WHEN IN ROME: EXAMINING THE INFLUENCE OF NEIGHBORHOODS ON THE RELATIONSHIP WITH SELF-CONTROL AND OFFENDING

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CHAPTER 1

INTRODUCTION

Gottfredson and Hirschi’s (1990) general theory of crime has been important for understanding the relationship between low self-control and a broad range of criminal and deviant offenses. According to the theory, low self-control is the most important individual-level factor that causes criminal and analogous behaviors. Even critics who debate the assumptions and findings of the theory agree that it has stimulated an incredible amount research and is among the most cited explanations in criminology (Akers 1991; Grasmick et al. 1993; Evens et al. 1997; Tittle et al. 2004; Akers 2008; Goode 2008). In fact, a recent overview of the general theory of crime referred to it as the “Tyrannosaurus rex of criminology” (Delisi 2011:103).

Empirical examinations confirm the general theory’s central proposition that low self-control directly relates to deviant and criminal behavior. Pratt and Cullen (2000) conducted a meta-analysis of published general theory research and found that low self-control is one of the strongest correlates of crime, even after controlling for other theoretically relevant variables. The relationship between low self-control and crime has been examined and confirmed in experimental, cross-sectional, and longitudinal studies and within different groups and cultures (Evans et al. 1997; Tittle et al. 2004; Gottfredson and Hirschi 2008).
Despite the empirical support for the effects of low self-control on crime, Gottfredson and Hirschi have been critiqued for claiming that the general theory of crime has universal application (Greenberg 2008; Geis 2000, 2008) and for neglecting to develop the concept of opportunity in the theory (Barlow 1991; Grasmick et al. 1993; Simpson and Geis 2000, 2008; Matsuada 2008). A case has also been made that Gottfredson and Hirschi’s oppositional stance toward other explanations is not congruent with evidence that supports these explanations, including social disorganization and social learning theories (Akers 2008; Matsuada 2008; and Gies 2008). Matsuada (2008), for example, suggests that social disorganization theory is still relevant and stands as an important contribution to the field. Akers (2008) proposes that social learning and self-control theories are actually compatible. Tittle and colleagues (2004), Akers (2008), Matsuada (2008), and Simpson and Geis (2008) argue that the shortcomings mentioned above could be reduced by integrating concepts and/or propositions from other theories.

Advocates of theoretical integration propose that theoretical development is hindered by the fact that there are too many theories, and that sociologists (including criminologists) could reduce the number of theories through integration, which would lead to a more unified framework and thereby increase explanatory power (Bernard and Snipes 1996; Markovsky et al. 2008). Integration could assist in the development of models that test interactions with concepts from different theories and across levels of analysis. The general theory of crime is important in its own right, but integrating contextual-level variables and attendant explanations would further an understanding of
how cross-level interactions between low self-control and contextual-level factors impact criminal and deviant behavior.

**Opportunity: An Avenue for Integration**

Toward developing an integrated perspective, I begin by drawing attention to the criticism that the general theory of crime neglects the opportunity construct while giving almost all emphasis to self-control itself (Barlow 1991; Grasmick et al. 1993; Akers 2008; Geis 2000; Geis and Simpson 2008; Goode 2008; Matsuada 2008). As Barlow (1991) states, “Even though Gottfredson and Hirschi define criminality in terms of certain inferred properties of crime, it is not at all clear how differential opportunities for force and fraud link theoretically (or logically) with different levels of self-control” (241). According to Grasmick et al. (1993), future research should examine individual and structural circumstances that amplify or counteract the effects of low self-control, including motivations and relevant perceptions of situations.

For one thing, whether or not (or to what extent) individuals are motivated to control themselves may be conditioned by social context. As Tittle et al. (2004) state, “whether [an] interest in self-regulation manifests itself probably depends on many contextual contingencies, including one’s perception of the composition and quality of the social audience, specific types of misbehavior that might be at issue, and one’s experience and reputation” (156). Contextual contingencies might be construed, in general theory terms, as perceived opportunities at the neighborhood-level. This line of reasoning suggests the general predicate that *macro-level variables such as collective*
efficacy and aggregate self-control could interact with individual low self-control as constructs representing dimensions of opportunity. Specifically, high levels of collective efficacy reduce the opportunity to commit deviant acts, and aggregate self-control reflects the salient “social audience” that individuals have available in the way of behavioral models.

From a social learning perspective, it is axiomatic that individuals, through interaction, will learn definitions of situations from others and, even more simply, imitate others around them (Bandura 1969; Akers 2008). According to social learning theory, behavioral outcomes are influenced by a host of factors, including differential associations, definitions of situations, differential reinforcement, and imitation (Burgess and Akers 1966). Drawing on fundamental insights from social learning approaches could further illuminate how self-control interacts with contextual characteristics as individuals model their behavior and self-control within their social environment. Also, previous research has found that different contexts are related to different types of offending patterns. For example, Cloward and Ohlin (1960) found gambling and vice prevalent in Italian neighborhoods, and robbery more prevalent in racially mixed neighborhoods. Along these lines, I propose that neighborhoods as social landscapes provide differential opportunities for learning, especially imitation, and these opportunities condition the influence of individual-level self-control on different types of criminal behavior.
General Theory of Crime: Explaining Various Types of Deviance

Gottfredson and Hirschi (1990, 2008) contend that low self-control predicts rates of offending for all types of crimes and analogous behaviors. Accidents, school disobedience, truancy, drug use, smoking, drinking, victimization, sexual deviance, disease, and crime, including white collar crime, are all viewed as outcomes of low self-control (1990). Thus individuals with low self-control do not “specialize,” but rather are versatile in their offending. Gottfredson and Hirschi note that there are exceptions (2008), but they emphasize that the general theory of crime is meant to be abstract and general, rather than crime specific. Gottfredson and Hirschi (2008) state, “Any focus on a single type of crime will inevitably produce results apparently contrary to a theory that has no use for typologies, a theory based on the premise that all crimes tend to be engaged in by the same people and therefore have something in common” (218). Overall, the theory suggests that crimes and analogous acts are interchangeable and traditional distinctions of types of crimes and forms of deviance are irrelevant.

Critics of the general theory of crime argue that the effects of self-control are not as general as the theory predicts in regards to different types of crimes and deviant behaviors. Evidence is not consistent with the claim that low self-control is related to all types of criminal and deviant behavior (Barlow 1991; Geis 2000, 2008; Goode 2008). For example, Arneklev et al. (1993) found that low self-control was related to gambling and drinking but not smoking. Barlow (1991) states, “[Gottfredson and Hirschi do not] provide a basis for deducing what kind of social or cultural setting would experience a high (or low) rate of any particular crime or analogous act” (237). I will examine if low
self-control has a differential impact on varying types of deviance by exploring models that specify cross-level interactions between individual low self-control and theoretically pertinent contextual factors representing opportunity. I propose that including contextual factors could advance our understanding of how low self-control affects behavior. In the most general of terms, the influence of low self-control may be stronger for some types of behaviors in some neighborhoods but not others because opportunities vary by neighborhood. I elaborate on this point below.

Theoretical Implications

Several guiding theoretical principles can be drawn from the above discussion. First, if individuals model self-control by imitating others within their immediate social environment (Bandura and Mischel 1965), then the effects of self-control are not as stable and consistent as Gottfredson and Hirschi claim. As Akers (2008) argues, self-control is itself learned by the process detailed in social learning theory. Second, low self-control may manifest itself in different ways and lead to different types of crime and analogous behaviors if we take contextual variables (e.g., aggregate levels of self-control) into account. In general, the contextual variables identified in this research expand on the neglected concept of opportunity within research on the general theory of crime and advance the theory in a direction that fosters connections with other causal theories of crime.
Research Question

This dissertation explores an integration of propositions and concepts from social learning and social disorganization approaches with Gottfredson and Hirschi’s (1990) general theory of crime. I propose that aggregate self-control and collective efficacy represent aspects of social learning and criminal opportunity, and they condition the relationship between low self-control and deviance. Furthermore, I suggest that the effects and strengths of model coefficients vary depending upon the type of deviant behavior in question, and these differences resemble how opportunities for different types of deviant activities vary by neighborhood context. To examine this question, I test a multi-level model that specifies non-additive effects of community characteristics and self-control on different types of deviant outcomes.

The layout of this dissertation is as follows. In Chapter 2, I discuss the general theory of crime, social disorganization and collective efficacy, and aggregate self-control. In Chapter 3, I describe my research methodology. In Chapter 4, I present my results. In Chapter 5, I conclude with a discussion of findings and limitations and future directions pertaining to the present study.
CHAPTER 2

LITERATURE REVIEW

The general theory of crime predicts that when opportunities for deviant and criminal behavior exist, individuals with low self-control are more likely to act out their deviant and criminal impulses than individuals with high levels of self-control (Gottfredson and Hirschi 1990). Gottfredson and Hirschi (1990) explain that self-control is the most important individual-level cause of crime, and research has shown that low self-control is significantly related to various types of deviance.

In this chapter I summarize the criminological literature on self-control, social disorganization, and aggregate self-control and social learning. To begin, I explicate the elements, assumptions, and research pertaining to self-control. Next, I provide an overview of social disorganization and collective efficacy and offer a justification for integrating social disorganization with the general theory of crime. Subsequently, I describe aggregate self-control and the process of social learning and propose conceptualizing aggregate self-control as opportunity. Finally, I present an overview of my theoretical model and discuss theoretical contributions and claims.
Elements, Indicators, and Measures of Self-Control

Gottfredson and Hirschi (1990) define self-control as an individual attribute that reflects the extent to which individuals can refrain from committing criminal acts. According to the authors, low self-control is comprised of six separate elements: 1) immediate gratification of desires, 2) easy or simple gratification of desires, 3) excitement and risk, 4) lack of focus on long term goals, 5) lack of preparation or skill (i.e., no need to learn crime), and 6) being self-centered, indifferent, or insensitive to the suffering and needs of others (i.e., low-self-control individuals often commit crimes of pain and discomfort). As Gottfredson and Hirschi state, “In sum, people who lack self-control tend to be impulsive, insensitive, physical (as opposed to mental), risk taking, short-sighted, and nonverbal, and they will tend therefore to engage in criminal and analogous acts” (90). Self-control is conceptualized as a unidimensional personality trait that is often measured by observing behavioral and/or attitudinal aspects of the elements mentioned above.

In general, studies vary in the way they select and operationalize the elements of self-control. For example, Zimmerman (2009) highlights impulsivity, while Gibson et al. (2010) omitted measures of self-centeredness. To operationalize the elements of self-control pertaining to simple tasks, physical activities, and impulsive behavior, Teasdale and Silver (2009) used four indicators: homework completion, trouble getting along with teachers, problems with paying attention, and trouble keeping focused. Wright et al.
developed a measure of self-control from 150 items that represent impulsivity, lack of persistence, high activity, risk, and responses to conflict. Grasmick and his colleagues (1993) created an attitudinal self-control scale from 23 items pertaining to impulsivity, simple tasks, risk seeking, physical activities, self-centeredness, and temper. Gibson et al. (2010) used the Emotionality, Activity, Sociability, and Impulsivity (EASI) Temperament scale originally developed by Buss and Plomin (1984) to measure aspects of self-control relating to what the authors label inhibitory control, decision time, sensation seeking, and persistence.

Regardless of differences in measurement, the general theory of crime emphasizes that self-control is a unidimensional personality trait comprised of the varying elements of self-control described above. The unidimensional conceptualization might be called into question if empirical assessments find that the elements are, in fact, distinct. Grasmick et al.’s (1993) scale, a common measure for self-control (Pratt and Cullen 2000), was developed to explore this important question. On the one hand, Grasmick et al. (1993) and Piquero and Rosay (1998) provide evidence that the elements of self-control (i.e., impulsivity, simple tasks, risk seeking, physical activities, volatile temper, and self-centeredness) do form a unidimensional latent personality trait. On the other hand, some evidence suggests that elements of the theory are not as distinct as theorized. Arneklev et al. (1993) found that when they disaggregated Grasmik et al.’s (1993) self-control control scale into unique components, simple tasks and physical activities did not predict anti-social behavior. Furthermore, the effect of simple tasks was in the opposite direction of the theory’s prediction (i.e., self-control as “simple tasks” had a negative
effect on anti-social behavior). More recently, Arneklev et al. (1999) found that items representing impulsivity had very high loadings on a factor interpreted as the self-control construct in the general theory, while items representing physical activities had very low factor loadings. While the authors question whether self-control and impulsivity are one and the same, they conclude that the six dimensions are important and do in fact represent a single construct-self-control.

Beyond questions concerning the measurement of self-control, another area of controversy within research on self-control concerns the distinction between behavioral and attitudinal measures of self-control. Wright et al. (1999, 2004) recommend use of both types of measures by observing psychological (attitudinal) characteristics (i.e., impulsivity, risk, and persistence) as well as behavioral characteristics (i.e., accidents, drinking, and smoking). In a relevant meta-analysis, Pratt and Cullen (2000) found that most studies in their sample (N=21) used attitudinal measures, such as the Grasmick et al. (1993) scale, as opposed to behavioral measures. Regardless, the effect size estimates on criminal outcomes were comparable for both types of measures. Tittle et al. (2003) examined whether behavioral and cognitive (attitudinal) measures of self-control produced divergent findings for eight types of criminal/deviant outcomes and found that both behavioral and attitudinal assessments of self-control provided support for the theory.

On this particular issue, Gottfredson and Hirschi (2008) and Gottfredson (2009) prefer behavioral over attitudinal measures and suggest that future self-control research should explore new measures of self-control, including age-graded developmental scales.
However, the exclusive use of behavioral indicators is not without problems. Discriminant validity and tautology are potential limitations when using behaviors analogous to crime as measures of self-control (Akers 1991, 2008; Tittle et al. 2003).

Hirschi and Gottfredson (1993) address this point of criticism by arguing that self-control is associated with, not the cause of, behaviors used as indicators: “We explicitly propose that the link between self-control and crime is not deterministic, but probabilistic, affected by opportunities and other constraints” (p. 53; see also Gottfredson and Hirschi 2008). In fact, the authors suggest that the tautological criticism is a “compliment” because they logically derived their conceptualization of an offender from their conceptualization of crime; the two will be similar by nature. The authors argue that measures such as school performance could be either an indicator or an outcome of self-control. Hirschi and Gottfredson (1993) argue that if tautology represents a problem for researchers, then they could use indicators of self-control that are independent from “crime.” For example, whining (for younger respondents), smoking, getting in accidents, and drinking (as an adult) are independent from Hirschi and Gottfredson’s definition of crime (i.e., using force or fraud for personal gain).

The current research on the general theory uses the Emotionality, Activity, Sociability, and Impulsivity (EASI) Temperament Survey developed by Buss and Plomin (1975). The EASI survey captures several elements of Gottfredson and Hirschi’s (1990) conceptualization of self-control. It can be used to evaluate respondents based on four similar “temperaments”: emotionality, activity, sociability, and impulsivity. Gibson and colleagues (2010) used the EASI scale to assess the need for immediate gratification,
easy or simple gratification of desires, risk taking, lack of focus on long term goals, and persistence. Evaluations of construct validity were supportive, and problems associated with attitudinal assessment were avoided because Gibson et al. used parental reports (54). That is, Hirschi and Gottfredson (1993) suggest that self-reported measures of self-control (e.g., the Grasmick et al. 1993 scale) are not as valid as observations of behaviors from other sources (e.g., parents, teachers, peers) because respondents’ level of self-control will influence survey responses. (Hirschi and Gottfredson 1993; Piquero et al. 2004). Overall, the EASI scale is desirable because it has been used in previous research (e.g., Halverson et al. 1994), is available in the PHDCN data, has the advantages of parental assessments of self-control, and focuses on behavioral aspects of self-control.

**Theoretical Assumptions**

Two important empirical trends facilitated the development of self-control theory and its underlying assumptions. **First**, the consistency of the age-crime curve implies that criminal behavior is both stable and variable; that is, differences in criminal offending *between individuals* are stable over time, but as individuals grow older, rates of offending decline for everyone. **Second**, criminals are versatile in that they do not specialize in criminal activity but engage in multiple types of deviance throughout the life-course. Crime is just a way to ensure that one’s self interests and gratifications are met quickly and easily. These two insights, Gottfredson (2008) states, are the core assumptions for a general theory of crime.
In addition to these core assumptions, the general theory of crime also assumes that self-control is a product of parenting (Gottfredson and Hirschi 1990). Parental affection and attachment, operationalized by measures indicating the “physical and psychological presence of parents in the child’s immediate environment,” influence the development of self-control (Gottfredson 2008: 86). A handful of recent studies have examined this assumption. Using the Project on Human Development in Chicago Neighborhoods (PHDCN) data, Gibson et al. (2010) found parenting to be more important than neighborhood collective efficacy. Gibson et al.’s (2010) findings are consistent with the general theory of crime’s assumption that parenting is the most important influence on self-control.

Other studies provide evidence that self-control is contingent upon other factors (i.e., in addition to parental socialization). Using a sample from The National Longitudinal Study of Adolescent Health (ADD Health) data, Teasdale and Silver (2009) found that neighborhood structural characteristics (i.e., neighborhood SES and residential mobility) were more important than parenting. Pratt et al. (2004) found that the effects of neighborhood conditions were as strong as parenting variables on levels of self-control. Turner et al. (2005) identified school context as an important indicator of self-control, controlling for parenting socialization. Furthermore, Turner and colleagues found that the effects of school socialization on self-control varied by neighborhood, thus suggesting cross-level interactions between individual levels of self-control, schools, and neighborhoods.
In addition to its focus on the importance of parental socialization, another important assumption in the general theory of crime concerns motivation. According to Gottfredson and Hirschi (1990), the motivation to commit crime is constant because all individuals are born motivated to commit crime in pursuit of self-interest. Conceptualizing motivation as a constant has several implications: 1) crime is not learned, 2) delinquent peers are not the cause of crime, and 3) subcultural theories are in error because criminals do not learn rationalizations, techniques, and motivations for criminal offending (Matsuada 2008). As such, the general theory of crime conflicts with many traditional criminological theories (Matsuada 2008). Furthermore, it asserts that an individual’s level of self-control, once developed, is invariant across situations defined by varying levels social disorganization and differential social organization (i.e., contexts for social learning).

Research on Self-Control

The hypothesis that self-control is negatively related to criminal and deviant behavior has been generally supported (Pratt and Cullen 2000). In addition, findings bearing on the general theory of crime are consistent, as the theory would predict, across samples and groups. For example, Vazsonyi et al. (2001) found that self-control theory “works” for both males and females, in different countries, and across different age groups. Studies have confirmed the effects of self-control on crime among groups of offenders (Longshore 1998; Stewart 2004; Piquero et al. 2005), non-offenders (Redmon 2003; Seipel et al. 2010), college students (Sellers 1999; Muraven 2006; Denson 2006;
Ward et al. 2010), adolescents (Schreck et al. 2006; Burt et al. 2006; Malin et al. 2009; Nofziger 2009), the homeless (Baron 2003), and even species other than humans (Tanno et al. 2011).

The relationship between self-control and crime has been examined with cross-sectional, longitudinal, experimental, and qualitative research methodologies. According to Gottfredson and Hirschi (1990), cross-sectional studies are preferred over longitudinal designs. They claim that longitudinal designs are not needed because: 1) a person’s self-control is invariant beyond adolescence, 2) levels of criminality are stable when compared across individuals, and 3) the age crime curve is empirically robust. Life-course events that may shape criminal behavior are spurious effects of self-control and aging (Gottfredson and Hirschi 1990). Lynam et al. (2000) and Pratt and colleagues (2004) examined results from both cross-sectional and longitudinal designs and reported findings consistent with this view.

Despite the analytical and empirical case for using cross-sectional data to test the general theory of crime, many studies examining self-control have employed longitudinal designs (Pratt et al. 2004; Burt et al. 2006; Schreck et al. 2006; McGloin et al. 2010). For example, Burt and colleagues (2006) used longitudinal data to test whether individual levels of self-control are stable over time. Contrary to the general theory, the authors found that levels of self-control are variant, and factors such as improvements in parenting and associations with deviant or pro-social peers explained a significant amount of the variance in self-control.
In addition to survey studies, experimental research designs have also been used to investigate the influence of self-control on deviant behavior (Muraven et al. 2006; Kalkhoff and Willer 2008; Mead et al. 2009; Denson et al. 2011). Most recently, Denson and colleagues (2011) examined whether self-control “training” had an effect on subsequent aggression among college students. Their results indicated that two weeks of self-control training was especially beneficial for highly aggressive individuals and that the experimental group, in general, showed less follow-up aggression than participants in a control group who did not receive any training. These results are clearly inconsistent with Gottfredson and Hirschi’s (1990) assumption that an individual’s level of self-control is invariant once formed.

Whether experimental or survey based, most studies of the general theory have utilized quantitative methods. As an exception, Redmon (2003) utilized both quantitative and qualitative data to understand self-control’s influence on lewd behavior. Respondents attending “Mardi Gras” in New Orleans first filled out a questionnaire about self-control and various deviant behaviors (i.e., fighting, drug use, and lewd behavior). These respondents then completed open-ended, semi-structured interviews that focused on public sexual behavior (e.g., exposing breasts). Consistent with the upshot of this dissertation, Redmon’s (2003) qualitative analyses suggest that self-control’s influence is a product of the situation. Specifically, respondents felt that they were “escaping” from the daily grind of their “regular” lives and, while at Mardi Gras, were acting out in ways congruent with the normative situation (Redmon 2003). As Redmon (2003) put it, “The common responses from all the interviewees suggest that the attraction to perform lewd
behavior is the perception that they can liberate themselves from an everyday life of self-control and discipline” (381). These findings are inconsistent with the general theory of crime’s assumption that self-control is invariant, at least insofar as the respondents in Redmon’s (2003) study can be seen as enacting low self-control when the situation calls for it, or “when in Rome.” Furthermore, Redmon’s (2003) results support Tittle et al.’s (2004) finding that self-control and the motivation to self-regulate have additive, non-additive, and cumulative effects on criminal and deviant behaviors. In the case of Redmon’s (2003) sample, people’s desire to regulate their level of self-control was reduced because they were in an emancipating social context.

While self-control is an important individual-level explanation of crime and deviance, the inconsistencies mentioned above suggest that self-control’s relationship with crime is more complex than originally conceptualized (e.g., Redmon 2003; Burt et al. 2006; Denson et al. 2010). Specifically, environmental characteristics representing opportunity structures may interact with self-control; the former may attenuate or amplify the effect of self-control on crime and deviant behaviors.

Self-Control and Types of Offending and Deviance

Gottfredson and Hirschi (1990) claim the general theory of crime explains all types of crime and analogous behavior, ranging from accidents to white collar crimes. Empirical examinations of this point of contention provide varying levels of support. Low Self-control is significantly related to victimization (Stewart et al. 2004; Schreck et al. 2006; Kerley et al. 2008; Nofziger 2009), property crimes (Longshore 1998), violent
crime (Sellers 1999; Ozbay and Koksoy 2009), cheating (Muraven 2006), drug use (Baron 2003; Conner et al. 2009), movie piracy (Malin and Fowers 2009), and lewd behavior (Redmon 1993). However, research directly comparing the effects of self-control across criminal (and analogous) behaviors has produced mixed results. On the one hand, Vazsonyi et al. (2004) show that the effects of self-control on crime are invariant across most types of deviance. On the other hand, Longshore (1998a) found that self-control influenced both acts of force and fraud (i.e., acts consistent with the general theory’s definition of crime), but opportunity exerted a differential moderating influence: the effects of self-control on fraud were contingent on opportunity, while this was not the case for acts of force. Additionally, Longshore (1998b) examined self-control’s influence on drug use and property crimes and found similar results. Drug use and property crimes were most frequent among low self-control respondents, but opportunity explained part of that relationship. Cretacci (2008) concluded that the effects of self-control vary by type of offense and that future research should include other contextual measures—such as opportunity, risk, and bonds—to further our understanding of self-control’s influence on various types of criminal behavior. Finally, Conner et al. (2009) found that specific elements of self-control, rather than a global measure, were associated with different types of crimes. Risk seeking traits were associated with property crimes and temper predicted drug use and violent crime. In sum, the effects of self-control on crime do not appear to be consistent across types of offenses, the specific elements of self-control appear to have differential effects, and most importantly, social learning structures and
neighborhood characteristics, as moderating influences, may help explain the variability in self-control’s effects on different types of offending.

Gaps in the Theory

Gottfredson and Hirschi are often critiqued for 1) claiming that the general theory of crime has universal application (Greenberg 2008; Geis 2000, 2008), 2) offering a tautological explanation (Akers 1991, 2008; Geis 2000), 3) assuming that the motivation to commit crime is constant (Matsuada 2008, Akers 2008), and 4) neglecting to develop the concept of opportunity in their theory (Barlow 1991; Grasmick et al. 1993; Simpson and Geis 2000, 2008; Matsuada 2008). As mentioned above, a case has also been made that Gottfredson and Hirschi’s oppositional stance is incongruent with evidence that supports other theories, including social disorganization and social learning theories (Akers 2008; Matsuada 2008; and Gies 2008). Matsuada (2008) suggests that social disorganization theory is still relevant and stands as an important contribution to the field. Akers (2008) proposes that social learning and self-control theories are actually compatible. Tittle and colleagues (2004) assert that the link between self-control and crime is not particularly strong, with correlations typically reported around .30. As they state, “For self-control to more fully account for criminal/deviant behavior, the theory will probably have to identify other variables that intermesh with it” (Tittle et al. 2004: 145). Tittle et al. (2004), Akers (2008), Matsuada (2008), and Simpson and Geis (2008) argue that the shortcomings mentioned above could be overcome by integrating concepts and/or propositions from other theories.
Gottfredson and Hirschi (2008) have responded to critiques of their approach by stating that the questions their theory asks, and the answers to those questions, are supported by empirical facts. Gottfredson (2008) suggests that future research should focus on developing refined measures of self-control, including age-graded self-control measures for developmental stages of children. Additionally, Gottfredson and Hirschi argue that integration will undermine the theory by adding unneeded complexity (2008). While parsimony is an important goal, many critics of the general theory of crime recommend that integration is nonetheless needed to advance our understanding of the self-control crime link (Matsuada 2008, Akers 2008, and Tittle et al. 2004).

Opportunity and Self-Control

As stated above, research on the general theory of crime has neglected the opportunity construct in the theory while directing almost all attention to the main effect of self-control (Barlow, 1991; Grasmick et al. 1993; Akers 2008; Geis 2000; Geis and Simpson 2008; Goode 2008; Matsuada 2008). According to Grasmick et al. (1993), the general theory of crime could benefit from research examining the circumstances that attenuate or amplify the effects of low self-control, including motivations and perceptions of situations. I argue that variables from social disorganization theory (i.e., collective efficacy) or social learning approaches (i.e., opportunities for modeling) could shed light on how dimensions of opportunity moderate the relationship between self-control and crime. For example, high levels of collective efficacy may reduce the opportunity to commit deviant acts (which would attenuate the effect of self-control), and aggregate
self-control may reflect the salient “social audience” that individuals have available as behavioral models (i.e., high levels may change the types of deviant behaviors that low self-control individuals enact). I take the position that fleshing out collective efficacy and aggregate self-control as moderating opportunity structures may prove to be especially fruitful when it comes to unraveling the varying influence self-control on crime and, in particular, on different types of crimes (Cretacci 2008; Conner et al. 2009).

Studies on Self-Control and Opportunity

In the Social Science Citation Index (1980-present), there are 102 citations for the search terms “self-control” and “opportunity.” Almost one-third of these citations occurred in the period from 2010 and 2011, suggesting that interest and research on opportunity and self-control is relatively recent. Altogether, published research on opportunity and self-control represents less than one percent of literature on self-control.

The relative paucity of research on self-control and opportunity is somewhat surprising because the general theory of crime proposes that opportunity should interact with self-control’s influence on crime and deviance. In the research that does exist on opportunity and self-control, opportunity has been conceptualized and measured in various ways. As a set, specific studies have borrowed variables from routine activities theory (Hay and Forrest 2008; Seipel and Eifler 2010), social learning theories (Malin and Fowers 2009; McGloin et al. 2011), and social disorganization approaches (Lynam 2000; Zimmerman 2009).
According to Cloward and Ohlin (1960), differences in the social structure can lead to differential opportunity structures that resemble the availability of legitimate or illegitimate means of achieving goals (152). More recently, Grasmick and colleagues (1993) defined “opportunity” as the ease of committing a criminal act, the source of instant gratification, and the chance that a given criminal act might be sanctioned. As expected, the effect of low self-control on crime depended upon opportunity. In another study, Hay and Forrest (2008) conceptualized opportunity using measures derived from routine activities theory and found that self-control interacts with these measures in its effects on crime. Specifically, opportunities amplified the effects of low self-control on crime. Hay and Forrest (2008) argue that future research should compare different types of opportunity in models specifying opportunity as a moderating construct. Seipel and Eifler (2010) did just this and found similar results using rational choice variables as measures of opportunity.

Beyond utilitarian approaches to the problem, researchers have also used social bond and social learning constructs to examine the moderating influence of opportunity structures on the relationship between self-control and crime. Longshore and Messina (2005) found support for the moderating influence of social bonds. Nofziger (2009) examined the link between self-control and victimization and found that exposure to peer deviance moderated the effect of self-control on victimization.

Not all studies support the claim that opportunity variables moderate the influence of self-control on crime. Crelacci (2008) found direct effects of opportunity on crime above and beyond the direct effect of self-control, but the interaction term (i.e.,
opportunity X self-control) was not significant for drug use, property crime, or violence. Yet Crelacci (2008) still concludes that low self-control by itself cannot explain all types of crime (e.g., violence), and that opportunity is among those variables that may clarify the complexities in the link between self-control and crime. Along these lines, Ozbay and Koksoy (2009) examined the non-additive effects of opportunity and self-control on violence. While the authors failed to find non-additive effects when using a general self-control index, they did find some interactions among specific dimensions of self-control and specific types of opportunities. For example, measures of opportunity related to family supervision do not appear to moderate the effect of risk-seeking behavior on violence, yet they do appear to moderate the effect of the “temper” dimension of self-control on violence (Ozbay and Koksoy 2009).

Overall, then, researchers have just begun to include opportunity in models examining propositions from the general theory of crime. As I detailed above, opportunity has been conceptualized in various ways using measures drawn from routine activities theory, social learning theories, and social disorganization approaches. As the results summarized above suggest, much more work is needed to untangle the complexity of opportunity’s role in the link between self-control and crime. The next section summarizes social disorganization theory and how one of its central concepts, collective efficacy, might prove to be especially useful in this task.
Social Disorganization and Collective Efficacy

Sociology and criminology have long been concerned with neighborhood influences on crime rates and criminal behavior. Developing out of the contributions of early American sociology (Burgess 1925; Park 1926; Thomas and Znaniecki 1927; Thrasher 1927; Shaw and McKay 1929), social disorganization theory has been a dominant paradigm for understanding the link between macro-level measures of community disadvantage and organization (e.g., neighborhood SES, residential mobility, and immigration rates) and aggregate rates of crime and delinquency.

Two assumptions lie at the core of social disorganization theory: 1) neighborhood structural characteristics and resources facilitate or impede social organization within neighborhoods, and 2) variations between neighborhoods in crime, delinquency, and other social problems stem from the lack social organization and social control, which intensifies definitions of situations that motivate individuals to commit crime (Thomas and Znaniecki 1958; Matsuada 2008). According to classical social disorganization theory, structural characteristics such as industrialization, urbanization, and immigration directly affect social organization within communities, which in turn influences rates of social control and explains, therefore, variability of crime from one neighborhood to another (Liska and Mesner, 1999). Cloward and Ohlin (1960) describe socially disorganized communities as places that lack legitimate opportunities for success and where illegitimate means are viewed as alternative ways of attaining such success.

Contemporary research on social disorganization stresses the importance of “collective efficacy” in the neighborhood-crime link. The inclusion of collective efficacy
resolves theoretical problems endemic to traditional conceptualizations of social (dis)organization. Specifically, social organization does not invariably entail higher levels of social control (Sampson 2009). Some areas and groups may be highly organized but lack the motivation, efforts, and resources for establishing social control (Whyte 1943). Additionally, weak levels of neighborhood ties can still coexist with social control and low levels of crime (Bellair 1997; Sampson 2009). Overall, conceptualizing social organization as collective efficacy provides a new, fruitful avenue for social disorganization research absent of the problems accompanying traditional measures of social disorganization.

Definition of Collective Efficacy

Collective efficacy, as conceptualized by Sampson and colleagues (1997), is a specific form of social organization that moves beyond social disorganization theory’s traditional focus on aspects of structural cohesion (e.g., density, immigration, and neighborhood ties). Sampson et al. (1997) define “collective efficacy” as the combination of “mutual trust and willingness to intervene for the common good” (919). They measure collective efficacy with questions focusing on the likelihood that a respondent would intervene to help solve neighborhood issues and how strongly the respondent agrees that the neighborhood is close knit.

Although collective efficacy is a powerful indicator of neighborhood organization, it is not without limitations. Most importantly, because it is correlated with measures of other neighborhood processes and characteristics (e.g., disorder and dense
personal ties), the collective efficacy measure developed by Sampson et al. (1997) has questionable discriminant validity. Using factor analysis and PHDCN Community Survey data, Sampson (2002, 2009) found that indicators of control, cohesion, and disorder load on the same factor, but density of social ties does not. Sampson (2009) concludes, “based on theory and empirical evidence,...we have some confidence to maintain the core analytical distinction between efficacy (social action) and dense ties, all the while recognizing that there the correlations among social processes [i.e., disorder], just as among structural covariates, are high” (161).

Research on Social Disorganization

Empirical support for social disorganization theory has accumulated over the last one hundred years. Consistently, macro-level structural characteristics measuring neighborhood disadvantage vary by neighborhood, and neighborhoods with higher levels of disadvantage are more likely to have higher rates of social problems, such as disorder and adolescent delinquency (Sampson 2001). Early studies, including work by Shaw and colleagues (1929), found that: 1) patterns of crime and delinquency in Chicago varied from place to place, 2) problems persisted even after population turnovers, and 3) structural factors such as residential mobility and low median income were related to both social disorganization and deviant behavior.

More recent research finds that collective efficacy is related to crime and delinquency, and that collective efficacy mediates the effects of neighborhood disadvantage and disorder on crime (Sampson, Raudenbush, and Earls 1997;
Sampson and Raudenbush 1999; and Sampson and Raudenbush 2001). Using PHDCN data and multi-level modeling, Sampson et al. (1997) found that violence, violent victimizations, and homicides varied by neighborhood collective efficacy. That is, higher rates of collective efficacy were related to lower rates of violence. Additionally, collective efficacy mediated the relationship between neighborhood structural characteristics (i.e., concentrated disadvantage and residential mobility) and crime (Sampson et al. 1997).

**Social Disorganization and Self-Control**

Given the parallel development of social disorganization approaches and the general theory of crime, it is not surprising that recent empirical examinations have begun to combine variables from self-control and social disorganization theories (Lynam et al. 2000; Vazsonyi et al. 2006; Jones and Lynam 2009; Teasdale and Silver 2009; Zimmerman 2009, Wikstrom et al. 2010). Generally speaking, one avenue for integration involves examining the influence of macro-level social disorganization variables on individual levels of self-control to see, for example, if parenting is the primary source of self-control, as Gottfredson and Hirschi (1990) have argued. Another especially promising avenue involves multi-level specification and examination of cross-level interactions between neighborhood factors and self-control. Such an approach asks, “Does self-control vary by neighborhood context and with what effects?”
In terms of the first avenue of integration, results have been inconsistent. On the one hand, using The Project on Human Development in Chicago Neighborhoods (PHDCN) data, Gibson et al. (2010), found that parenting more strongly influenced levels of self-control than neighborhood collective efficacy. This finding supports Gottfredson and Hirschi’s claim that parental socialization is the most important determinant of self-control. On the other hand, Teasdale and Silver (2009) used a sample from The National Longitudinal Study of Adolescent Health (ADD Health) data and found that neighborhood structural characteristics (i.e., neighborhood SES and residential mobility) were more important than parenting for the development of self-control. Across cross-sectional and longitudinal research designs, Pratt et al. (2004) found that neighborhood conditions had effects on self-control comparable to parenting. Finally, Turner et al. (2005) found that school socialization is significantly related to self-control, but only in good neighborhoods.

In terms of the second avenue of integration mentioned above, only a handful of studies have examined how neighborhood characteristics may moderate the impact of self-control on crime. Lynam et al. (2000) found that the effects of impulsivity on crime were stronger among adolescent boys who lived in low SES neighborhoods. Using a nationally representative sample, Vazsonyi et al. (2006) found that the effect of self-control on crime did not vary across neighborhoods for males, though it did for females. Despite the finding for females, Vazsonyi et al. (2006) concluded that their findings support the hypothesis that neighborhoods are, for the most part, not influential in the relationship between self-control and crime. In another study, Jones and Lynam (2009)
found that the effects of impulsivity on offending were stronger for individuals who perceived low social control in their neighborhoods. Finally, in a study most relevant to this dissertation, Zimmerman (2009) also found that the effect of impulsivity on property and violent crimes was moderated by various measures of neighborhood disadvantage (i.e., neighborhood SES, collective efficacy, criminogenic behavior settings, and pro-criminal definitions). However, unlike Lynam et al. (2000), Zimmerman’s findings were in the opposite direction: the effect of impulsivity on crime was stronger in higher, not lower, SES neighborhoods.

**Conceptualizing Collective Efficacy as Opportunity**

The research summarized above, at least in part, supports the contention that macro-level variables, including collective efficacy, moderate the effect of self-control on crime. In contributing to this line of research, this dissertation specifically conceives of collective efficacy as a construct representing opportunity within the framework of the general theory of crime. If collective efficacy is high, I maintain that opportunities for criminal behavior may be greatly reduced insofar as neighbors are more likely to “do something or say something” about neighborhood problems. Furthermore, a central contention of my dissertation is this: as proposed by symbolic interactionsists in general (e.g., Mead 1934) and by social disorganization theorists in particular (e.g., Thomas and Znaniecki 1958), individuals perceive and contribute to definitions of the situations around them, and they act in ways congruent with their social (e.g., neighborhood) perceptions and definitions. This view is consistent at the most general level with
Kalkhoff and Willer’s (2008) experimental research showing that low self-control individuals are more responsive to sanction perceptions than high self-control individuals. Impulsive residents who perceive low, as opposed to high, levels of collective efficacy may be more inclined to behaviorally enact an impulsive drive in line with attendant perceptions of diminished external control (e.g., fewer interpersonal consequences of misconduct). Results in this direction would constitute further support the view that the effects of self-control on crime vary by neighborhoods. In the absence of such interactions, my findings would support the “invariance hypothesis” asserted by Gottfredson and Hirschi. The current research expands on the general theory of crime by including macro-level characteristics that resemble opportunity (i.e., collective efficacy) in models that examine the relationship between self-control and crime. Furthermore, I theorize an additional undertheorized form of opportunity, aggregate self-control, which I describe in the next section.

Social Learning Theory

Social Learning and Modeling

Social learning presumes that individuals’ attitudes and behaviors are open to change, and that socio-environmental factors produce such changes by providing models that exert social influence over attitudes and behaviors (Bandura 1969). Bandura and Mischel (1965) have shown that delayed gratification, an important element of self-control, can change through reinforcement and modeling. Parents, neighbors, peers, teachers, and other groups are all potential social models that may activate within an
observer certain behaviors, attitudes, and propensities. Variables measuring *aggregate* levels of self-control can be viewed as indicating a social modeling context. That is, people who are surrounded by others with low self-control may be far more likely to *behaviorally enact* their own low self-control through modeling because “that’s just what people do.” By the same token, individuals with low self-control who are surrounded by others with high self-control may find different outlets for its expression (e.g., analogous acts and less serious forms of offending).

Like Bandura, Akers (1973) proposes that behavior is acquired through interaction, and behavior changes when social and environmental cues reinforce new behaviors, definitions, and rationalizations. The argument is clearly Meadian in flavor. More recently, Akers (2009) has identified five traits important for social learning: 1) imitation, 2) definitions, 3) differential association, 4) differential reinforcement, and 5) perceived reward/costs. More to the point, Akers (2008) proposes that social learning theory and self-control are analytically compatible and that self-control is itself learned by the process illustrated by social learning theory. In line with this view, Wright et al. (1999, 2001) found that the effect of self-control on crime is moderated by social affiliations. Specifically, the effect of self-control on crime was most important for individuals with delinquent friends. Similarly, Higgins (2007) found that peers conditioned the effect of self-control on movie piracy. In other words, group norms exacerbated the effect of self-control on movie piracy. Taken together, these results suggest that the effects of self-control on crime are amplified by a social learning process.
**Conceptualizing Aggregate Self-Control as Opportunity**

Drawing on fundamental insights from social learning theory could further illuminate how self-control interacts with contextual characteristics as individuals model their behavior and self-control within a social environment. I use aggregate levels of self-control as a social learning variable to represent a dimension of neighborhood opportunity, thus providing the theoretical link with the general theory of crime. I propose that neighborhoods, as social landscapes, provide differential *opportunities* for learning, namely imitation, and these opportunities condition the influence of self-control on different *types* of criminal behavior, as described below.

To date, aggregate self-control has not been examined as a theoretical variable in models looking at criminal and deviant behavior. However, insights from social learning theory provide a framework for conceiving of aggregate self-control, along with collective efficacy, as an opportunity construct within the framework of the general theory of crime. The widespread presence of low self-control provides a catalytic social opportunity for the modeling and behavioral expression of anti-social impulses, while the widespread presence of high self-control entails different social conduits for the modeling and expression of anti-social drives. In areas characterized by high levels of aggregate self-control—i.e., in areas marked by diminished “opportunity”—it stands to reason that the behavioral expression of low self-control is likely to take on the character of less serious forms of offending and analogous acts: As self-control decreases in areas characterized by high aggregate self-control, self-reported involvement in minor offenses and analogous acts will increase. In areas characterized by low aggregate self-control,
individual levels of self-control will be related to all forms of offending, including serious offenses.

*Theoretical Models*

**Aggregate Self-Control Models**

Level 1
- Individual Controls
- Low Self-Control
- Offending

Level 2
- Aggregate Self-Control
- Neighborhood SES

**Collective Efficacy Models**

Level 1
- Individual Controls
- Low Self-Control
- Offending

Level 2
- Collective Efficacy
- Neighborhood SES

*Figure 1: Simplified Theoretical Model—“When in Rome”*

*Theoretical Elaboration*

This dissertation extends research on self-control by integrating concepts from social disorganization and social learning theories into the general theory of crime. To complete this task, I specify moderating (cross-level) effects of collective efficacy and
aggregate self-control in the relationship between individuals’ self-control and self-reports of their offending behavior. Congruent with Gottfredson and Hirschi (1990), I propose that opportunities are always available to commit crime, but I extend the theory by treating opportunities as variable rather than constant. Multi-level modeling will allow me to conceptualize opportunity as a variable construct in an examination of the relationship between self-control and deviant behavior.

A limited number of studies have used multi-level modeling to understand connections between neighborhood characteristics (i.e., opportunity), self-control, and crime. These studies have produced inconsistent findings regarding the stability of self-control, the generality of self-control arguments (i.e., the theory’s ability to explain all types of crimes), and the significance and nature of opportunity as a moderating influence on the relationship between self-control and crime (Lynam et al. 2000; Vazsonyi et al. 2006; Zimmerman 2009). As reviewed above, Lynam et al. 2000 found that the effects of self-control on crime were strongest in low SES neighborhoods, while Zimmerman (2009) found that the effects of self-control were strongest in high SES and low risk neighborhoods. Vazonyi (2006), by contrast, concluded that the effects of self-control were invariant across neighborhoods. The differences in these findings could reflect unmeasured characteristics of neighborhoods.

Unlike previous studies, this dissertation examines the effects of aggregate self-control. Focusing on this factor could shed some light on why past studies have produced inconsistent results. Along these lines, it could be that varying levels of aggregate self-control are tantamount to varying levels of opportunities for modeling. Like Zimmerman
(2009), I conceptualize collective efficacy as another factor that influences the likelihood of opportunity and expect that the effects of individual-level self-control will vary by neighborhood. Additionally, I propose that the effects of self-control will vary for different types of offenses because neighborhood differences in aggregate self-control create different types of modeling opportunities. Consistent with the general theory of crime, I postulate that individuals with low self-control will find ways to express their levels of self-control. Unlike the general theory, however, I argue that available behavioral models will determine exactly how individuals with low self-control will “release” their impulsive tendencies. In areas with many high self-control individuals, behavioral models should resemble conformity and self-restraint. Individuals with low self-control who reside in these neighborhoods will manifest their impulsive drives in ways congruent with social models around them. Immersed in an environment of conformity and self-constraint, individuals with low self-control will tend to commit minor and analogous offenses rather than serious offenses. Alternatively, in areas characterized by low levels of aggregate self-control, respondents with low levels of individual self-control will tend to commit serious and minor offenses as well as analogous acts—i.e., because the social models around them are not providing behavioral cues that suggest refraining from crime or analogous acts. In short, “when in Rome, do as the Romans.”
Based on the discussion above, I derive four abstract and general theoretical claims:

1) Individual-levels of low self-control have a positive effect on delinquency, serious offending, and smoking: as low self-control increases, self-reported acts of delinquency, serious offending, and smoking will increase.

2) Collective efficacy and aggregate levels of low self-control will affect rates of delinquency, serious offending, and smoking as follows: as collective efficacy decreases and aggregate low self-control increases, rates of self-reported delinquency, serious offending, and smoking will increase.

3) Aggregate levels of self-control affect the strength and form of the relationship between individual levels of self-control and offending: In areas characterized by relatively low levels of aggregate self-control, the effect of low self-control will be stronger (amplified) compared to high aggregate self-control neighborhoods for serious offending, but not minor offending (delinquency) or smoking.

4) Neighborhood levels of collective efficacy affect the strength and form of the relationships between individual levels of low self-control and offending: In areas characterized by relatively low levels of collective efficacy, the effect of low self-control will be stronger (amplified) for serious offending, but not for minor offending (delinquency) and minor offending and smoking.
CHAPTER 3

METHODS

The following chapter is divided into three sections. In the first section, I discuss the basic research design and sampling procedures. In the next section, I describe the measures used in the current study. In the final section of this chapter, I outline my analytic strategy.

Research Design

For this study, I use secondary survey data collected from telephone and face-to-face interviews for the Project on Human Development in Chicago Neighborhoods (PHDCN). The project was launched in 1988, and data collection began in 1994 and lasted roughly eight years. A primary goal of the PHDCN was to develop an understanding of how social contexts affect child development and behavior in order to inform public policy concerning crime reduction (Tonry et al. 1991). To fulfill this task, data were collected about neighborhoods, families, schools, and children residing in the city of Chicago. Because the PHDCN is an interdisciplinary effort, it contains a broad range of variables that are related to psychological, ecological, and race and class perspectives (Tonry et al. 1991).
The PHDCN study consists of four major components: 1) the Longitudinal Cohort Study (LCS), 2) Community Surveys (CS), 3) Infant Assessment Units (IAU), and 4) Systematic Social Observation (SSO). This dissertation will utilize the Community Surveys and the Longitudinal Cohort Study. Together, the Community Surveys and the Longitudinal Cohort Study provide information on neighborhood and individual-level factors that are relevant to many theories of childhood behavior, and to my research questions in particular.

Sample

Location

Chicago was selected as the research site for the PHDCN for several reasons. First, Chicago’s size and extensive diversity along racial, ethnic, and class lines allow for meaningful group comparisons (Sampson et al. 1997). Second, the relative stability of Chicago neighborhood boundaries allows researchers to investigate well-defined geographic units. Third, Chicago has been an important research site for social scientists since the early part of last century when Chicago School theorists completed extensive qualitative and quantitative research on the city and its occupants (e.g., Burgess 1925; Park 1926; Shaw and McKay 1929). Finally, the city’s governmental officials, schools, and criminal justice workers were willing to participate in the PHDCN project.
Sampling Method

To obtain a representative sample for the Community Survey, the PHDCN involved a stratified probability sample—a method that allows sampling units to have a known probability of selection, thereby ensuring sufficient sample points to support subgroup analyses, among other benefits (Groves et al. 2004). The directors of the study began by defining geographic neighborhood boundaries across the city. To develop neighborhood clusters, developers used census data and performed cluster analyses on racial distributions, SES, housing density, and family organization (Sampson et al. 1997). They selected 343 neighborhood clusters derived from 847 census tracts. Knowledge of physical borders (e.g., railroads) and traditional neighborhood boundaries helped develop neighborhood units (Sampson 1997). This strategy resulted in neighborhoods consisting of approximately 8,000 people who were homogenous on the census variables mentioned above (Sampson et al. 1997).

After the 343 neighborhood clusters were identified, a multistage sampling technique was employed in three subsequent stages. First, city blocks were sampled from within each neighborhood cluster. Second, a systematic random sample of households within the selected blocks was conducted. Third, respondents were selected within each household by creating a list of all eligible respondents per household and randomly selecting one for the interview. This method produced 8,782 survey respondents from the 343 neighborhood clusters. The overall response rate for the Community Survey was 78% (Earls 1997).
Out of the 343 neighborhood clusters in the Community Survey, stratified probability sampling methods were used to select 80 for the Longitudinal Cohort Study (LCS) (Sampson et al. 1997). Respondents in neighborhood clusters selected for the LCS were oversampled with the goal of having 50 households in each neighborhood (Sampson 1997). After the LCS neighborhood clusters were identified, block groups were chosen by means of simple random sampling. Next, a systematic random sample of households was selected from within these block groups. Finally, a respondent was randomly selected from a list all household members over the age of 18 (Sampson 1997).

The Longitudinal Cohort Survey data collection occurred in three waves: 1994-1997, 1997-1999, and 2000-2001. Information was collected from primary caregivers and respondents who were from one of seven cohorts aged 0 (6 months), 3, 6, 9, 12, 15, and 18. The Longitudinal Cohort Study has a response rate that ranges from 75-85%, depending on the wave of data collection, and consists of over 6000 respondents.

This dissertation focuses on cohorts aged 9, 12, 15, and 18 from the first wave of data collection. These ages are especially important for the onset of criminal offending and the development of offending patterns (Tonry et al. 1991). Cohorts, who are younger than 9, are less likely to have committed any serious offenses. Additionally, self-control is assumed to be stable after the age of 9 (Gottfredson and Hirschi 1990). Because this dissertation is concerned with the effects of self-control, not how it develops, I do not use cohorts younger than 9.

The four cohorts (i.e., 9, 12, 15, and 18) from wave 1 resulted in a sample of 2978 respondents. In the sample there are slightly more male respondents (1499) than female
respondents (1479). The average age of respondents is 13.14 years old. The PHDCN oversampled Hispanics and Blacks, and yielded 1315 Hispanics (44.3%), 1083 Blacks (36.5%), 448 Whites (15.1%), 41 Asians (1.4%), 7 Pacific Islanders (.2%), and 30 Native Americans (1.2%). Forty-two respondents (1.4%) reported an ethnicity of “other” and twelve cases (.4) were missing. Respondents from low, medium, and high SES neighborhoods made up 36%, 39%, and 25% of the sample, respectively (Earls et al. 2002).

Measures

Dependent Variables

This dissertation examines outcomes related to serious offending, delinquent offending, and smoking. These dependent variables capture a continuum of offending that goes from serious to minor offenses.

I use the Self-Report of Offending Survey (Huizinga et al. 1991) to develop indices for different types of deviant offending. This survey is useful because it provides a broad range of delinquent and criminal acts, ranging from minor crimes like school disobedience to more serious offenses like assault with a weapon.

The Self-Report of Offending Survey is a self-report questionnaire that asks respondents about their involvement in, and consequences related to, deviant and antisocial offending (Earl et al. 2002). Respondents were asked questions about offenses that occurred in their lifetime and within the last 12 months more specifically (Earl et al. 2002). If respondents reported having engaged in any of the behaviors of interest, the
frequency of the behavior was recorded and further questions were asked about consequences, such as police involvement and court outcomes.

The Self-Report of Offending instrument was utilized to create two indices that examine counts of serious offending and minor offending. Elliott et al. (1986) classify offending based on how likely an offense is to “invoke official action if observed” as well as the seriousness of the charge if action is taken (e.g., felony versus misdemeanor) (481). Similar to Elliott et al. (1986), I develop a serious offending index based on offenses that would lead to felony charges if caught along with a minor crime (delinquency) index that captures offenses that are mostly status and misdemeanor offenses. Specifically, I constructed an index of serious offending by using questions from the Self-Report of Offending Survey that asked respondents if they had ever and how many times in the past year they had: 1) hit someone with whom they lived with the intent of hurting them, 2) hit someone with whom they did not live with the idea of hurting them, 3) attacked someone with a weapon, 4) thrown something like bottles or rocks at people with the intent of hurting them, and 5) been involved in a gang fight in which someone was hurt or threatened with harm. The minor offending (delinquency) index was developed from questions that asked respondents if they ever and how many times in the past year they had: 1) ran away from home and stayed away overnight, 2) carried a hidden weapon, 3) caused trouble in a public place so that people complained about it, such as being loud or disorderly, 4) stolen something from a store, 5) been paid for having sexual relations, and 6) used a false name or alias to try to obtain something not entitled to, and 7) driven a motor vehicle without a driver’s license.
In addition observing outcomes related to serious and minor offending, I examine another dependent variable that asks about smoking cigarettes. I use the Substance Use Interview developed by The National Institute on Drug Abuse (1991). This survey is a questionnaire that asks parents of minors or respondents 18 years of age or older about the use of tobacco, marijuana, alcohol, cocaine, and heroin. For each type of substance the respondents are asked about ever using each substance and if someone reports using then respondents are asked about the frequency of use. I selected smoking as an outcome because it was more frequent than other substance use (i.e., marijuana, cocaine, and heroin). Additionally, unlike alcohol use, smoking varied enough across neighborhoods to conduct analyses using multi-level models. In the PHDCN, smoking is an ordinal variable with a range from 0 to 8. The coding represents the number of days respondents smoked cigarettes. Responses were coded as follows: “0” for never, “1” 1-2 days, “2” for 3-5 days, “3” 6-11 days, “4” for 12-24 days, “5” for 25-50 days, “6” for 51-99 days, “7” for 100-199 days, and “8” for 200 days.

Independent Variables

**Low Self-Control.** To measure respondent levels of low self-control, I use Buss and Plomin’s (1975) Emotionality, Activity, Sociability, and Impulsivity (EASI) Temperament Survey. Gibson et al. (2010) demonstrate that the scale is both reliable (Cronbach alpha = .74) and valid. Furthermore, they examined the EASI survey with PHDCN data using exploratory factor analysis and maximum likelihood estimation and
found that the 17 items in the survey produced four separate factors resembling inhibitory control, decision time, sensation seeking, and persistence.

Inhibitory control was measured by asking primary caregivers the extent to which their child: 1) has trouble controlling his/her impulses, 2) usually cannot stand waiting, 3) can tolerate frustration better than most, 4) has trouble resisting temptation, and 5) finds self-control easy to learn. Decision time was measured by asking primary caregivers the extent to which their child: 1) says the first thing that comes into his/her head, 2) likes to plan things way ahead of time, 3) often acts on the spur of the moment, 4) likes to make detailed plans before he/she does something, and 5) has trouble making up his/her mind. Sensation seeking was measured by asking primary caregivers the extent to which their child: 1) generally seeks new and exciting experiences and sensations, 2) will try anything once, 3) sometimes does “crazy” things just to be different, 4) tends to get bored easy, and 5) feels happiest in familiar surroundings. Persistence seeking was measured by asking primary caregivers the extent to which their child: 1) generally likes to see things through to the end, 2) tends to give up easily, 3) bothered by unfinished tasks, 4) once he/she gets going on something she/he hates to stop, and 5) tends to hop from one thing to another.

Responses for the EASI instrument were based on a five-point Likert-type scale that ranged from uncharacteristic (coded 1) to characteristic (coded 5). Higher responses reflect lower levels of self-control. Some items were reversed coded (See Appendix A for recode details). I summed the four subscales described above to get a total low self-control score and then divided the total scores by 5 to keep the scale in its original metric.
A Cronbach’s alpha of .73 suggests that the scale has acceptable reliability. Values on the overall scale range from 1.20 to 4.85, and 2.68 is the average level of self-control for cohorts 9, 12, 15, and 18.

**Neighborhood-Level Variables.** Aggregate self-control (ASC) was aggregated from the individual-level low self-control measure described above. Borrowing from Felson and colleagues’ (1994) method of examining aggregated and individual level data, I treat aggregate self-control as a contextual variable to explain differences in offending within and between neighborhoods. Felson et al. (1994) found that aggregate levels of violent subcultural values at the school level increased violent behavior for individuals independent of individual personal values concerning violence. Low and high aggregate self-control neighborhoods are assigned by using the medium split of aggregate self-control; coded “0” for low ASC neighborhoods and “1” for high ASC neighborhoods. This method is similar to Barrios’ (1985), who used the median split of respondents’ scores on the Rosenbaum’s Self-Control Schedule to create high and low self-control groups. Dividing neighborhoods into two groups will make interpretation more straightforward than using continuous aggregate self-control scores for each neighborhood.

Collective Efficacy (CE) is the combination of social cohesion and social control scales. This method replicates Sampson and colleagues’ (1997) measure of collective efficacy. Social Cohesion was measured by creating a scale from five variables that capture neighboring relations. Specifically, respondents were asked to rate if their
neighborhood was close knit, if people are willing to help neighbors, if people do not get along (reverse coded), if people in the neighborhood do not share same values (reverse coded), and if people in the neighborhood can be trusted.” Responses were coded as follows: “1” for strongly agree, “2” for agree, “3” for neither agree nor disagree, “4” for disagree, and “5” for strongly disagree. The Cronbach’s Alpha is .74.

The second dimension of collective efficacy is social control, which relates to the extent to which neighbors manage their local neighborhood. The variable Social Control is a scale created from five questions asking respondents the extent to which they agree or disagree about whether neighbors do something about kids skipping school, kids defacing building, children not showing respect, kids fighting in front of neighbors’ houses, and keeping a local fire station that is faced with budget cuts. Responses were coded: “1” very likely, “2” likely, “3” neither likely nor unlikely, “4” unlikely, and “5” very unlikely. Cronbach’s alpha for the scale is .819.

Finally, to create the collective efficacy scale, the social cohesion and social control sub-scales were combined and divided by 2 to maintain the original scaling of the variables. In order to keep as many cases as possible, I replicate Sampson and colleagues strategy (1997) of coding missing responses as “neither agree nor disagree.” The average level of collective efficacy is 3.61. The Cronbach’s alpha for the Collective Efficacy scale is .85, which suggests that this scale is a reliable measure.
Control Variables

The current research controls for respondent age, sex, race, and neighborhood SES. Age was recorded as respondent’s age in years at the time of the wave 1 interview. Sex was coded “0” for male and “1” for male. I coded race as a series of dummy variables. Black was coded “1” for Black and “0” for White and Hispanic was coded “1” for Hispanic and “0” for White. Because there were so few respondents who were Pacific Islanders (N=7), Asians (N=41), Native Americans (N=30), or from another ethnicity (N=42), they were omitted from the analyses. Neighborhood SES is a combination of 1990 census indicators that measure poverty, public assistance, income, and education levels (Sampson et al. 1997). Neighborhood SES was coded “1” for low, “2” for medium, and “3” for high.

Analytic Strategy

Because I am examining individual-level and neighborhood-level data, I will use hierarchical linear modeling (HLM). HLM is required because respondents are clustered in neighborhoods (Raudenbush and Bryk 2002). For multi-level problems, traditional methods of analysis, such as OLS regression, entail violation of important analysis assumptions (namely independence of observations) and the inability to disentangle individual and group effects on outcomes of interest (Felson et al. 1994; Raudenvush and Bryk 2002). The first step in multi-level analysis is to determine if there is enough variance across neighborhoods to warrant the analysis (Raudenbush and Bryk 2002). I will examine whether sufficient variance exists between neighborhoods by estimating
preliminary ANOVA models and examining intraclass correlations for the dependent variables described above. If the variance between neighborhoods is statistically significant, then I will test whether low self-control, aggregate self-control, or collective efficacy can explain the differences between neighborhoods regarding various types of offending.

**Hypotheses**

H1: Higher scores of low self-control are associated with higher levels of self-reported serious offending, delinquency, and smoking, controlling for age, sex, and race.

H2: Higher scores of aggregate low self-control are associated with higher levels of self-reported serious offending, delinquency, and smoking, controlling for age, sex, race, and neighborhood SES.

H3: Aggregate self-control will moderate the relationship between low self-control and self-reported serious offending, but not delinquency and smoking, controlling for age, sex, race, and neighborhood SES. Specifically, the effect of low self-control on serious offending will be greater in neighborhoods characterized by low aggregate self-control.
H4: Low collective efficacy is associated with higher levels of self-reported serious offending, delinquency, and smoking, controlling for age, sex, race, and neighborhood SES.

H5: Collective efficacy will moderate the relationship between low self-control and self-reported serious offending but not delinquency and smoking, controlling for age, sex, race, and neighborhood SES. Specifically the effect of low self-control on serious offending will be greater in neighborhoods characterized by lower collective efficacy.

Statistical Models

This dissertation explores the hypotheses stated above by running two separate sets of models. The first set of models includes variables that are related to the influence of individual-levels of low self-control, aggregate self-control, and the interaction of low self-control and aggregate self-control on each type of offending. The second set of models examines the effects of individual-levels of low self-control, collective efficacy, and the interaction of low self-control and collective efficacy on each type of offending. The following models will be used to test the hypotheses listed above.

Low Self-Control and Offending with Aggregate Self-Control (ASC) as a Moderator

Level 1:
\[ Y_{ij} = \beta_{00} + \beta_{01}(LSC)_{ij} + r_{ij} \]

Level 2:
\[ \beta_{0j} = \gamma_{00} + \gamma_{01}(ASC)_{j} + u_{0j} \]
\[ \beta_{1j} = \gamma_{10} + \gamma_{11}(ASC)_{j} + u_{1j} \]
Composite:
\[ Y_{ij} = \gamma_{00} + \gamma_{10}(LSC)_{ij} + \gamma_{01}(ASC)_{ij} + \gamma_{11}(LSC \times ASC)_{ij} + u_{1j}(ASC) + u_{0j}(ASC) + r_{ij}. \]

This model allows individual-levels of offending to vary across neighborhoods by way of the cross-level interaction of aggregate self-control (ASC) and individual-levels of low self-control (LSC). Support for Hypothesis 1 will be shown if higher scores of LSC are positively related to self-reported smoking, minor, and serious offenses. Hypothesis 2 will be supported if self-reported smoking, minor, and serious offenses are greater in neighborhoods characterized by low aggregate self-control. Hypotheses 3 will be supported if the relationship between low self-control and offending is statistically moderated by aggregate self-control, but only for serious offending (and not for minor offending or smoking), such that the effect of individual levels of low self-control on serious offending is greater in neighborhoods characterized by low aggregate self-control. Because I am expecting/predicting equivalence across neighborhoods for minor offending and smoking (i.e., I am not predicting a difference as is done with traditional hypothesis testing), I will only conclude that moderation does not exist if the p-value associated with the parameter for the interaction term is greater than .25 (Julnes and Mohr 1989; see also Yeaton and Sechrest 1986 for details on the importance of “equivalence testing” in social science research).

*Low Self-Control and Offending with Collective Efficacy (CE) as a Moderator*

**Level 1:**
\[ Y_{ij} = \beta_{00} + \beta_{01}(LSC)_{ij} + r_{ij} \]

**Level 2:**
\[ \beta_{0j} = \gamma_{00} + \gamma_{01}(CE)j + u_{0j} \]
\[ \beta_{1j} = \gamma_{10} + \gamma_{11}(CE)j + u_{1j} \]

Composite:
\[ Y_{ij} = \gamma_{00} + \gamma_{10}(LSC)ij + \gamma_{01}(CE)j + \gamma_{11}(LSC*CE)ij + u_{1j}(CE) + u_{0j}(CE) + r_{ij}. \]

This model also allows individual-levels of offending to vary across neighborhoods, but here this variation is a result of the cross-level interaction of collective efficacy (CE) and low self-control (LSC). Support for Hypotheses 4 will be supported if self-reported smoking, minor, and serious offenses are greater in neighborhoods characterized by low collective efficacy. Finally, hypothesis 5 will be supported if the relationship between the low self-control and offending is statistically moderated by collective efficacy but only for serious offending, such that the effect of individual levels of low self-control on serious offending is greater in neighborhoods characterized by low collective efficacy. Again, for reasons discussed above, I will only conclude that moderation does not exist if the p-value associated with the parameter for the interaction term is greater than .25.
CHAPTER 4

RESULTS

This chapter summarizes results for two separate sets of models. In the beginning of the chapter I present the descriptive statistics for my dependent variables measuring serious offending, delinquency, and smoking. Next I describe results of hypothesis tests pertaining to the main effect of aggregate low-self-control on offending and the cross-level interaction effect of low self-control and aggregate low self-control on offending. Finally, I describe results of hypothesis tests pertaining to the main effect of collective efficacy on offending and the cross-level interaction effect of low self-control and collective efficacy on offending.

Descriptive Statistics for Serious Offending, Delinquency, and Smoking

In this section I describe the characteristics of the variables measuring serious offending, delinquency, and smoking. Each variable is summarized in terms of its mean, characteristics of the distribution, and variation between neighborhoods. I begin with the index measuring serious offending.

The index of serious offending had 2791 valid and 48 missing cases. The mean rate of serious offending in the past year is 4.68, although the distribution of this variable is highly skewed. In the current study, self-reports of serious offending range from 0 to 935 times. Because the models I estimate (below) to test my hypotheses use maximum
likelihood estimation, and because the ML estimator is extremely sensitive to the influence of outliers (Hall and Shen 2009), my models on first pass would not converge. As a remedy, I eliminated the impact of extreme outliers by recoding any value over 150 to 150. According to Tadachnic and Fidell (2007), transforming outliers in such a fashion rather than deleting them altogether is preferred. Originally, I started with an even more conservative cutoff (i.e., any value over 250), but the models described below would not converge until I reduced the cutoff to 150, which is 9 standard deviations above the mean and still quite conservative compared to conventional recommendations and practice (Bakeman and Robinson 2005; French et al. 1995). In this study, only .7% of cases were treated as outliers and transformed to a value of 150. After recoding, “skewness” dropped from 14.48 to 6.86. Finally, most respondents (58.2%) never committed any serious offenses in the year prior to the interview. The modeling strategy described below takes this important fact into account.

The delinquency index yielded 2794 valid and 45 missing cases. The mean rate of delinquent offenses in the last year is 5.55 times, but as with serious offending, the distribution of delinquent offending is highly skewed. Patterns of delinquent offending range from 0 to 455 acts reported for a one year period, but any value over 150 was recoded to 150. Similar to serious offending, I employ a conservative cutoff for outliers using the same approach described above. I tested various cutoff values until the models detailed below converged. For the delinquency index, I had to recode 1.5% of the cases with values exceeding 150, which for this index is seven standard deviations above the mean. After recoding, skewness dropped from 7.72 to 5.67. However, here again many
respondents (65.2%) did not commit any delinquent offenses, and the modeling strategy described below takes this distributional property into account. Finally, the variable smoking had 2748 valid respondents and 91 missing cases. The mean rate of smoking in the past year is .96 (i.e., between never and 1 to 2 days in the last year). The distribution is also positively skewed with a value of 2.41. The number of days that respondents smoked in the past year ranges from 0 to over 200, with the latter value coded as 8. I use the original coding scheme from the survey instrument. However, here again most respondents (72.8%) did not smoke at all in the past year, and the modeling strategy described below takes this into account.

**Low Self-Control and Aggregate Self-Control Models**

While it may be seen as more ideal to examine aggregate self-control and collective efficacy at the same time (i.e., in the same model), I analyze them separately, beginning with aggregate self-control, because (a) doing so is consistent with the theoretical discussion in Chapter 2, and (b) exploratory attempts to analyze them in the same model resulted in convergence problems that could not be overcome, even after centering the continuous predictors for the interaction terms (as described below).

According to Atkins and Gallop (2007), models that require iterative algorithms, for example models using Maximum Likelihood estimation, can experience problems with convergence as the number of parameters increases.

Prior to estimating models to test any of my hypotheses, I conducted preliminary ANOVA analyses to examine whether serious offending, delinquency, and smoking vary
significantly between neighborhoods. If significant variations between neighborhoods exist, multilevel modeling may be warranted. According to the ANOVA results, all three dependent variables vary significantly across the 76 neighborhoods, as anticipated (see Table 1).

Table 1: ANOVA Results for Serious Offending, Delinquency, and Smoking

<table>
<thead>
<tr>
<th>Type of Offending</th>
<th>df</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serious</td>
<td>Between</td>
<td>76</td>
<td>1.93</td>
</tr>
<tr>
<td></td>
<td>Within</td>
<td>2714</td>
<td></td>
</tr>
<tr>
<td>Delinquency</td>
<td>Between</td>
<td>76</td>
<td>1.47</td>
</tr>
<tr>
<td></td>
<td>Within</td>
<td>2717</td>
<td></td>
</tr>
<tr>
<td>Smoking</td>
<td>Between</td>
<td>76</td>
<td>1.66</td>
</tr>
<tr>
<td></td>
<td>Within</td>
<td>2709</td>
<td></td>
</tr>
</tbody>
</table>

Next, I checked to see if the mean rate of these behaviors varied by type of neighborhood (i.e., high versus low aggregate self-control). The mean rate of serious offending is much more frequent in low self-control neighborhoods compared to high self-control neighborhoods. In low self-control neighborhoods the mean number of serious offenses in the last year is over two times greater than the mean number in high self-control neighborhoods (see Table 2 and Appendix B). Delinquency also varied by type of neighborhood, but not as dramatically. The mean number of self-reported delinquent offenses in low self-control neighborhoods is 6.450, compared to a mean of 4.750 in high self-control neighborhoods (see Table 2 and Appendix B). The difference
in smoking between neighborhood types is even less pronounced. For the year prior to the interview, the mean rate of smoking in low self-control neighborhoods is 1.019 compared to a mean of .895 in high self-control neighborhoods (see Table 2 and Appendix B).

Table 2: Rates of Offending by Low or High Self-Control Neighborhoods

<table>
<thead>
<tr>
<th>Type of Offending</th>
<th>Type of Neighborhood</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serious</td>
<td>Low Self-Control</td>
<td>1326</td>
<td>6.449</td>
<td>20.925</td>
</tr>
<tr>
<td></td>
<td>High Self-Control</td>
<td>1459</td>
<td>3.071</td>
<td>10.688</td>
</tr>
<tr>
<td>Delinquency</td>
<td>Low Self-Control</td>
<td>1328</td>
<td>6.450</td>
<td>22.640</td>
</tr>
<tr>
<td></td>
<td>High Self-Control</td>
<td>1460</td>
<td>4.750</td>
<td>19.932</td>
</tr>
<tr>
<td>Smoking</td>
<td>Low Self-Control</td>
<td>1325</td>
<td>1.019</td>
<td>2.245</td>
</tr>
<tr>
<td></td>
<td>High Self-Control</td>
<td>1455</td>
<td>0.895</td>
<td>2.046</td>
</tr>
</tbody>
</table>

The results above provide preliminary evidence that there are differences in rates of serious offending, delinquency, and smoking across neighborhoods. Additionally, my hypotheses and theoretical position suggest a need to control for clustering of individuals within neighborhoods. For these analyses a multi-level modeling approach is potentially warranted because we cannot assume that individuals are independent of grouping characteristics (i.e., neighborhoods), and we need to account for the variance components within and between neighborhoods (Raudenbush and Bryk 2002). Furthermore, multi-level analyses make it possible to test cross-level effects (Raudenbush and Bryk 2002;
which is a primary goal of this dissertation. To analyze these data, I used the Proc Mixed procedure in SAS.

The first step in multi-level analysis is to determine how much variance exists between neighborhoods, given that the above preliminary analyses point to differences across neighborhoods. The intraclass correlation coefficient (ICC) is a measure of the variance between neighborhoods, and it is calculated according to the following formula:

$$\text{ICC} = \frac{\sigma^2(b)}{\sigma^2(b) + \sigma^2(w)}$$

where $\sigma^2(b)$ is the variation between groups, $\sigma^2(w)$ is the variation within groups, and $\sigma^2(b) + \sigma^2(w)$ is the total variation for the dependent variable in question (Wang et al. 2012; Raudenbush and Bryk 2002). The ICC results are presented in Table 3. Serious offending and smoking significantly vary across neighborhoods ($p = .004$ and .014, respectively), but the variation in delinquency across neighborhoods is not statistically significant ($p = .073$). Clustering in the data should not be ignored if an ICC value is over .01 (Cohen et al. 2003). With the exception of delinquency, the results indicate that clustering is non-ignorable. Additionally, likelihood ratio tests of the null model for each dependent variable (i.e., the model that includes only a random intercept for each upper-level/neighborhood unit and no covariates) indicate clustering for serious offending and smoking, but not for delinquency (see Table 3). However, the ICC for delinquency in Table 3 approaches 1%, and the $p$-value for the likelihood ratio test of the null model for delinquency approaches significance; therefore, I will account for clustering in the analyses of delinquency, which will (a) maintain consistency with the mixed models for serious offending and smoking, and (b) provide a conservative test of my hypotheses pertaining to delinquency, given that failing to
account for clustering tends to bias standard errors downward and increase the probability of Type I error (i.e., false positives).

Table 3: Intraclass Correlation Coefficient (ICC) and Null Model Likelihood Ratio

<table>
<thead>
<tr>
<th>Type of Offending</th>
<th>ICC (%)</th>
<th>p</th>
<th>Chi-Square</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serious</td>
<td>.025(3%)</td>
<td>.004</td>
<td>16.11</td>
<td>.000</td>
</tr>
<tr>
<td>Delinquency</td>
<td>.008(1%)</td>
<td>.073</td>
<td>3.25</td>
<td>.072</td>
</tr>
<tr>
<td>Smoking</td>
<td>.016(2%)</td>
<td>.014</td>
<td>9.41</td>
<td>.002</td>
</tr>
</tbody>
</table>

In addition to including random intercepts for neighborhoods, other statistical considerations presented themselves as I conducted my analyses. First, many respondents never offended (i.e., the outcome variables are all highly skewed toward zero), which indicates potential violation of the second component of the “iid” assumption in linear modeling insofar as high skewness greatly increases the likelihood that prediction errors will not be identically distributed. Second, the variables in the PHDCN data measuring serious offending and delinquency are most appropriately treated as indexes with count data, while smoking (an ordinal measure) has a range that can also be treated as a count. Poisson and negative binomial models are often used for count data, and negative binomial models are needed in cases where the variances are larger than the means (Wang et al. 2012). However, according to Wang et al. (2012), zero-inflated Poisson (ZIP) and zero-inflated negative binomial (ZINB) models are more appropriate than
Poisson and negative binomial models when count data contain excessive zeros. In the present case, the dependent variables turned out to have excessive skewness with most responses being zero (i.e., never offended). ZIP and ZINB account for the fact that extra zeros in data arise from two distinct processes, and the models provide separate estimates of both the probability of occurrence (i.e., ever having offended) as well as the rate of offending among those who have ever offended (see Wang et al. 2012; Ulubag et al. 2009; Demaris 2001). Thus, ZIP and ZINB models are useful for observing different processes of occurrence and intensity of offending (Wang et al. 2012; Ulubag et al. 2009). ZINB models are preferred when over-dispersion exists in the data, which if ignored may result in downwardly biased estimates of standard errors and thus an increased Type I error rate (Cox 1983; Wang et al. 2012). To account for this problem, ZINB models estimate a dispersion parameter. If this parameter is significant, the ZINB model is the preferred modeling strategy (Wang et al 2012; Ulubag et al. 2009). Because my data are nested, and given the statistical considerations just described, I need to integrate ZIP and ZINB models into the multilevel framework. Wang et al. (2012) refer to such models RE-ZIP and RE-ZINB models. RE-ZIP are appropriate for nested data with excessive zeros, while RE-ZINB models can account for nested data, excessive zeros, as well as over dispersion (Wang et al. 2012). These models were explored using PROC NLMIXED.

The dispersion parameter, alpha, is significant for each outcome, which indicates that ZINB modeling is the best strategy for estimating models of serious offending, delinquency, and smoking using the current data. Below I describe the results of the
ZINB models that also include random intercepts for neighborhoods. For the substantive analyses and tests of my hypotheses, each dependent variable was analyzed in three stages. In the first step, I only include individual-level variables and controls. In the second step, I add the community-level predictors. The final models include all predictors as well as the interaction term that is of central interest.

For reasons discussed immediately below, I also grand-mean-center individual-level low self-control. Grand-mean-centering changes the parameter estimates, but it is effectively equivalent to a model without centering in that the two approaches will provide the same fit, predicted values, and residuals (Aiken and West 1991). However, grand-mean-centering offers a number of advantages that are capitalized upon in the present research. First, grand mean centering assists in interpretation of main effects in models with interactions by standardizing the variables to include zero values (Aiken and West 1991; Wang et al. 2012). In other words, “[V]ariables involved in an interaction must have meaningful zero values in their observed measures. Otherwise the main effect of the counterpart variable will not be meaningful” (Wang et al. 2012: 20). Second, centering assists in model convergence problems that can stem from multicollinearity, especially when interaction terms are included in a model (Wang et al. 2012).

For the substantive analyses focusing on aggregate self-control that are described next, and for each outcome separately, I start by summarizing my findings related to occurrence and then present my findings related to the frequency of offending. As described above, differentiating the findings in this way is part of the modeling of “zero inflated” outcomes, which here presented itself in the early stages of my analyses. After
discussing my findings in terms of occurrence and frequency, I interpret each set of findings in terms of my specific hypotheses concerning aggregate self-control before turning to my models focusing on collective efficacy.

Aggregate Self-Control and Serious Offending

**Occurrence:** Model 1 in Panel A of Table 4 examines the effect of individual-level predictors on the occurrence of serious offending. When only individual-level predictors are included in the model, low self-control, age, sex, and race are significantly associated with the likelihood of *not* committing a serious offense. As levels of low self-control and respondent age increase, the probability of *never* committing a serious offense decreases. Male respondents were less likely to never offend than females. Compared to White respondents (the reference category in all models), being Black is negatively related to the probability of never committing a serious offense. To be clear, the interpretation of the coefficients in the “occurrence” models is the same as in standard logistic regression (Wang et al. 2012). For instance, for Model 1 in Table 4, if a respondent’s low self-control score increases by one unit from the mean, then the probability of being zero (i.e., *never* offending) decreases by a factor of .68 (exp(-.39)) for every unit change in low self-control, holding constant all other variables in the model.

The community-level variables, neighborhood SES and aggregate low self-control are added as predictors in Model 2. Neither neighborhood SES nor aggregate low self-control are significant predictors of serious offending. Low self-control, age, sex, and
race are still significantly related to serious offending in the expected fashion, but unlike Model 1, being Hispanic is now significant. Specifically, compared to White respondents, being Hispanic is positively related to the probability of never committing a serious offense.

Model 3 includes the interaction term for individual low self-control and aggregate low self-control. Here the cross-level interaction is not significant for the probability of never committing a serious offense, and, as with Model 2, all individual-level predictors are significantly related to the probability of never committing a serious offense.

**Frequency:** Model 1 in Panel B of Table 4, which only includes individual-level predictors, shows that low self-control, age, and being Black are significantly related to the frequency of serious offending. As low-self-control increases, the frequency of committing serious offenses increases. Also, as respondents’ age increases, the frequency of serious offending decreases, and compared to White respondents, Black respondents are more frequently involved in serious offending.

Model 2 adds the community-level predictors. While not related to the occurrence of serious offending (as detailed above), here the community-level/aggregate impact of low self-control does have a significant effect on the frequency of serious offending. In neighborhoods with low levels of aggregate self-control, respondents are more frequently involved in serious offending. The effects of the individual-level characteristics are similar to Model 1 in terms of the effects of low self-control, age, and race.
The final model (Model 3 in Panel B of Table 4) includes all predictors described above and the interaction term for low self-control and aggregate low-self-control. The interaction term is not significant for serious offending. Similar to Model 2, aggregate low self-control still has a significant main effect on the frequency of committing serious offenses. Respondents living in areas with low levels of aggregate self-control are more likely to commit serious offenses than respondents from areas with high levels of aggregate self-control. Furthermore, after adding the interaction term, the main effect of individual low-self-control is reduced to non-significance. This model also reveals that as age increases, the frequency of serious offending decreases. Lastly, being Black (compared to being White) and living in a low self-control neighborhood is positively related to the frequency of offending.

**Aggregate Self-Control and Delinquency (Minor Offending)**

**Occurrence:** Model 1 in Panel A of Table 5 examines the effect of individual-level predictors on the occurrence of delinquency. When only individual-level predictors are included in the model, low self-control, age, and sex are significantly related to the occurrence of delinquent offending. As low self-control and age increase, the likelihood of never committing a delinquent offense decreases. Finally, males were less likely to never commit a delinquent offense than females.

Model 2 adds the community-level variables, neighborhood SES and aggregate low self-control. The effects of neighborhood SES and aggregate low self-control are not significant. Similar to Model 1, low self-control, age, and sex are significantly related to
delinquent offending. Additionally, unlike Model 1, race is significant in this model. Compared to being White, being Black reduces the likelihood of never committing a delinquent offense.

Model 3 includes both individual and community-level variables, as well as the interaction term for low self-control and aggregate low self-control. The effect of the interaction term is significant and positive, which, when compared to the negative main effect of individual-level low self-control, suggests that the effect of low self-control is amplified in neighborhoods with low levels of self-control. When all variables are included, the effects of age and sex remain the same as the in Models 1 and 2, but being Black (compared to being White) is no longer significantly related to delinquency.

**Frequency:** Model 1 in Panel B of Table 5, which only includes individual-level predictors, shows that low self-control and age are significantly related to the frequency of delinquency. As low self-control, and age increase the frequency of delinquent offending increases.

Model 2 adds the community-level predictors, neighborhood SES and aggregate low-self-control. Neighborhood SES and aggregate low self-control are not significant predictors of the frequency of delinquency. As with Model 1, Model 2 shows that the individual-level characteristics, low self-control and age, are still positively related to the frequency of committing delinquent offenses.

Model 3 includes all individual-level and community-level predictors, as well as the interaction term for low self-control and aggregate low-self-control. The interaction term is positive and significant, which, when compared to the positive main effect of
individual low self-control, suggests again that the effect of low self-control is amplified in low self-control neighborhood. Age is still positively and significantly related to the frequency of delinquency.

Aggregate Self-Control and Smoking

**Occurrence:** Model 1 in Panel A of Table 6 examines the effect of individual-level predictors on the occurrence of smoking. This model shows that low self-control, age, and race are significant predictors of never having smoked cigarettes. Increases in low self-control and age decrease the probability of never smoking. Compared to White respondents, black respondents are more likely to report never having smoked.

Model 2 adds the community-level variables, neighborhood SES and aggregate low-self-control. Neither of these factors is important for predicting the occurrence of smoking. Similar to Model 1, the individual-level characteristics, low self-control and age, decrease the likelihood of never smoking. The effect of race is no longer significant after controlling for neighborhood SES and aggregate low self-control.

Model 3 adds the interaction term for low self-control and aggregate low self-control. In terms of my criterion based on Julnes and Mohr’s (1989) recommendations for *expected* equivalence (i.e., $p > .25$; see discussion above), the interaction term is not significant in this model. And as with Model 2, community-level factors do not predict the likelihood of never smoking. The effects of the individual-level characteristics are similar to Model 1 in terms of the effects of low self-control, age, and race.

---

1 Sex was omitted from the analyses of smoking due to insurmountable model convergence problems.
**Frequency:** Model 1 in Panel B of Table 6, which only includes the individual-level variables, shows that low self-control, age, and race are significant predictors of the frequency of smoking. As low self-control and age increase, the frequency of smoking also increases. Blacks and Hispanics are less frequent in their smoking compared to white respondents.

Model 2 adds the community-level variables (see Table 6). Neither aggregate low self-control nor neighborhood SES is a significant predictor of the frequency of smoking. The effects of low self-control and age are still important predictors for the frequency of smoking even after controlling for the community-level covariates.

In the final (full) model, the cross-level interaction between low-self-control and aggregate low-self-control is not significant (i.e., $p > .25$). Here individual-level low self-control and age are the only variables that influence the frequency of smoking.

*Summary of Results for Aggregate Self-Control*

Here I summarize my results in terms of my specific hypotheses, including the central hypothesis concerning the interaction of individual low self-control and aggregate self-control (H3).

**H1:** Higher scores of low self-control are associated with higher levels of self-reported serious offending, delinquency, and smoking, controlling for age, sex, and race.

This hypothesis is fully supported for both the occurrence of offending and the frequency for all types of offending.

**H2:** Higher scores of aggregate low self-control are associated with higher levels of self-reported serious offending, delinquency, and smoking, controlling for age, sex, race, and neighborhood SES.
Table 4: ZINB Models for Low Self-Control and Aggregate Low Self-Control Interactions and Serious Offending

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<td>.000 ***</td>
<td>6.38(.60)</td>
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| Low Self-Control (LSC)        | -.39(.13)| -3.06    | .003 **  | -.43(.13)| -3.43    | .001 *** | -.34(.17)| -2.01    | .048    *
| Age                           | -.51(.04)| -11.41   | .000 *** | -.50(.04)| -11.68   | .000 *** | -.51(.04)| -11.34   | .000 *** |
| Sex                           | -1.00(.17)| -6.04    | .000 *** | -0.98(.16)| -5.98    | .000 *** | -0.98(.16)| -5.96    | .000 *** |
| Black                         | -.95(.25)| -3.88    | .000 *** | -.92(.24)| -3.53    | .001 *** | -.91(.26)| -3.55    | .001 *** |
| Hispanic                      | .52(.24)| 2.20     | .031    *  | .55(.26)| 2.17     | .033    *  | .57(.26)| 2.22     | .030    *
| Aggregate Self-Control (ASC)  |         |          |          |         |          |          |         |          |          |
| Neighborhood SES              |         |          |          |         |          |          |         |          |          |
| Interaction (LSC by ASC)       |         |          |          |         |          |          |         |          |          |
| **(Panel B) Parameter Estimates**|         |          |          |         |          |          |         |          |          |
| **(Intensity: Frequency of Offending)**|         |          |          |         |          |          |         |          |          |
| Intercept                     | 2.43(.31)| 7.8      | .000 *** | 2.12(.38)| 5.53     | .000 *** | 2.10(.39)| 5.44     | .000 *** |
| Low Self-Control (LSC)        | .29(.08)| 3.61     | .001 *** | .25(.08)| 3.23     | .002 **  | .20(.10)| 1.90     | .062    |
| Age                           | -.07(.02)| -4.11   | .000 *** | -.07(.02)| -4.26    | .000 *** | -.07(.02)| -4.08    | .000 *** |
| Sex                           | .14(.10)| 1.43     | .156    | .13(.10)| 1.35     | .181     | .14(.10)| 1.43     | .156    |
| Black                         | .55(.17)| 3.16     | .002 **  | .53(.18)| 3.03     | .003 **  | .55(.18)| 3.03     | .003 ** |
| Hispanic                      | .16(.16)| 0.96     | .339    | .23(.17)| 1.34     | .184     | .22(.17)| 1.30     | .197    |
| Aggregate Self-Control (ASC)  | .48(.16)| 3.07     | .003 **  | .47(.16)| 3.02     | .004 **  | .47(.16)| 3.47     | .641    |
| Neighborhood SES              | .05(.10)| .54      | .592    | .05(.10)| .47      | .641     | .05(.10)| .47      | .641    |
| Interaction (LSC by ASC)       |         |          |          |         |          |          |         |          |          |

* p < .05  ** p < .01  *** p < .001
Table 5 (Continued)

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.05* .01** .001***
Table 5: ZINB Models for Low Self-Control and Aggregate Low Self-Control Interactions and Delinquency

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(Panel B) Parameter Estimates
(Intensity: Frequency of Offending)

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*.05*, **.01**, ***.001***
### Table 6: ZINB Models for Low Self-Control and Aggregate Low Self-Control Interactions and Smoking

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.05* .01** .001***
This hypothesis is partially supported. Aggregate low self-control only increases the frequency of serious offending; it does not predict the frequency of other types of offending, nor does it explain the occurrence of any of the types of offending.

H3: Aggregate self-control will moderate the relationship between low self-control and self-reported serious offending, but not delinquency and smoking, controlling for age, sex, race, and neighborhood SES. Specifically, the effect of low self-control on serious offending will be greater in neighborhoods characterized by low aggregate self-control.

The primary hypothesis H3 is rejected. The interaction term between low self-control and aggregate self-control is significant for the occurrence and frequency of delinquency, but not serious offending. I predicted that the effect of individual low self-control on offending would be amplified in neighborhoods characterized by low aggregate self-control with respect to serious offending, but my results show that low self-control amplified the effect of individual low self-control on minor offending (delinquency). I return to this unexpected finding in the discussion.

Low Self-Control and Collective Efficacy Models

The results above describe models that investigate the main effects of low self-control, aggregate low self-control, and cross-level interactions between low-self-control and aggregate low self-control on offending. For those models there is evidence that a cross-level interaction is present for predicting the occurrence and frequency of delinquency. Additionally, aggregate low self-control, rather than individual-level low self-control, is significant for the frequency of serious offending, and individual-low self-
control is a significant predictor of the occurrence for all three types of offending. The results below provide an additional examination of the relationship between low self-control on offending by observing another community-level predictor representing structural opportunity, collective efficacy, and its influence on offending.

Preliminary analyses (described above) indicate that I should use ZINB modeling with random intercepts for neighborhoods. However, before I estimated the ZINB models for collective efficacy, I checked to see if the mean rate of the three types of deviant behaviors varied by low or high collective efficacy neighborhoods. As expected, the mean rate of serious offending is more frequent in neighborhoods with low collective efficacy (see Table 7 and Appendix B). In low collective efficacy neighborhoods, the mean number of serious offenses in the last year is 5.4 times, whereas the mean number of offenses in high collective efficacy neighborhoods is 4 times (see Table 7 and Appendix B). To a much lesser extent, delinquency varied by low and high collective efficacy neighborhoods. The rate of delinquent offenses in low collective efficacy neighborhoods is about 6 times for the year prior to the interview, and the average number of delinquent offenses is slightly less (5 times) for respondents in high collective efficacy neighborhoods (see Table 7 and Appendix B). The differences in smoking between neighborhoods are even less pronounced. The mean rate of smoking in low collective efficacy neighborhoods is over 1 day for the year prior to the interview and .90 days in high collective efficacy neighborhoods (see Table 7 and Appendix B).
Table 7: Rates of Offending by Low or High Collective Efficacy Neighborhoods

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<tr>
<th>Type of Offending</th>
<th>Type of Neighborhood</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
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<td>Serious</td>
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<td>1397</td>
<td>5.402</td>
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<td>Delinquency</td>
<td>Low Collective Efficacy</td>
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<td>5.925</td>
<td>21.103</td>
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<td>1396</td>
<td>5.182</td>
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<td>1.092</td>
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<td>High Collective Efficacy</td>
<td>1392</td>
<td>0.826</td>
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</table>

Results for the ZINB models focusing on collective efficacy are presented in Tables 8-10. As above, I begin by summarizing the results for the relationships between the factors related to the occurrence of offending, then I summarize the relationships related to the frequency of offending. I conclude by describing the findings in relation to my hypotheses.

Collective Efficacy and Serious Offending

Occurrence: Model 1 in Panel A of Table 8 examines the effect of individual-level predictors on the occurrence of serious offending. When only individual-level predictors are included in the model, low self-control, age, sex, and race are significantly associated with the likelihood of never committing a serious offense. As levels of low self-control and respondent age increase, the probability of never committing a serious offense decreases. Male respondents are less likely to never commit a serious offense than females. Additionally, the likelihood of never committing a serious offense is lower
for Black respondents than White respondents, and the likelihood of never committing a serious offense is higher for Hispanics than White respondents.

Model 2 includes the community-level variables, neighborhood SES and collective efficacy. Neighborhood SES and collective efficacy are not significantly related to the likelihood of never committing a serious offense. As in Model 1, low self-control, age, sex, and race are significantly associated with never offending.

Model 3 includes all predictors plus the interaction term for low self-control and collective efficacy. The cross-level interaction with low self-control and collective efficacy is not a significant predictor of the likelihood of never committing a serious offense. Similar to the previous model, the community-level effects are not significant, but low self-control, age, sex, and race are still significant predictors of never committing a serious offense.

**Frequency:** Model 1 in Panel B of Table 8, which only includes individual-level predictors, shows that low self-control, age, and being Black are significantly related to the frequency of serious offending. As low-self-control increases, the frequency of committing serious offenses increases. As respondents’ age increases, the frequency of serious offending decreases. Black respondents are more frequent in serious offending compared to White respondents.

Model 2, which includes the community-level variables, neighborhood SES and collective efficacy, indicates that collective efficacy is significantly related to the frequency of serious offending. Respondents living in a low collective efficacy neighborhoods are more frequent in their serious offending than individuals in high
collective efficacy neighborhoods. Similar to Model 1, low self-control, age, and race are significantly related to the frequency of serious offending.

The final model includes all predictors and the interaction between low self-control and collective efficacy. The interaction term is significant and positive, which, when compared to the positive main effect of individual low self-control, suggests that the effect of low self-control on serious offending is amplified low collective efficacy neighborhoods. Age and race maintained significance after including the interaction term in the model.

Collective Efficacy and Delinquency (Minor Offending)

Occurrence: Model 1 in Panel A of Table 9 examines the effect of individual-level predictors on delinquency. Low self-control, age, and sex are significantly related to the probability of never committing a delinquent offense. As low self-control and age increase, the likelihood of never offending decreases. Additionally, male respondents were less likely to never commit delinquency than females.

Model 2 adds the community-level variables, neighborhood SES and collective efficacy. Neither neighborhood SES nor collective efficacy is a significant predictor of the likelihood of never committing a delinquent act. Similar to Model 1 the individual-level variables representing low self-control, age, and sex are significant predictors of delinquency. Unlike Model 1, being Black (as opposed to being White) is negatively related to the probability of never offending.

I include the interaction for low self-control by collective efficacy in Model 3. The interaction term is not significant, though the $p$-value associated with this parameter
(i.e., $p = .138$) is beneath my criterion of .25 for establishing equivalence. In addition, by
themselves, the community level effects are not significant. Similar to Model 2, the
individual-level variables measuring low self-control, age, sex, and race are significant
predictors of never committing a delinquent offense. Overall, it is clear that low self-
control is important for predicting the likelihood of never committing delinquent acts
after controlling for all other covariates. As mentioned, by my criterion for establishing
equivalence, I also cannot reject the possibility that the occurrence of delinquency varies
across neighborhoods characterized by high- and low levels of collective efficacy.

**Frequency:** Model 1 in Panel B of Table 9, which only includes individual-level
predictors, shows that low self-control and age are significantly related to delinquency.
As low self-control and age increase, the frequency of delinquent offending increases.

In Model 2 adds neighborhood SES and collective efficacy; however, neither is
significantly related to the frequency of committing delinquent acts. Including
community-level factors does not change the results, and low self-control and age are still
important for predicting the frequency of committing delinquent acts.

Model 3 includes all predictors and the interaction term for low self-control and
collective efficacy. In this model, the interaction term is significant and positive, which,
when compared to the positive main effect of individual low self-control, suggests that
the effect of low self-control on delinquency is amplified in neighborhoods with low
levels of collective efficacy. The relationships between the community-level variables and
delinquency are not significant. Finally, age is an important predictor in every model. As
respondents get older they are less frequent in their delinquent offending.
Collective Efficacy and Smoking (Minor Offending)

**Occurrence:** Model 1 in Panel A of Table 10, which only includes individual-level predictors, shows that low self-control, age, and race are significantly related to the likelihood of never smoking. As low self-control and age increase, the probability of never smoking decreases. Compared to being White, being Black is positively related to never smoking.

Model 2 adds the community-level predictors, but neither is a significant predictor of smoking. Low self-control and age are still significantly related to the likelihood of never smoking; however, race is no longer significant after controlling for community-level factors.

Model 3 adds the interaction term for low self-control and collective efficacy. This term is not significant, though the \( p \)-value associated with this parameter (i.e., \( p = .073 \)) approaches significance and is well beneath my criterion of .25 for establishing equivalence. Thus here again I cannot reject the possibility that the occurrence of smoking varies across neighborhoods characterized by high- and low levels of collective efficacy.

Similar to Model 2, the effects of neighborhood SES and collective efficacy are not significant. Low self-control is negatively related to never smoking. Additionally, age, and being Black are significantly related to the likelihood of never smoking.

**Frequency:** Model 1 in Panel B of Table 10, which only includes individual level predictors related to the frequency of smoking, shows that low self-control, age, and race are significantly related to the frequency of smoking. Respondents with low self-control
smoke more frequently than respondents who have high levels of self-control. Older respondents smoke more frequently than younger respondents. Blacks smoke less frequently than white respondents.

Model 2 adds the community-level predictors, but these are not significant predictors of the frequency of smoking. Once neighborhood SES and collective efficacy are included, the effect of race on the frequency of smoking is reduced to non-significance. Low self-control and age are still significant predictors for frequency of smoking.

Model 3 includes all predictors and the interaction term low self-control by collective efficacy. The interaction term is not significant, though the $p$-value associated with this parameter (i.e., $p = .057$) approaches significance and is also well beneath my criterion of .25 for establishing equivalence. Thus here again I cannot reject the possibility that the frequency of smoking varies across neighborhoods characterized by high- and low levels of collective efficacy. Additionally, the community level effects are not significant predictors of the frequency of smoking. Furthermore, after including the interaction term, the effect of low self-control is no longer significant. Age and race are the only significant factors predicting the frequency of smoking once all variables are included in the model.
Table 8: ZINB Models For Low Self-Control and Collective Efficacy Interactions and Serious Offending

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* .05 ** .01 *** .001 **
Table 9: ZINB Models for Low Self-Control and Collective Efficacy Interactions and Delinquency

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.05 * .01 ** .001 ***
Table 10: ZINB Models For Low Self-Control and Collective Efficacy Interactions and Smoking

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.05* .01** .001***
Summary of Results for Collective Efficacy

Here I summarize my results in terms of my specific hypotheses, including the central hypothesis concerning the interaction of individual low self-control and collective efficacy (H5).

H4: Low collective efficacy is associated with higher levels of self-reported serious offending, delinquency, and smoking, controlling for age, sex, race, and neighborhood SES.

This hypothesis was only supported for the model pertaining to the frequency of serious offending. Low collective efficacy increases the frequency of serious offending, but does not predict the occurrence of serious offending or the occurrence or frequency of delinquency or smoking.

H5: Collective efficacy will moderate the relationship between low self-control and self-reported serious offending but not delinquency and smoking, controlling for age, sex, race, and neighborhood SES. Specifically the effect of low self-control on serious offending will be greater in neighborhoods characterized by lower collective efficacy.

The primary hypothesis (H5) was only partially supported. The interaction term for low self-control and collective efficacy is significant in the predicted fashion for the frequency of serious offending, but contrary to my argument, it is also significant for the frequency of minor offending (delinquency). Moreover, I failed to establish equivalent effects of low self-control on offending across low- and high collective efficacy neighborhoods for the occurrence of delinquency as well as the frequency and occurrence of smoking. I return to these unanticipated results below.
CHAPTER 5

DISCUSSION AND CONCLUSIONS

The layout of this chapter is as follows. First, I provide a brief review of my arguments and summarize my findings. Second, I discuss the theoretical contributions of this dissertation with a focus on the proposed integration for self-control, social disorganization, and social learning theories. Third, I summarize the methodological strategies used in this dissertation and their contributions to criminology. Fourth, I provide a discussion of my findings related to the differences between occurrence and frequencies of offending patterns. Finally, I discuss limitations of this research and directions for future research.

This dissertation investigated the influence of self-control and neighborhood characteristics on juvenile offending patterns. My primary question was to see if the relationship between individual-level low self-control and offending is conditioned by community-level characteristics that, as I have argued, constitute opportunities and social learning processes. To get at this question, I integrated concepts and propositions from the general theory of crime, social learning theory, and social disorganization theory. Using secondary data from the Project of Human Development in Chicago Neighborhoods (PHDCN), I investigated the relationship between individual-level low
self-control, aggregate self-control, and collective efficacy on juvenile offending. Additionally, and most importantly, I examined cross-level interactions between (a) individual-level low self-control and aggregate self-control, and (b) individual-level low self-control and collective efficacy.

According to the general theory of crime, individuals with low self-control are more likely to commit delinquency and crime (Gottfredson and Hirschi 1990). In fact Gottfredson and Hirschi (1990) state that self-control is the most important individual-level characteristic that predicts offending, and that the relationship between self-control and offending patterns is invariant across situations and contexts. There is little question concerning the link between self-control and offending (Pratt and Cullen 2000), but the assumption of context-invariance has not been sufficiently examined (Grasmick et al. 1993). My dissertation contributes to filling this gap.

My findings confirm the well-established claim that low self-control is an important factor for explaining juvenile offending. Additionally, however, I find that the relationship between low self-control and offending is not invariant across neighborhoods and types of offending, though not always as predicted by my theoretical arguments. Community-level factors are important for understanding offending. Most importantly, I find that community-level factors can amplify the relationship between one’s level of self-control and particular types of offending. In the next section I discuss my results in greater detail.

In what follows I begin by describing my results pertaining to the relationship between low self-control and offending. Next, I discuss findings regarding the effects of
community-level factors on offending. Finally, I discuss my findings bearing on Gottfredson and Hirschi’s (1990) claim that the effect of low self-control on offending is invariant across situations and contexts. The integrated formulation that I have developed suggests otherwise.

To begin, my results are consistent with the well-substantiated finding that low self-control is related to offending. In models that include only individual-level variables (i.e., low self-control, age, sex, and race), low self-control is a significant predictor of the both the occurrence and frequency of serious offending, delinquency, and smoking. However, my second set of hypotheses included variables that are important for social learning and social disorganization theories. First, I conceptualize aggregate self-control as a “modeling” opportunity for social learning (i.e., “When in Rome, do as the Romans”). That is, social learning theory assumes that environments provide opportunities for reinforcement and modeling (Bandura 1969; Bandura and Mischel 1965). Thus, I hypothesized that aggregate self-control will influence respondents’ offending rates because those around them could provide an opportunity for individuals with low self-control to behaviorally enact their disposition for anti-social conduct. I found that aggregate self-control is significantly related to the frequency of committing serious offenses. It was not a significant predictor of delinquency or smoking.

Like aggregate self-control, I conceptualize collective efficacy as a factor that influences the opportunity structure for committing delinquency and crime. Collective efficacy has been an important concept for social disorganization research (Sampson 2009). Collective efficacy is critical for neighborhood stability because it is indicates the
extent to which residents exert community-level control over their neighborhoods (Sampson et al. 1997). Theoretically, as collective efficacy increases, criminal offending will decrease because there will be fewer opportunities to commit and “get away” with crime in these types of neighborhoods. Indeed, I found that collective efficacy is significantly related to serious offending and delinquency. However, like aggregate low self-control, collective efficacy was only important for the frequency of offending rather than the occurrence of offending. These findings suggest that neighborhood characteristics are important factors in determining the frequency of offending. At this point, then, the critical finding is this: while low self-control at the individual-level is important for the onset of offending, community-level indicators of aggregate self-control and collective efficacy shape the frequencies of offending.

My third set of hypotheses pertains to whether the relationship between low self-control and serious offending only is moderated by aggregate self-control and collective efficacy, as predicted. If the interactions are significant, and particularly if the interaction effects are as predicted for each type of offending, then neighborhoods provide the contexts that shape the relationship between types of offending and individual low self-control and offending. Such findings would go against Gottfredson and Hirschi’s (1990) claim that the relationship between individual low self-control and offending is invariant. That question is at the very heart of this dissertation.

In models taking into account aggregate self-control and the interaction between low self-control and aggregate self-control, I expected to find that the link between low self-control and serious offending is amplified in neighborhoods characterized by low
aggregate self-control. However, contrary to my hypotheses, I found that the occurrence and frequency of *minor offending* (delinquency) was amplified in neighborhoods with low levels of aggregate self-control. In models that examined the influence of collective efficacy and the interaction between low self-control and collective efficacy, I found, in line with my argument, that the relationship between low self-control and the frequency of committing serious offenses is, in fact, conditioned by collective efficacy. However, the contrary to my argument, the relationship between low self-control and the frequency of committing less serious acts is amplified in areas with less collective efficacy. I also failed to establish equivalent effects of low self-control on offending across low- and high collective efficacy neighborhoods for the occurrence of delinquency as well as the frequency and occurrence of smoking. Though not always in the predicted fashion, then, neighborhood characteristics do seem to matter.

*Theoretical Contributions*

Contrary to Gottfredson and Hirshi’s (1990) position, my findings indicate that there appears to be a connection between neighborhood characteristics and the relationship between low self-control and offending. In line with the position put forth by Grasmick et al. (1993), my results support the view that the relationship between low self-control and offending is amplified under certain circumstances. Again, I found that in areas with low levels of aggregate self-control and collective efficacy, the relationship between low self-control and offending is amplified and is not invariant across neighborhoods. This finding builds on Lynam and colleagues’ (2000) finding that the
effect of low self-control was amplified in low SES neighborhoods. However, unlike Lynam et al. (2000) who used neighborhood SES as an indicator of neighborhood stability, I examine aggregate low self-control and collective efficacy as indicators of stability while controlling for neighborhood SES. In addition, my findings contrast with Vazonyi’s (2006) study, which found that the effect of self-control on offending is invariant across neighborhoods. I advanced a theoretical integration to explain these effects.

To the best of my knowledge, this is the first empirical test that examines the influence of aggregate self-control on offending and the effect of the cross-level interaction of low self-control and aggregate self-control on offending. My results indicate that there is a cross-level interaction between aggregate self-control and individual-level low self-control with delinquency. In areas where aggregate self-control is relatively low, the effect of low self-control on delinquency is amplified. While I expected this relationship for serious offending, this finding could support a social learning theory view, in that individuals with low self-control model delinquent behavior in line with those by whom they are surrounded when aggregate self-control is low. In hindsight, given the age range of respondents, this unanticipated finding makes sense. For an adult sample, it might be the case that low self-control and serious offending is moderated by aggregate self-control. Further articulation of theory put forth in this dissertation should take this age graded condition into account.
Methodological Contributions

As I stated above, this dissertation explored how opportunities in neighborhoods might influence the relationship between low self-control and offending. In other words, both micro and macro level processes influence the probability of offending. To account for each level and the cross-level interactions between the community-level variables (i.e., aggregate self-control and collective efficacy) and individual-levels of self-control, I employed multilevel modeling. Only a handful of studies have examined cross-level interactions between community-level characteristics and low self-control (Lynam et al. 2000; Vazsonyi et al. 2006; Jones and Lynam 2009; Zimmerman 2009). Previous studies examining the influence of neighborhood effects on the low self-control-offending link have produced mixed results. For example, Lynam (2000) found that low SES amplifies the relationship between low self-control and offending, while Zimmerman (2009) found that the effect of low self-control is stronger in high SES neighborhoods.

Unlike Vazsonyi et al. (2006), my results indicate that the effect of low self-control is not invariant across neighborhoods. Using multi-level modeling techniques, my study provides additional support for Jones and Lynam’s (2009) finding that individuals who perceive low social control in neighborhoods and have low self-control are even more likely to offend.

Another methodological contribution of this dissertation is the (unplanned) use of ZINB models with random intercepts for level-2 units. To the best of my knowledge, this is the first examination that uses ZINB modeling to investigate the influence of low self-control and offending while controlling for neighborhood characteristics. The choice to
use ZINB modeling was entirely empirical. Because (a) the distributions of the outcomes were highly skewed, (b) the variances were very large, and (c) I was faced with count data with excessive zeros (i.e., most respondents were not offenders), I had to employ ZINB modeling.

*Unexpected Findings*

Because ZINB modeling accounts for the fact that *never offending* is different from the *frequency of offending*, this analytic strategy provides additional insights and unexpected findings concerning the main effects of low self-control, aggregate self-control, and collective efficacy, and the moderating effects of low self-control X aggregate self-control and low self-control X collective efficacy on different types of offending.

The findings in this dissertation strongly suggest that there are differences between never offending and the frequency of offending. One especially fascinating result to emerge from my analyses is that *individual-level factors are more important overall for predicting the occurrence of offending (i.e., the probability of never offending)*, *while community-level factors are more important overall for predicting the frequency of offending*. Along these lines, perhaps the most striking finding is that individual-level low self-control predicts occurrence of serious and delinquent offending, yet aggregate self-control predicts the frequency of serious and delinquent offending.

Models examining collective efficacy produced similar results concerning the difference between occurrence and frequency of offending. Individual-level low self-
control is significantly related to the occurrence of all outcomes, but it is not related the frequency of committing any of them. By contrast, collective efficacy is related to the frequency of serious and delinquent offending, and it moderates the effect of individual-level low self-control on serious offending and delinquency. Again, these findings suggest that individual-level factors are related to the occurrence, but not the frequency, of offending, and community-level factors are related to the frequency of offending and smoking.

Future research should investigate the difference between the occurrence and frequency of offending. This study provides empirical evidence that different factors are related to the occurrence versus the frequency of offending. Ultimately, these results could become important for policies or interventions that are aimed at reducing offending. My dissertation suggests that policies and intervention plans should be mindful of the fact that different processes may underlie the occurrence of offending versus the frequency of offending. Qualitative research might shed light on the finer details of these processes, and quantitative research might examine these patterns with different samples, variable operationalizations, and longitudinal research designs.

**Limitations and Future Research**

In this dissertation, the research design and the data structure pose two important limitations. Specifically, the use of cross-sectional data and relatively low variance between neighborhoods on the outcomes of interest limits the strength of my findings.
While the cross-sectional research design that I employed was arguably sufficient for answering my research questions (Gottfredson and Hirschi 1990), a longitudinal design would make it possible to more conclusively see how changes in a respondent’s context impact the relationship between self-control and offending. For example, if the PHDCN had measures of self-control for all three waves (which it does not), I could have investigated whether changes in neighborhood context over time alter the effects of self-control on patterns of offending in the manner that I have theorized. Future research should employ longitudinal designs to examine respondents who move to a different type of neighborhood (i.e., one with either greater or lesser aggregate self-control or collective efficacy or both) to see whether and how changing neighborhood characteristics influence the low self-control-offending link.

The second limitation of this dissertation pointing to further directions for future research concerns the characteristics of the PHDCN data. Two of three dependent variables used in this study significantly vary across neighborhoods, but none of the outcomes that I examined have variances between neighborhoods exceeding 2%. Thus, predicting variation between neighborhoods is inherently difficult because little variation exists from the outset. Because my ZINB models took into account variance between neighborhoods, model convergence became a complex matter. The lack of variation between neighborhoods made it impossible for some models to converge. Consequently, I had to keep my models as parsimonious as possible. According to Wang et al. (2012), ZINB models accounting for random effects should only include predictors that are theoretically important and have been shown to be strong predictors of the outcomes.
under investigation. Unfortunately, I had to make sacrifices and minimize the number of parameters in order for my models to achieve convergence. If convergence were not an issue, I would have included more theoretically relevant control variables in all models, including indicators of neighborhood disadvantage and number of delinquent peers. Future research should explore means of controlling for additional factors to see whether the relationships regarding self-control and offending reported in this dissertation are robust. Finally, as mentioned above, research should test the arguments advanced in this dissertation with a sample that exhibits greater variation between neighborhoods, which may reduce convergence problems and open the door for further refinement and articulation of the theoretical framework that I have presented.
REFERENCES


APPENDIX A

QUESTIONNAIRE AND CODING

**Dependent Variables**

*Self-Reported Offending*

Script: I am going to describe some things that people do. First, tell me if you have ever done any of these things. Then I will ask how many times you have done the thing during the last year or last 12 months, that is since [month of interview]. Responses were coded “0” for no and “1” for yes.

Serious Offenses:
Sr20a0: Have you ever hit someone with whom you lived with the idea of hurting them?
Sr21a0: Have you ever hit someone with whom you did not live with the idea of hurting them?
Sr22a0: Have you ever attacked someone with a weapon?
Sr24a0: Have you ever thrown objects, such as rocks or bottles, at people (other than the events you have already mentioned?)
Sr25a0: Have you ever been involved in a gang fight in which someone was hurt or threatened with harm?

Minor Offenses (Delinquency):
Sr1a0: Have you ever run away from home and stayed away overnight?
Sr3a0: Have you ever carried a hidden weapon?
Sr4a0: Have you ever caused trouble in a public place so that people complained about it, such as being loud or disorderly?
Sr8a0: Have you ever stolen something from a store?
Sr27a0: Have you ever been paid by someone for having sexual relations with them?
Sr28a0: Have you ever used a false name or alias to try to obtain something you were not entitled to, such as a job or bank loan?
Sr32a0: Have you ever driven a motor vehicle when you did not have a driver’s license or after your driver’s license had been suspended?
Smoking:
Su1C0: How many days have you smoked cigarettes during the past 12 months? Responses were coded: “0” for never, “1” 1-2 days, “2” for 3-5 days, “3” 6-11 days, “4” for 12-24 days, “5” for 25-50 days, “6” for 51-99 days, “7” for 100-199 days, and “8” for 200 days.

Independent Variables

Self-Control is observed by combining sub-scales from EASI that capture the respondent’s inhibitory control, decision time, sensation seeking and persistence.

Script: Now I am going to read some statements about what **** might be like. For each one, try to rate **** on a scale from 1 to 5, with 1 being uncharacteristic or not at all like **** and 5 being characteristic or very much like ****.

The following questions made up the final self-control measure.

Inhibitory control
Ey25: Has trouble controlling his/her impulses
Ey24: Usually cannot stand waiting
Ey15: Can tolerate frustration better than most (reverse coded)
Ey6: Has trouble resisting temptation
Ey14: Finds self-control easy to learn (reverse coded)

Decision time
Ey21: Often says the first thing that comes into his/her head
Ey38: Likes to plan things way ahead of time (reverse coded)
Ey2: Often acts on the spur of the moment
Ey28: Likes to make detailed plans before he/she does something (reverse coded)
Ey30: Has trouble making up his/her mind*

Sensation seeking
Ey13: Generally seeks new and exciting experiences and sensations
Ey40: Will try anything once
Ey4: Sometimes does “crazy” things just to be different
Ey23: Tends to get bored easy
Ey1: Feels happiest in familiar surroundings*

Persistence
Ey29: Generally likes to see things through to the end (reverse coded)
Ey36: Tends to give up easily
Ey8: Bothered by unfinished tasks (reverse coded)
Ey39: Once gets going on something she/he hates to stop (reverse coded)
Ey18: Tends to hop from one thing to another*
The Cronbach’s Alpha is .73

*These variables were part of the original EASI subscales but not Gibson and colleagues’ (2010) scale. The reliability of the original EASI subscales and the Gibson et al. (2010) scale were comparable (i.e., Cronbach’s alpha of .73 compared to .74).

**Neighborhood-Level Variables:**

**Collective Efficacy** is the combination of the **Social Cohesion** and **Social Control** variables. Responses ranged from “1” (high collective efficacy) to “5” (low collective efficacy). The Cronbach’s alpha is .85.

**Social Cohesion**

Script: Now I’m going to read some statements about things that people in your neighborhood may or may not do. For each of these statements, please tell me whether you strongly agree, agree, disagree, or strongly disagree. Responses were coded: “1” strongly agree, “2” agree, “3” neither agree nor disagree, “4” disagree, and “5” strongly disagree.

Q11b: This is a close-knit neighborhood
Q11e: People around here are willing to help neighbors
Q11f: People in the neighborhood generally don’t get along with each other (reverse coded)
Q11k: People in the neighborhood do not share same values (reverse coded)
Q11m: People in the neighborhood can be trusted
The Cronbach’s alpha is .74.

**Social Control**

Script: For each of the following, please tell me if it is very likely, likely, unlikely or very unlikely that people in your neighborhood would act in the following manner. Responses were coded: “1” very likely, “2” likely, “3” neither likely nor unlikely, “4” unlikely, and “5” very unlikely.

Q12a: Neighbors do something if a group of neighborhood children skip school and hang out on street corner
Q12b: Neighbors would do something if some children spray-paint graffiti on a local building
Q12c: People in neighborhood would scold child if child shows disrespect to an adult
Q12e: Neighbors break up a fight in front of your house where someone was being beaten or threatened
Q12f: Neighborhood residents would organize to keep closest fire station open if it were to be closed down by city because of budget cuts

The Cronbach’s alpha is .82.

**Control Variables**

***Age***
AGE 1: Age of subject at wave 1 interview

***Sex***
SEX: Gender of Subject. Responses were coded “0” female and “1” male.

***Race***
Black: Respondent racial status: Responses were coded “1” Black and “0” White.
Hispanic: Respondent racial status: Respondents were coded “1” Hispanic and “0” White.

***Neighborhood SES***:
SES_NC NC socio-economic status, wave 1. Responses were coded “1” low, “2” medium, and “3” high.
APPENDIX B

PLOTS FOR THE RELATIONSHIP BETWEEN LOW SELF-CONTROL ON OFFENDING BY TYPE OF NEIGHBORHOOD

Figure 2: Serious Offending and Low Self-Control by Low/High Self-Control Neighborhoods
**Figure 3:** Delinquent Offending and Low Self-Control by Low/High Self-Control Neighborhoods
Figure 4: Smoking and Low Self-Control by Low/High Self-Control Neighborhoods
Figure 5: Serious Offending and Low Self-Control by Low/High Collective Efficacy Neighborhoods
Figure 6: Delinquent Offending and Low Self-Control by Low/High Collective Efficacy Neighborhoods
Figure 7: Smoking and Low Self-Control by Low/High Collective Efficacy Neighborhoods
APPENDIX C

SAMPLE SAS CODE FOR MULTILEVEL AND ZINB MODELS

1) **Unconditional model**

```sas
proc mixed covtest noclprint;
class link_nc;
Model serious= /solution ddfm=bw;
Random intercept /subject = link_nc type=un gcorr;
run;
```

2) **Conditional model**

```sas
proc mixed covtest noclprint;
class link_nc;
Model serious=LSCCENTER age1 black hispanic LSCMED ses_nc LSCINTERCENTER /solution ddfm=bw;
Random intercept /sub = link_nc type = un gcorr;
Run;
```

3) **ZINB model with random effects**

```sas
proc nlmixed;
parameters  b0=0 b1=0 b2=0 b3=0 b4=0 b5=0 b6=0 b7=0 b8=0
            a0=0 a1=0 a2=0 a3=0 a4=0 a5=0 a6=0 a7=0 a8=0 sigma2=0 alpha=1;
linpinfl = a0 + a1*LSCCENTER + a2*age1 + a3*sex + a4*black + a5*Hispanic +
         a6*LSCMED + a7*ses_nc + a8*LSCINTERCENTER;
infprob = 1/(1+exp(-linpinfl));
lambda  = exp(b0 + u + b1*LSCCENTER + b2*age1 + b3*sex + b4*black +
            b5*Hispanic + b6*LSCMED + b7*ses_nc + b8*LSCINTERCENTER);
m= 1/alpha;
p = 1/(1+alpha*lambda);
if serious=0 then
   ll = log(infprob + (1-infprob)*(p**m));
else ll = log(1-infprob) + log(gamma(m + serious)) - log(gamma(serious+ 1))
        - log(gamma(m)) + m*log(p) + serious*log(1-p);
model serious~ general(ll);
random u~ normal(0, sigma2) subject=link_nc;
run;
```