologists have long noted the exacerbated rates of firearm-related offending in the United States in comparison to other developed nations. There has been a renewed focus on gun crime in the wake of a recent dramatic reversal of the long-trending decrease in firearm-related violence. Explorations of the factors that contribute to firearm offending are often restricted to large metro areas like Chicago, New York City, and Philadelphia—which may have limited generalizability to more common small and medium sized cities in the United States. This study attempts to address this concern through examination of the factors that contribute to firearm re-offending among arrestees in Chattanooga, Tennessee.

Specifically, multi-level analysis is used to explore the relative influence of neighborhood conditions, arrestee demographics, gang involvement, and offense characteristics on the odds of repeat firearm offending among a sample of individuals arrested for gun crimes committed between 1/1/21 and 4/30/23 (n = 937).

DEDICATION

This thesis is dedicated to my husband, Tavo, and my children, Madelyn, Penelope, Otilia, and Heloisa. I could write a thousand theses on the multitude of ways you each make my life better. Instead, though, I will dedicate my life to supporting your dreams and goals the way you do mine. I am forever grateful for your love and understanding throughout my time in graduate school and as I worked on this thesis. I adore you.

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CHAPTER I

INTRODUCTION

Firearm-related offending continues to represent both a substantial threat to public safety and a point of public and political debate in the United States (Cook et al., 2015; Goldsmith et al., 2022). Gun crime has long been more pronounced in the U.S. in comparison to other developed nations (Carson et al., 2022; Leach-Kemon & Sirull, 2023). This gap has only intensified with the recent increase in gun offending within the U.S., which represents a 25-year-high (CDC, 2022; Gramlich, 2022). Understandably, conversations arising from such dramatic shift in gun crime frequently tend to center on gun control. However, increased focus on individuals who are repeatedly involved in firearm-related offending and the correlates of such behaviors may prove equally fruitful.

Examination of the correlates of firearm-related offending in the U.S. suggests several noteworthy relationships. First, structural conditions, such as neighborhood levels of poverty, low educational attainment, unemployment, family disruption, and residential turnover, are markedly higher in communities where gun violence is more frequent (Burgason et al., 2014; Dierenfeldt et al., 2021). Structural theories of crime, such as social disorganization theory, provide a basis for understanding these relationships within the context of informal social control. Structural deficits such as concentrated disadvantage and residential instability prevent the development of pro-social behaviors, resulting in a reduction of effective social controls (Bursik & Webb, 1982; Kasarda & Janowitz, 1974). Importantly, as a legacy of systemic racism,

such deficits are disproportionately observed within communities of color (Johnson et al., 2021; Sampson & Bartusch, 1998; Tracy et al., 2019).

Within these contexts, studies consistently point to gang-involvement as a correlate of firearm-related offending (Brennan & Moore, 2009; Kirk & Papachristos, 2011; Pardini et al., 2021). Gangs offer an alternative form of status through the exhibition of hypermasculine qualities during acts of violence and exaggerated displays of aggression (Dierenfeldt et al., 2021). Firearm possession and use function as symbolic and utilitarian extensions of these valued qualities, promoting exacerbated rates of firearm offending among those who are gang-involved (Tracy et al., 2016). Indeed, gang-involved individuals experience disproportionately high rates of victimization and frequently cite self-protection as a primary motivation for firearm possession (Pardini et al., 2021). Yet research has consistently noted that gun carrying behaviors among gang-involved persons increase an individual's likelihood of involvement in a violent crime and, in turn, victimization (Peterson et al., 2004; Tracy et al., 2016).

Equally important is that young people are disproportionately involved in gang- and gun-related crime (Brennan & Moore, 2009; DuRant, et al., 1999; Farrington et al., 1986). In particular, juveniles residing within violent communities have exhibited the highest likelihood of committing firearm-related offenses (Comer & Connolly, 2023; Tracy et al., 2019). The increased frequency of gun-involved offending exhibited by these juveniles may be attributed, in part, to their increased vulnerability to peer influence, particularly as it relates to the prestige offered by gangs (Beardslee et al, 2018). Also, juveniles may respond to the pervasive distress of their structurally deteriorated and violent environments by carrying guns and adopting aggressive postures as a means of self-protection (Comer & Connolly, 2023; Tracy et al., 2019).

Cumulatively, these factors may explain why a small fraction of offenders commit a plurality or majority of offenses. Criminologists have long suggested, for example, that between 5 and 6 percent of offenders are responsible for 50 to 60 percent of known offenses (Farrington et al., 1986; Wolfgang et al., 1972). Importantly, the individual- and neighborhood-level covariates of violent offending appear to also manifest in repeat offending patterns, with black, gang-involved juveniles residing within socially disorganized communities representing a disproportionate number of repeat offenders (Baglivio et al., 2014; Piquero et al., 2015).

The extent to which these relationships extend to repeat firearm offending, however, remains unexplored. While recent research suggests that individuals with previous firearm-related convictions demonstrate an increased likelihood to commit subsequent firearm-related offenses (Osterman & Hashimi, 2022), more research is needed, particularly in cities outside of large metropolitan areas. To address these gaps in the literature, this thesis applies multi-level analysis to a sample of 937 gun offenders nested within 44 Chattanooga census tracts to determine how neighborhood conditions, arrestee demographics, gang involvement, and offense characteristics influence the odds of repeat firearm offending.

CHAPTER II

LITERATURE REVIEW

Prior scholarship has consistently noted a pattern in the individual characteristics associated with firearm-related offending, which tend to be elevated among non-white, juvenile, and gang-involved males (Blumstein, 2006; Burgason et al., 2014; Cook & Laub, 1998). Individuals involved in gun crime are, however, frequently nested within neighborhoods that exhibit structural deficits that became endemic to many communities in the wake of post-WWII (Dierenfeldt et al., 2021). These changes to the urban landscape included heavy job loss in blue collar manufacturing sectors and the development of interstate highway systems, resulting in large scale disruptions to many neighborhoods, particularly neighborhoods of color (Bursik & Grasmick, 1993).

The compounding effects of these circumstances resulted in the development of certain structural characteristics, such as comparatively high percentages of impoverished residents, low levels of educational attainment, and high rates of single-parent households (Sampson et al., 1997). These conditions, in turn, fostered the proliferation of violent subcultures that promote increased rates of firearm offending among residents (Anderson, 1999; Burgason et al., 2014). Thus, the rise and entrenchment of gun crime may hinge on levels of social (dis)organization within neighborhoods.

A Theory of Social Disorganization

Contemporary structural explanations of crime rest, to great extent, on the foundational research conducted by theorists of the early Chicago School of Criminology. Most notably, Park and Burgess (1925), upon studying the enduring radial configuration of urban development, advanced a concentric zone model that elaborated on the distinct structural characteristics associated with specific neighborhood zones. According to Park and Burgess (1925), the urban center or "central business district" comprised the core economic activity. Surrounding this was the "zone in transition," an area characterized by poverty, weak infrastructure, and high rates of transience. This zone served as the residential destination of many first-generation immigrants who, upon achieving greater economic stability, eventually moved outward into increasingly affluent, stable zones. These areas included the "zone of working men's homes," the "residential zone," and the "commuters' zone." Essentially, the Park and Burgess concentric zone model indicated that urban development occurred in a predictable pattern based on upward socioeconomic mobility.

Connecting this spatial conceptualization of urban development to criminology, Shaw and McKay (1942) hypothesized that juvenile delinquency was positively correlated with what they described as the "social disorganization" of a neighborhood. According to this perspective, increased cultural and ethnic variation, coupled with high levels of residential instability and poverty, prevented the development of the residential cohesion necessary to enforce pro-social norms. In the absence of these norms, a deviant subculture, offering alternative paths to power and prestige, evolved. Juveniles were believed to be especially vulnerable to these alternative sources of status as they were less attuned to the inherent risks and long-term consequences of

participating in deviant acts. Furthermore, their exclusion from mainstream opportunities may have resulted in a void that deviant subcultures ultimately filled. Moreover, a lack of consistent exposure to pro-social norms further increased juveniles' vulnerability to the socialization into these deviant subcultures by older, more experienced delinquents (Chung & Steinberg, 2006; Oetting & Donnermeyer, 1998; Trinidad, 2021).

The combination of structural deficit, subcultural influence, and perceived strain experienced by juveniles mired in these neglected communities coalesced into incredibly stable crime rates. This spatial and temporal stability stemmed from the consistent cycle of transience of the period. High levels of turnover within these communities provoked constant disruption, which led to weakened social bonds and institutions, ultimately culminating in increased crime rates (Skogan 1986; Skogan 1990). Shaw and McKay (1942) replicated these findings in other cities, including Seattle, thus cementing the association between neighborhood characteristics and stable crime rates and shifting the criminological perspective away from the individual nature of crime and toward the structural nature of crime.

Changes to the Urban Landscape

Eventually, however, Shaw and McKay's theory of social disorganization fell out of favor in the criminological community, with many critics deeming the theory tautological in its failure to effectively differentiate the concept of social disorganization and crime. Many of its findings also lost relevance upon the post-WWII shift from a manufacturing job market to a service-oriented job market- a dramatic economic transformation that greatly limited the availability of jobs offering a living wage and social mobility to unskilled workers. This, along with the development of the US highway system, irrevocably altered the process by which cities

developed, thus nullifying the concentric zone model and, by extension, social disorganization theory (Calamunci & Lonsky, 2022).

Unlike when Shaw and McKay developed their model, the urban spatial structure no longer expanded in a radial fashion, but rather developed linearly alongside the new highway system. The once-static structural characteristics of neighborhoods became dynamic as investments poured into new developments, and the urban centers of yesterday were left to progressively deteriorate by means of urban decay. Isolated from proper resources, property values plummeted, followed by home ownership rates. Increasingly impoverished individuals moved into dilapidated rentals within these communities, which only further decreased property values as residents did not have access to financial means to make improvements (Bursik & Grasmick, 1993).

Over time, urban decay would take hold of different neighborhoods, depending on the selective investment and neglect imparted by decision-makers. Regardless of specific location, though, urban decay became a permanent fixture in the urban development of American cities. So much so that many assume it to be inherent to the natural urban lifecycle when, in actuality, it is an intentional process placed upon areas deemed undesirable by mainstream society (Berry & Kasarda, 1977; Bursik & Grasmick, 1993; Kasarda, 1989; Kasarda, 1993).

As the process of urban decay redefined urban development, the structural nature of crime once again came into criminological focus. Building on the systemic model of community attachment advanced by Kasarda and Janowitz (1974), Ruth Kornhauser (1978) revitalized social disorganization theory by revising the original conception into a theory of social control. Specifically, Kornhauser (1978) rejected cultural criminological perspectives that had previously dominated the field, focusing instead on the role of social control.

In line with this perspective, Kornhauser (1978) directed the theory's focus toward weak informal social controls by way of residential instability. According to her iteration of social disorganization theory, communities characterized by residential instability were incapable of developing sufficient community attachment among residents. Without these ties to one another, informal social controls never fully emerged, which enabled criminal activity to flourish (Kasarda & Janowitz,1974; Kornhauser, 1978).

This reformulation of social disorganization as a theory of social control provided a foundation for additional influential perspectives, particularly those of Bursik and Sampson. Although the concentric zones described by Shaw and McKay (1942) no longer accurately represented urban landscape, the underlying idea of structural barriers impeding the development of pro-social behavior persisted as criminologists infused this with a systemic model that placed emphasis on community networks of friendship and kinship ties and their capacity to exert social control (Bursik & Webb, 1982; Kasarda & Janowitz, 1974). Through this lens, neighborhoods deficient in friendship networks and organizational participation experienced an attenuation in informal social control that resulted in higher rates of delinquency (Bursik, 1984; Bursik, 1986).

Sampson and Groves (1989) further contributed to the understanding of informal social controls with their conceptualization of collective efficacy. Collective efficacy refers to a community's capacity to exert informal social controls and suppress criminal behavior. Their work described informal social control as the latent effect of friendship, kinship, and community associations. Sampson, along with Raudenbush and Earls (1997), performed the first test of this concept and affirmed the proposed negative association between violence and collective efficacy. Their work also made evident the mediating effects of collective efficacy on the associations of violence with concentrated disadvantage and residential instability.

Offering an alternative perspective, Bursik and Grasmick (1993) articulated three types, or "spheres," of informal social control: private, parochial, and public. Private informal social control referred to the intimate ties between individuals within a community. These ties comprised one's family and friend kinship networks, which exert informal social control through the contribution or threatened withdrawal of sentiment (Bursik & Grasmick, 1993; Hunter, 1985).

Next, Bursik and Grasmick (1993) described parochial ties as those that derive from shared membership in neighborhood organizations or consistent neighborhood encounters. These ties exert control via informal surveillance. Strong parochial ties manifest as a willingness to assume responsibility for the well-being of neighbors and of neighbors' property. As these parochial ties require a certain level of intra-community concern and trust, heterogeneity can negatively impact their development. Varying ethnic and cultural groups may not exhibit effective supervisory capacity due to a lack of this essential trust and understanding.

Finally, public informal social control refers to a neighborhood's capacity to draw upon outside resources that contribute to social control. For example, neighborhoods with strong public ties can lobby various industries or government agencies in order to ensure resources and jobs are being properly invested in the community. These resources can then improve socioeconomic conditions and, in turn, improve residential stability, increasing social control capacity and reducing crime (Bursik & Grasmick, 1993).

The Rise of Gangs and Subcultural Violence

Using social disorganization theory as a framework, one recognizes how a confluence of socio-economic developments has disproportionately impacted young black males over time and

thus led to their overrepresentation within violent offending and victimization demographics (Burgason et al., 2014). As described above, post-WWII economic shifts and the onset of highway systems transformed the spatial development of cities and incited a process of urban decay within neglected neighborhoods. Significantly, increased race-based residential segregation meant that the communities most affected by urban decay were impoverished black communities. The out-migration of middle and upper-class whites and blacks resulted in the influx of predominantly impoverished black residents moving into areas and, therefore, experiencing overlapping forms of structural disadvantage. The ensuing rapid decline of these neighborhoods resulted in reduced collective efficacy and inadequate informal social controls, thus resulting in increased violent crime rates (Massey & Denton, 1988, Massey & Denton, 1993; Peterson & Krivo, 1993).

Notably, these changes facilitated a unique shift in the characteristics associated with heightened crime. Whereas violent crime once correlated with ethnically and culturally heterogenous communities, it became exceedingly concentrated within homogenous predominantly black populations (Vargas, 2012). This is, in large part, due to the persistent structural disadvantages that beset these communities, which resulted in the perpetuation of structural context defined by physical and social deterioration and the absence of legitimate means of upward mobility (Bursik & Grasmick 1993; Hipp et al. 2009; Warner & Pierce 1993).

Against this backdrop, the emergence of open-air, gang-controlled drug markets exacerbated rates of gun violence, particularly among juveniles (Blumstein, 1995; Braga et al., 2010; Cook & Laub, 1998). On the heels of these social problems, state and federal legislatures passed increasingly harsh laws related to drug and violent offending (Blumstein, 1995; Kleck, 1991). Seeking to avoid prison time while continuing drug sales, many adult drug dealers

recruited juveniles who were not subjected to the same sentencing standards as adults (Blumstein, 1995). As a matter of self-protection, youthful offenders associated with gangs and drug markets increasingly armed themselves with firearms, cementing the association between juvenile black male offenders and gun crime (Cook & Laub, 1998).

Eventually, as the crack market stabilized, violent crime rates began to decline. Despite this, the composition of offender demographics persisted, with black males under the age of twenty-five continuing to overrepresent violent crime offending (Blumstein, 2006; Cook & Laub, 1998). Criminologists explained this as a result of cultural diffusion, wherein the decay of poor black neighborhoods and the subsequent widespread deprivation experienced by these communities led to the formation of an underclass with its own subcultural values (Decker & Van Winkle, 1996; Lichter, 1988; Messner, 1988; Shihadeh & Steffensmeier 1994). Mainstream values that lacked utility were replaced by those rooted in a form of respect derived chiefly from masculine displays of aggression and violence, which Elijah Anderson (1999) referred to as "street code."

For many young black males in socially disorganized communities, the appeal of gang-involvement lies in this potential for respect and prestige. Gangs provide an alternative means to acquire a sense of self-esteem and identity (Stretesky & Pogrebin, 2007). Furthermore, they offer a substitution for mainstream institutions and conventional sources of stability and support, with gang members often describing their gang as a "brotherhood" or "family" (Swaner et al., 2020). As such, gang members' personal and social identities are almost entirely defined by gang values, and because gang culture rewards violence with status, gang members often partake in exaggerated, public displays of aggression and violence (Decker, 1996; Dierenfeldt et al., 2021; Swaner et al., 2020). The desire to earn and maintain respect through violence becomes the

primary driving force for the individual's behavior, and any perceived threat to that respect necessitates a violent, and largely expressive, response. Otherwise, the individual risks losing respect- the ultimate loss for the gang member.

In seeking to maintain their violent identities, gang members carry guns as an expression of their power, as well as a tool for protection. For the gang-involved individual, guns symbolize violence and aggression. Gun-carrying commands respect and conveys an important willingness to act violently, a message essential to maintaining an adherence to the gang's values and expected conduct (Stretesky & Pogrebin, 2007).

Neighborhood Characteristics and Firearm-Related Offending

The abovementioned subcultural explanations for gun-carrying and gun-use are inextricably intertwined with structural deprivation (Burgason et al., 2014; Dierenfeldt et al., 2021; Huebner et al., 2016). Individuals subjected to these adverse circumstances are more frequently exposed to violence and gang interactions, factors which studies have indicated correlate with increased firearm offending (Campbell & Schwartz, 1996; Jaycox et al., 2003; Spano, 2012; Spano & Bolland, 2011; Spano et al., 2012; Stein et al., 2003).

For example, Swaner and colleagues (2020) found that 88 percent of juveniles residing in a New York City low-income housing unit had been involved in a gang at some point, with 81 percent having been shot or shot at. Furthermore, 87 percent had owned or carried a gun, themselves. Similarly, and in line with structural explanations of firearm offending, Molnar et al. (2004) described a positive correlation between neighborhood levels of social and physical disorder and gun-carrying. They specifically described the role fear of victimization likely plays

in driving this association. This aligns with Sheley & Wright's (1993) findings that pointed to the desire for protection functioning as the primary motivator for obtaining a gun.

Juveniles who have experienced victimization demonstrate an increased likelihood of joining a gang, potentially for protective purposes. Upon joining a gang, individuals further seek protection by means of gun-carrying, which, along with cultural rationales, explains why gang members are significantly more likely to own a gun than non-gang members (Bjerregaard & Lizotte, 1995; Stretesky & Pogrebin, 2007). And while studies indicate no significant reduction in victimization resulted from joining a gang, this misaligned reasoning, according to Peterson et al. (2004) motivates at least half of gang members to join in the first place.

In fact, once an individual joins a gang, their likelihood of experiencing victimization only increases. Considering that violence serves as a primary mechanism by which gangs grow and protect their turf, it is understandable that gang-involvement exacerbates the risk of victimization and offending (Fox, 2017). Furthermore, gangs promote a highly retaliatory lifestyle in which conflict escalates quickly and severely. The resulting persistent threat of violence frequently results in pre-emptive attacks on rival gang members in an attempt to avoid future victimization, thus perpetuating an enduring cycle of violence wherein violent acts create new victims who then eventually become offenders (Spano & Bolland, 2013). When considering that heightened rates of victimization, as well as gang-involvement and gun-carrying are all associated with structurally deprived communities, it makes sense that these same communities also experience increased rates of firearm offending (Fox, 2017).

Chronic and Repeat Offending and Gun Crime

A clear pattern of chronic repeat offending pervades violent crime with crime concentrating geographically as well as within certain individuals. First, looking to the spatial concentration of crime, studies show that approximately 50 percent of crime occurs within street segments and addresses representing between 3 and 6 percent of a city's area (Pierce et al., 1986; Piquero et al., 2003; Sherman et al., 1989; Weisburd et al., 2004; Weisburd et al., 2012; Weisburd & Amram, 2014; Weisburd, 2015; Weisburd et al., 2014). This lends credence to those who propose neighborhood-level correlates to offending and reoffending, specifically. For example, in their analysis of ex-offenders within Portland and surrounding areas, Kubrin and Stewart (2006) analyzed the impact of neighborhood context on reoffending and found that individuals who returned to impoverished, resource-deficient neighborhoods recidivated at a greater rate than those who returned to more resource-rich environments. Consistent with the work of Bursik and Grasmick (1993), they observed that reoffending was positively correlated with the absence of strong family ties and lack of access to rehabilitative services. This demonstrates that structural covariates extend into reoffending as well as offending.

This spatial concentration of crime closely mirrors the concentration of crime within cohorts of individuals, a phenomenon labeled the "chronic 6%" by Wolfgang, Figlio, and Sellin (1972). They found that among a cohort of approximately 10,000 juvenile males, 6 percent were responsible for 51.9 percent of criminal offenses. Subsequent studies have replicated this phenomenon of relatively small segments of chronic offenders perpetrating a majority of violent crime. For example, Braga et al. (2000) noted that less than one percent of juveniles accounted for at least 60 percent of all juvenile homicides in Boston. Moreover, 77 percent had been previously arraigned in the Massachusetts court system.

As for the individual characteristics of chronic offenders, violent recidivism literature consistently indicates that non-white, juvenile males demonstrate a greater tendency toward reoffending (Baglivio et al., 2014, Piquero et al., 2015). Looking at race, specifically, people of color are over-represented in re-offending data, but it is important to note that some evidence indicates that the significance of race dissipates once controlling for socioeconomic status (Cottle et al., 2001; Jacobs et al., 2020).

The impact of juvenile status, on the other hand, consistently correlates with increased rates of reoffending. Age of onset has proven especially indicative of offending patterns, with early-onset offenders exhibiting two to three times greater risk of committing subsequent violent acts, serious offenses, and chronic offending (Baglivio et al., 2014; Brennan & Moore, 2009; Harris et al., 2007; Krohn et al., 2001).

Also repeatedly highlighted in the literature is the intensifying effect of gang-involvement on violent reoffending behavior (Craig et al., 2020; Huebner et al., 2007; Kennedy et al., 1996; MacRae et al., 2011; Thornberry et al., 2003; Trulson et al., 2012). For example, Caudill (2010) found that over 80 percent of a sample of 2,436 incarcerated youth recidivated within a five-year observation period, with gang-involved individuals being significantly more likely to reoffend. Some even argue that previous imprisonment may further entice individuals to associate with gangs, as imprisonment severs important family and social ties and further removes these individuals from mainstream society. This isolation generates even more interest in the sense of respect and belonging offered by gang membership. Then, upon integration into the gang-involved lifestyle, which, as previously noted, centers around hypermasculine displays of violence, individuals with prior convictions exhibit a greater likelihood of committing a subsequent violent offense (Huebner, 2005; Pager, 2003).

Of equal importance to the current study are the factors that contribute to gun-involved reoffending. The literature is, however, particularly scant in this area. Osterman and Hashimi (2022) recently expanded the literature through their analysis of individuals released from prison facilities in a large state on the east coast in 2009. They found that individuals with prior firearm-related convictions were more than twice as likely to commit firearm-related offenses than similarly situated individuals without prior firearm convictions. While informative, the topic of gun-crime reoffending necessitates further research.

The Current Study

Criminology has a long-standing interest in gun crime. The relative abundance of interest and research on the topic of gun crime, though, is not tantamount to a comprehensive understanding of this highly complex and multifaceted issue. The review of the literature reveals several gaps in the gun-crime scholarship, particularly surrounding the topic of reoffending. The current study seeks to expand the current literature by examining the extent to which both individual-level and neighborhood-level factors consistently associated with firearm-related offending extend to *re*offending. Specifically, through multi-level analysis, this study examines the impact neighborhood conditions, arrestee demographics, gang involvement, and offense characteristics have on the odds of repeat firearm offending among a sample of 937 individuals residing in 44 census tracts within Chattanooga, Tennessee who were arrested for gun crimes committed between 1/1/21 and 4/30/23. By focusing on a mid-sized city, this study also seeks to address potential generalizability concerns associated with prior firearm-related studies, which tend to center around large metro areas, such as Chicago and New York City.

CHAPTER III

METHODOLOGY

Research Questions and Hypotheses

Prior works clearly suggest a positive association between gang-involvement and increased gun-carrying/gun-use (Comer & Connolly, 2020; Tigri et al., 2016; Watkins et al., 2008). Much of the literature connects this behavior to the symbolic nature of guns within gang culture as well as to the protective function of gun-carrying, which is a particularly salient factor considering the violent lifestyle inherent to gang-involvement (Lauger, 2020; Molnar et al., 2004; Pyrooz et al., 2016; Stretesky & Pogrebin, 2007). Furthermore, gang-involvement consistently correlates with an increased likelihood of reoffending (Huebner et al., 2007; MacRae et al., 2011). The subculture of violence promoted by gangs augments an individual's negative peer associations and exposure to violence, which, according to Matsueda and Heimer (1997), reduces gang members' likelihood to modify their violent behaviors even after being detained, jailed, or incarcerated. Considering these factors led to the development of Research Question 1 (**RQ1**): How does gang-involvement influence an individual's likelihood of repeat gun offending? In concordance with prior works which illustrate an increase in firearm offending among gang-involved individuals (e.g., Tigri et al., 2016, Watkins et al., 2008), as well as works that exhibit an increase in repeat offending among gang-involved individuals (e.g., Huebner et al., 2007; MacRae et al., 2011) the current study hypothesizes:

H1: Gang membership will correspond with an increase in the probability of repeat gun offending.

According to extant scholarship, juveniles have consistently exhibited an increased likelihood to both carry and use guns (Dong et al., 2019; Wallace, 2017; Watkins et al., 2008). This propensity to use firearms increases upon exposure to gun violence, whether by means of prior offending or victimization (Beardslee et al, 2018). More specifically, evidence points to increased gun-carrying and gun-use among juveniles embedded in hostile environments due to the heightened perceived need for protection (Hemenway et al., 1996).

Studies also point to the fact that juvenile gun behaviors align with the symbolic role of guns within structurally deprived communities (Decker, 1996; Dierenfeldt et al., 2021; Sheley & Wright, 1993; Swaner et al., 2020). Essentially, juveniles within these communities react to the inaccessibility of mainstream objectives and achievements by seeking alternative forms of status, which ultimately manifest as masculine displays of aggression. Guns, thus, function as an important symbolic representation of this status, hence an increase in firearm-related offending. These perspectives led to Research Question 2 (**RQ2**): How does juvenile status impact the likelihood of repeat gun offending? In line with prior works indicating a positive correlation between firearm offending and juvenile status (e.g., Dong et al., 2019; Wallace, 2017), as well as those which exhibit a positive correlation between juvenile status and general repeat offending (e.g., Barret & Katsiyannis, 2016; Mennis & Harris, 2011), it is hypothesized that:

H2: Juvenile status will be positively associated with repeat gun offending.

Across numerous studies, neighborhood levels of concentrated disadvantaged consistently correlate with violent offending, specifically firearm offending rates (Campbell & Schwartz, 1996; Stein et al., 2003; Swaner et al., 2020). This can be attributed, in large part, to

the erosion of social cohesion and collective efficacy within socioeconomically disadvantaged communities, which ultimately leads to elevated violent crime rates (Bursik & Webb, 1982; Friedson & Sharkey, 2015; Sampson & Groves; 1989). In turn, the increased exposure to violence within these communities leads to elevated levels of firearm offending (Spano, 2012; Spano & Bolland, 2011; Spano et al., 2012.)

Prior scholarship also suggests a positive correlation between concentrated disadvantage and an individual's likelihood to reoffend (Jacobs et al., 2020). A dearth in the literature on neighborhood socioeconomic context and reoffending, though, necessitates more research on the matter. This omission prompted Research Question (**RQ3**): How do neighborhood levels of concentrated disadvantage impact the odds of repeat gun offending? In line with prior works that connect concentrated disadvantage to firearm-related offending and to general reoffending patterns (e.g., Jacobs et al., 2020; Swaner et al., 2020), this study hypothesizes that:

H3: Neighborhood levels of concentrated disadvantage will be positively related with the odds of repeat gun offending.

As discussed, studies clearly indicate that juvenile status and gang-involvement each increase an individual's likelihood of committing a firearm-related offense (Huebner et al., 2007; MacRae et al., 2011). With these findings in mind, one can reasonably speculate that exhibiting both juvenile status and gang-involvement would compound an individual's likelihood of committing a firearm-related offense. Watkins et al. (2008) evidenced such an effect, finding that gang-involved juveniles were over four times as likely to report having used a gun within the past year than non-gang juveniles. Significantly, the impact of gang-involvement on adults was also strong. Even so, such an effect was only half that of the effect that was demonstrated by juveniles. Whether these findings extend to locations outside of major metro areas remains an

open empirical question. This prompted Research Question 4 (**RQ4**): How does gang-membership impact the effects of juvenile status on repeat gun offending? In accordance with previous indications that juvenile status and gang-involvement each heighten an individual's likelihood to reoffend as well as commit firearm-related offenses, the current study hypothesizes that:

> **H4**: The impact of juvenile status on repeat gun offending will be exacerbated by gang membership.

Data and Sample

These hypotheses are tested using data collected from the Firearm Case Tracking Logs maintained by the Scenic City Crime Gun Intelligence Center, housed within the Chattanooga Police Department. Specifically, in the following analyses, I examine all local individuals arrested for gun-related offenses between 1/1/21 and 04/30/23 (n= 944). Consistent with the neighborhood level perspectives and research, I also gathered census tract data on tracts located within the city of study (n = 58) from the 2021 American Community Survey 5-year summary file. To accommodate the use of hierarchical generalized linear modeling, analyses were further restricted to census tracts in which a minimum of 3 residents were arrested for firearm offenses. This approach resulted in a final sample size of 937 arrestees nested within 44 census tracts. In other words, while 14 tracts were excluded, only 7 arrestees were removed, and they resided in 6 of the excluded tracts, thus highlighting the extent to which arrestees were clustered within the city. All research protocols were reviewed and approved by the UTC Institutional Review Board (IRB# 20–171).[1]

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Dependent Variable

The dependent variable is a dichotomous indicator of whether the offender was arrested for two or more firearm-related offenses during the 27-month observation period (1 = YES; 0 = NO). This is a nominal-level variable as the variable is distinct, mutually exclusive, exhaustive, and cannot be logically rank ordered. Furthermore, the current study seeks to ascertain the category in which an individual belongs- that of individuals arrested for two or more firearm-related offenses within the observation period or that of those who were not. Because dichotomous variables are most appropriate for representing categorical outcomes, a dichotomous variable represents the most appropriate variable type for the current study.

Independent Variables

The study assessed six individual level independent variables: gang membership, juvenile status, sex, race, offense severity, and state prosecutor decision. Consistent with prior works on (re)offending, arrestee-level independent variables, drawn from the Firearm Case Tracker, include binary indicators of gang membership (1 = YES; 0 = NO) and juvenile status at the time offense (1 = YES; 0 = NO). Arrestee-level controls include dichotomous measures of sex (1 = MALE; 0 = FEMALE) and race (1 = BLACK; 0 = OTHER) 1. We also control for offense severity (1 = FELONY; 0 = MISDEMEANOR) and charging decision by the state prosecutor (1 = DISMISSED; 0 = CHARGED). Each of these represents a nominal-level measure as they are distinct, mutually exclusive, exhaustive, and cannot be logically ranked ordered. Furthermore, the binary and categorical nature of each of these variables qualifies them as dichotomous.

and Prevention, the Office for Victims of Crime, and the SMART Office. Points of view or opinions in this document are those of the author and do not necessarily represent the official position or policies of the U.S. Department of Justice.

The primary independent neighborhood-level variable drawn from the 2021 ACS is a summary index of concentrated disadvantage (Eigenvalue = 3.635; factor loadings $\geq$ .731; α = .869) constructed as the average of standardized values of measures of the percent of the population over the age of 25 that has failed to earn a high school diploma or equivalency, percent of the population living below the federally established poverty line, percent of the population that is unemployed, percent of households receiving public assistance, percent of households headed by a single parent whose children live with them, and percent of the population that is Black. I also use a summary index of residential stability (Eigenvalue = 1.486; factor loadings $\geq$ .862; α = .654) constructed as the average of standardized values of measures of the percent of homes that are owner occupied and percent of residents who have lived in the same home for at least 1 year. Each of these indexes represents an interval level of measurement as they are distinct, mutually exclusive, exhaustive, can be logically rank ordered, maintain equal intervals between categories, and lack a true zero.

Additional tract-level controls include total population, percent of the population between the ages of 15 and 24, and percent of the population that identifies as Hispanic (a common proxy for ethnic heterogeneity). Each of these represents a ratio level of measurement as they are distinct, mutually exclusive, exhaustive, can be logically rank ordered, maintain equal intervals between categories, and maintain a true zero.

Analytic Approach

To explore the confluence of individual and neighborhood characteristics on the odds of repeat firearm offending, the current study uses Hierarchical Generalized Linear Modeling (HGLM) techniques. HGLM addresses nested data structures, wherein the variables are not truly

independent of one another. This form of analysis allows for the modeling of variability at different levels in order to achieve a more accurate representation of relationships between variables (Raudenbush & Bryk, 2002).

Model 1 presents the baseline fixed effects of the individual- and neighborhood-level measures predicting the odds that individuals arrested for a gun-related crime will be arrested for a subsequent gun crime during the observation period. In Model 2, a cross-product interaction term is introduced between gang membership and juvenile status. This allows the current study to examine whether, as expected, gang membership will exacerbate the effects of juvenile status on repeat firearm offending.

CHAPTER IV

RESULTS

Means and standard deviations for all measures are displayed in Table 1. Descriptive statistics for tract-level measures are derived through aggregation of arrestee-level data, calculation of the mean for each tract, and averaging the tract means. Approximately 8 percent of arrestees within the sample were arrested for at least two firearm offenses (e.g., at least one additional gun crime following release for their initial gun crime), compared with the tract-level average of approximately 6%. Most arrestees were males (91%). Similarly, approximately 89% of the arrestees were Black, compared to the tract-level average of 79%. Juveniles comprised approximately 12 percent of the arrestees, while approximately 15 percent were identified as gang members. Slightly less than half (45%) of initial gun crime arrests constituted felonies, compared to the tract level average of 41%, while 26% of initial arrests resulted in a case dismissal by the prosecutor.

In terms of tract characteristics, descriptive analysis demonstrates the extent to which arrestees are clustered within neighborhoods exhibiting comparatively higher levels of structural deterioration. Specifically, the neighborhoods occupied by greater numbers of arrestees exhibited higher average levels of low educational attainment, poverty, unemployment, households receiving public assistance, and single parent households than the tract-level average. This information, considered in tandem with relatively lower levels of home ownership and greater residential stability, points to an inability of marginalized populations to escape structurally

disadvantaged areas of Chattanooga—an assertion consistent with systemic theories of social disorganization (e.g., Bursik & Grasmick, 1993). In contrast, age structure and ethnic composition were more consistent between units of analysis, with the percent of the population that was Hispanic hovering around 8% and percent of the population between the ages 15 and 24 standing just above 13% at both the arrestee and tract levels.

Table 1 Means and Standard Deviations

	Arrestee (n = 937)	Tract (n = 44)
Total Population	3968.82(1603.58)	3994.43(1868.68)
Total Population (Ln)	8.20(0.41)	8.17(0.52)
Concentrated Disadvantage Index	0.53(0.80)	0.00(0.78)
Percent Black	53.70(26.44)	33.63(26.02)
Percent Low Educational Attainment	15.88(8.79)	12.44(8.79)
Percent in Poverty	24.98(12.62)	19.88(12.38)
Percent Unemployed	8.48(5.23)	5.99(4.53)
Percent Public Assistance	3.45(2.49)	2.38(2.23)
Percent Single Parent Households	58.19(27.75)	43.24(25.96)
Residential Stability	0.02(0.75)	0.00(0.86)
Percent Owner Occupied Homes	45.41(16.49)	49.06(17.50)
Percent Same House	83.27(7.78)	81.04(9.20)
Percent Hispanic	8.12(9.58)	8.49(9.81)
Percent Population 15-24	13.35(7.93)	13.15(9.93)
Gang Membership (1 = Yes)	0.15(0.35)	0.13(0.11)
Juvenile (1 = Yes)	0.12(0.33)	0.10(0.09)
Sex (1 = Male)	0.91(0.28)	0.89(0.12)
Race (1 = Black)	0.89(0.31)	0.79(0.24)
Offense Severity (1 = Felony)	0.45(0.50)	0.41(0.18)
Case Dismissed (1 = Yes)	0.26(0.44)	0.26(0.15)
Repeat Offender (1 = Yes)	0.08(0.27)	0.06(0.08)

Table 2 presents HGLM estimates for predicting the variability in repeat firearm offenses in the form of log-odds coefficients. Before estimating the complete models, an Intraclass Correlation Coefficient (ICC) was derived from an unconditional model to assess the variation in repeat firearm offending across the sample of tracts. This measure was calculated by dividing the

variance component of the tract-level random effect by the sum of the tract and arrestee level variance components. The resulting ICC was 0.235, indicating that 23.5 percent of the variation in repeat firearm offending can be attributed to tract-level characteristics. This result supports the suitability of multilevel analysis. Additionally, the reliability estimates for each model exceeded the standard threshold of 0.200, indicating a moderate level of variation between tracts in the probability that gun offenders would be arrested for two or more gun-related offenses.

Model 1 of the multi-level analysis presents the baseline fixed effects concerning the probability of repeat gun use based on arrestee- and tract-level measures. Hypotheses 1 and 2 expressed the expectation that both gang membership and juvenile status would exhibit positive, and statistically significant associations with repeat gun offending. Consistent with these expectations, being a gang member corresponded with a 24.63 percent increase in the odds of being arrested for a subsequent gun crime, while juvenile status was linked to a 76.55 percent increase. In contrast, the relationship between the concentrated disadvantage index and repeat gun offending failed to achieve statistical significance. This outcome was counter to Hypothesis 3, which predicted a positive correlation between neighborhood levels of concentrated disadvantage and the odds of repeat gun offending.

Table 2 Multi-Level Analyses of Repeat Firearm Offending

	Model 1	Model 2
Contextual-Level Predictors		
Population (Ln)	.255(.463)	.254(.476)
Concentrated Disadvantage	-.125(.167)	-.123(.172)
Residential Stability	-.069(.252)	-.078(.254)
Percent Hispanic	-.008(.018)	-.009(.018)
Percent Pop. 15-24	-.013(.021)	-.013(.020)
Individual-Level Predictors		
Gang Membership	1.246(.334)***	.950(.398)*
Juvenile	1.766(.252)***	1.550(.318)***

Sex	.597(.818)	.608(.809)
Race	-.058(.698)	.027(.691)
Offense Severity	-.384(.354)	-.301(.383)
Case Dismissed	-.710(.477)	-.722(.484)
Cross-Product Interactions		
Gang Membership x Juvenile	--	.859(.754)

†p ≤ .10 *p ≤ .05 **p ≤ .01 ***p ≤ .001 Robust standard errors in parentheses

Finally, Model 2 of the analysis introduced a cross-product interaction term gang membership and juvenile status to test Hypothesis 4, which expressed the expectation that the impact of juvenile status on repeat firearm offending would be exacerbated by gang membership. In other words, juveniles who were gang members were expected to have greater odds of being arrested for repeat firearm offending than juveniles who were not gang members. Contrary to this expectation, the interaction term failed to achieve statistical significance.

CHAPTER V

DISCUSSION

The purpose of this study was to use multilevel analysis to explore the relative influence of neighborhood conditions, arrestee demographics, gang involvement, and offense characteristics on the odds of repeat firearm offending. Consistent with my hypotheses, gang membership and juvenile status were each associated with increased odds in repeat firearm offending. Counter to expectations, however, the influence of neighborhood levels of concentrated disadvantage failed to achieve statistical significance. Further, the impact of juvenile status did not condition the impact of gang membership on repeat firearm offending. The implications of these findings merit further discussion. The finding that juvenile status and gang involvement each corresponded with such a pronounced increase in the odds of committing multiple gun-related crimes is not particularly surprising given the wealth of studies that have examined the covariates of crime and violence—particularly gun offending. Still, these effects are notable given the relatively brief 27-month observation period. It is also noteworthy that descriptive analysis is consistent with past findings associated with compositions of offending populations (e.g., the so-called 'chronic 6%').

I considered the possibility that the findings might be an artifact of the relationships between juvenile status, crime severity, and case dismissal. Specifically, I entertained the notion that juveniles might commit less serious gun offenses (e.g, misdemeanor possession) and be more likely to have their cases dismissed—which might influence the frequency of their

offending and likelihood of committing multiple gun crimes. There is some support for this explanation, as correlations between juvenile status and offense severity ($b = -.194$, $p \leq .001$) and case dismissal ($b = -.180$, $p \leq .001$) were statistically significant and weak to moderate in magnitude. An alternative explanation is that juvenile offenders are more likely to be released prior to their next court appearance and, therefore, maintain greater and more frequent opportunities to engage in additional gun crimes. Absent 'in/out' data from the jail management system, however, I could not test this hypothesis.

It is also important to note the finding that, counter to Hypothesis 4, the cross-product interaction between gang membership and juvenile status failed to achieve statistical significance. This finding could speak to the need to explore additional mediating or moderating effects, such as risk and/or protective factors that influence a juvenile's odds of repeat firearm offending. Temporal factors could have similarly impacted these results. For example, the development of a juvenile's involvement within a gang may lead to more frequent and serious gun offending at later stages.

Another notable discrepancy between the current study's findings and the expected results was the null relationship between concentrated disadvantage and repeat firearm offending. Prior works have routinely described strong, positive, and statistically significant relationships between measures of structural deprivation and aggregate, repeat, and chronic offending—including offenses associated with firearms (Chung & Steinberg., 2006; Fabio et al., 2011; Messer et al., 2006). Our findings therefore represent a departure from prior studies, yet they are consistent with prior studies of Chattanooga (e.g., Scott et al., 2023). One potential explanation could be the disproportionate structural disadvantage experienced by the tracts included in the sample. As described above, tract-level analysis was restricted to 44 census tracts

containing a minimum of 3 residents arrested for firearm-related offenses. Descriptive analysis of these included tracts revealed markedly high levels of structural deprivation (e.g., percent in poverty, low educational attainment) at both the individual and tract levels. Therefore, the overrepresentation of structural disadvantage within the sample could have masked the impact of structural factors on the dependent variable.

Limitations

In addition to these concerns, there are potential issues related to the brevity of the observation period, which extended from 1/1/21 to 4/30/23. Recidivism studies typically use a minimum window of 3 years, with some extending to 5 and 10 years, to adequately explore the effects of individual and contextual characteristics on repeat offending. Thus, the effects reported here may be underestimated. Effects are also likely to be underestimated because the data are based on arrest records related to *known* gun crimes. It is entirely possible, if not likely, that any number of individuals committed one or more gun crimes but were not identified as suspects or arrested. Further, not all offenders in the sample had the same temporal 'opportunity' to reoffend. In other words, an offender whose first known gun crime was committed on 4/29/23 had far less time to reoffend than another offender whose first known crime was committed on 1/2/21. This may suggest the need for application of additional statistical analysis in the form of survival/hazard analysis.

Conclusions

Despite these limitations, the findings presented in this thesis lend themselves to specific and practical policy recommendations. First, the results of the HGLM strongly suggest the need for CPD and the Hamilton County District Attorney's Office to pay increased attention to gun

crimes involving arrestees who are juveniles and/or gang members, even those that might appear 'minor' according to statute (e.g., misdemeanor possession). As my findings illustrate, these individuals are at increased risk of continued involvement in gun crime. Moreover, there is a progression in the seriousness of offending observed among multiple arrestees included in the data. Specifically, several offenders initially arrested for relatively minor gun crimes were later re-arrested for additional and more violent gun-related offenses (e.g, murder, aggravated assault) —suggesting the potential utility of early intervention.

Increased scrutiny and intervention should not, however, be considered tantamount to increased severity in punishment. Indeed, research indicates that heavy-handed sanctions can produce deleterious effects, particularly when applied to juveniles (Lambie & Randell, 2013; Myers, 2003; Scott & Steinberg, 2008). A triaged approach to gun crime and gun offenders is likely more appropriate. For instance, although some cases may require the full application of the law, others may simply require a more robust responses that incorporates stakeholders ranging from schools and parents to mental health professionals, social workers, and juvenile officers.

Furthermore, this study highlights noteworthy concerns with the data itself that can and should be addressed. First, the inclusion of "in/out" data would allow future research to more accurately account for the duration during which offenders are in custody and, thus, unable to commit additional gun crimes. Second, the inclusion of any other relevant data gathered by CPD during the booking of offenders, such as mental health diagnoses and educational attainment, would allow for a more complete understanding of potential risk factors associated with (re)offending patterns, thus addressing issues of omitted variable bias and bolstering confidence in the results of statistical analysis.

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APPENDIX A

IRB APPROVAL LETTER

THE UNIVERSITY OF TENNESSEE CHATTANOOGA

Institutional Review Board
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TO: Dr. Rick Dierenfeldt **IRB #20-171**
Katlyn Whittenburg, Grant Drawve

FROM: Dr. Cheryl Murphy, Director of Research Integrity
Dr. Susan Davidson, IRB Committee Chair

DATE: 9/11/2023

SUBJECT: IRB #20-171: Scenic City Crime Gun Intelligence Center

The University of Tennessee at Chattanooga Institutional Review Board has reviewed and approved the following changes for the IRB protocol listed above:

- Addition of Katlyn Whittenburg as an investigator.
- Removal of Dana Stripling as an investigator.
- Protocol extended until 9/11/2024.

Please keep in mind that all research must be conducted according to the proposal submitted to the UTC IRB. If changes to the approved protocol occur, a revised protocol must be reviewed and approved by the IRB before implementation. For any proposed changes in your research protocol, please submit an Application for Changes, Annual Review, or Project Termination/Completion form to the UTC IRB. Please bear in mind that significant changes could result in having to develop a new application for submission and approval. Your protocol will be automatically closed at the end of the proposed research period unless a change request application is submitted. No research may take place under a closed or expired protocol.

A goal of the IRB is to prevent negative occurrences during any research study. However, despite our best intent, unforeseen circumstances or events may arise during the research. If an unexpected situation or adverse event happens during your investigation, please notify the UTC IRB as soon as possible. Once notified, we will ask for a complete explanation of the event and your response. Other actions also may be required depending on the nature of the event.

Please refer to the protocol number denoted above in all communication or correspondence related to

your application and this approval.

For additional information, please consult our web page http://www.utc.edu/irb or email instrb@utc.edu.

Best wishes for a successful research project.

VITA

Katlyn Whittenburg was born in Atlanta, Georgia to Saun Whittenburg and Nicholas Whittenburg. She is the eldest of two. After graduating from Notre Dame High School in Chattanooga, Tennessee, she continued her education at the University of Tennessee in Knoxville. In May of 2010, she graduated with her Bachelor of Art in Theatre. Upon graduating, Katlyn worked in marketing and community building at The Iron Yard Code School in Austin, Texas and, later, at the Lamp Post Group in Chattanooga, Tennessee. All the while, she performed stand-up comedy- completing an intensive comedy writing program at Second City in Chicago, Illinois as well as an intensive improvisation performance program at the Upright Citizens Brigade in Los Angeles, California. Katlyn is continuing her education by pursuing a Master of Science in Criminal Justice at the University of Tennessee in Chattanooga.