OFFENDING IN KARACHI'S NEIGHBORHOODS:

AN EMPIRICAL TEST OF THE SYSTEMIC MODEL OF

SOCIAL DISORGANIZATION

by

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ABSTRACT

Offending in Karachi's Neighborhoods:

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The systemic model of social disorganization posits that structural challenges impede the development of neighborhood networks responsible for informal social control, and thereby increase residents' involvement in crime. However recent studies suggest that in severely disadvantaged and isolated communities, even well-functioning networks may be unable to prevent offending, as a result of cultural and political economy factors such as legal cynicism and the legitimization of violence. This research examines the utility of the ecological framework in Karachi, and assesses the impact of key social disorganization indicators - ethnic heterogeneity, residential mobility and concentrated poverty - on offending. It also examines the extent to which these impacts are mediated by variation in state legitimacy across Karachi's neighborhoods.

The project draws on three sources of secondary data: census of Pakistan, election data, and jail admission records. The sample consists of 453 of Karachi's census tracts. Analyses include descriptive techniques to assess the utility of the ecological framework, multivariate regressions to examine direct and mediation effects, and structural equation models to test the

significance of the entire complex models.

Results display considerable variation across neighborhoods in offending, voting behavior and other sociological indicators. Two social disorganization factors – concentrated disadvantage and ethnic heterogeneity – as well as legitimacy, are each seen to have significant, positive, direct effects on total offending, violent offending and robbery. Results further suggest that concentrated disadvantage and mobility contribute to voting behaviors.

These results have important implications for the application of ecological theories in general, and social disorganization in particular, in Karachi. The study also points to the importance of macro-social indicators such as voting behavior in explaining offending. Finally, results speak to the need for careful selection of multivariate regression models and the benefits of supplementing these techniques with SEM. However, it is suggested that further investigation into the nature of the micro-social processes underlying social disorganization, and a more rigorous understanding of the determinants of voting behavior and its ability to adequately represent attitudes toward state legitimacy will allow for more accurate application of these findings to the systemic model.

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CHAPTER 1

INTRODUCTION

1.1 Research goals

This dissertation examines crime in Karachi through the lens of ecological framework. Specifically, it examines the amount and type of offending that takes place by residents of Karachi's neighborhoods, and assesses how these patterns are impacted by variation in the structural attributes identified in social disorganization theory: ethnic heterogeneity, population mobility and concentrated disadvantage[1]. The research also tests an extension of the theory by examining how state legitimacy intervenes in this relationship.

This research has three goals. First, it assesses the utility of ecological theory in the current context by examining neighborhood level variation in structural attributes and offending patterns across Karachi. These attributes include offending rates, poverty, ethnicity and length of residence. Apparent variation in structural attributes across Karachi's neighborhoods make it an excellent 'sociological laboratory'[2] for the examination of neighborhood effects posited in ecological theory. Available data allow for the quantitative examination of these variables across many of the 1200 census tracts in Karachi. This scale of research is unprecedented in the study of ecological approaches to crime outside the US and Europe.[3]

Second, the research examines social disorganization theory in Karachi. Specifically it

[1] Concentrated disadvantage represents an extreme form of relative disadvantage that can lead to isolation and disable local networks. It can be measured as a factor score based on the following variables: proportion families below poverty line, proportion families female headed, proportion families receiving unemployment assistance, proportion unemployed, proportion African American (Sampson et al, 1997).

[2] This term has been applied to Robert E. Park's conceptualization of the city by Gross (2006).

[3] See table 1 for a breakdown of the geographical origin of studies of social disorganization and the systemic model of crime.

examines how structural characteristics, i.e. concentrated disadvantage, ethnic heterogeneity and population mobility, impact offending rates across Karachi's neighborhoods.

Finally, the project responds to the critique that social disorganization theory fails to account for cultural and urban political economy factors. Specifically, it contributes to a growing body of literature which examines the extent to which public controls allow private and parochial controls to operate. It does so by examining the extent to which state legitimacy mitigates the impact of neighborhood attributes on offending rates.

1.2 Ecological perspective, social disorganization theory, and the systemic approach

The ecological perspective posits that society operates in the same way as other natural systems: each part performs a designated role. This perspective locates the root causes of crime in individuals' social and physical environment. Shaw and McKay's original version of social disorganization theory – particularly ecological in its approach - held that neighborhoods which experienced high rates of poverty, ethnic heterogeneity and rapid residential turnover often found it challenging to informally control residents' behavior, allowing crime and delinquency to flourish. Berry and Kasarda (1977), and later Bursik and Grasmick (1993) developed the systemic approach to social disorganization which specified that the mechanisms through which structural characteristic of neighborhoods affected informal social control, and subsequently crime and delinquency, were rooted in dense social networks amongst residents, and their persistent attachments with the neighborhood. Informal control occurs at three levels: within the immediate family and kinship group (private), neighborhood institutions such as schools and churches (parochial), and through residents' ties with external organizations (public). Evidence from empirical research supports the importance of networks and attachments in mediating the relationship between neighborhood characteristics and crime, particularly violent property crime

(Bursik and Grasmick, 1993). Moreover, the literature irrefutably supports community based mechanisms as distinct social processes that impact individual behavior (Sampson, 2008). This project assesses the utility of the ecological framework in Karachi, by examing neighborhood-level variation in several areas: poverty, ethnic distributions, population mobility and offending rates.

1.3 Alternate relationships between networks and crime

In some cases, however, strong networks and persistent attachments are unable to prevent criminal involvement of neighborhood residents. There are least three, somewhat overlapping theoretical explanations for why this might be the case.

In the first instance, Anderson (1999) suggests that the persistence of discriminatory government policies, in the area of housing and education in particular, cause severely disadvantaged communities to become isolated from the wider social, political, economic and cultural environment of the city and experience a breakdown in the public order of informal social control. Embracing the "code of the street" to acquire and maintain personal respect causes the "legitimation of violence" whereby violent means are seen as a necessary means for survival (Anderson, 1999). Sampson and Bartusch (1998) further this perspective, pointing to the inability or unwillingness of communities to access criminal justice institutions and other state agencies, stemming from their lack of trust in these agencies. This lack of trust is generally rooted in the perception of discriminatory state policy which negatively impacts these already disadvantaged, predominantly minority communities. This "legal cynicism" (Sampson and Bartusch, 1998) further contributes to the legitimization of violence and deepens offending patterns in neighborhoods.

Fagan and Tyler (2005) put forward a second perspective for why rule breaking might

occur despite strong social networks. This perspective puts the onus on the legal actors responsible for procedural justice: the perception that the process, as opposed to the outcome, of neighborhood residents' interactions with the criminal justice system, is fair. They find that "legal socialization" is impacted by childrens interaction with the law, and that compliance with the legal system is influenced by the perception of fairness in these interactions. This suggests that the behavior of officers of the police, courts and correctional institutions can impact rule abidance amongst young people. Further, they find that neighborhood characteristics such as racial composition influence the nature and quality of these interactions. They argue that discriminatory policies and misuse of authority cause the police and other agencies of formal control to lose legitimacy in disadvantaged communities, thereby lessening residents' willingness to abide by the rules and laws that govern mainstream society (Fagan and Tyler, 2005).

Finally, a third perspective is put forward by Wilson (1987, 1996) and Patillo (1998; Patillo-McCoy, 1999). This perspective posits that low skill levels and limited interaction with positive mainstream influences may in fact cause strong networks to increase negative behavior amongst residents, particularly youth (Wilson, 1987). Further, the long-term presence of gangs and gang leaders in an otherwise middle-class community may legitimize their actions, particularly because of the positive investments they make in the community (Patillo, 1998; Patillo-McCoy, 1999). Research on shanty-towns (favellas) in Brazil supports these findings. Strong networks are seen to be associated with increased violence and insecurity in favellas, as strong gangs and criminal elements within the favella make it a target for rival gangs and state forces (Villareal and Silva, 2006; Arias, 2006).

1.4 Non-state violence and the strength of informal mechanisms in Karachi

Karachi is one of the largest cities in the world, and yields much of Pakistan's national revenue.

It attracts labor from around the country and as a result is divided along multiple ethnic and religious lines. Pakistan's role in the US-led war against the Taliban and Al-Qaida has relatively recently placed it on center-stage in the current discourse on global insecurity. However, non-state violence in Karachi is not new, and has been persistently high since the late 1970s, oscillating between political violence with a strong, underlying ethnic dimension, and religious violence manifested through sectarian rifts (Buddhani et al, 2010). Criminal violence, particularly robbery and kidnapping for ransom have increased dramatically in recent years[4]. There have also been recent media reports of public attacks on alleged criminals (multiple sources, see section 2.7).

As articulated by Buddhani et al (2010), rapid population growth through the '70s and '80s, and simultaneous limitations in the state's capacity to provide or regulate the use of public infrastructure – in particular, mass transit, water, and the regulation of tenancy and ownership of land - created a high demand for the informal provision of such services. In response, informal, private-sector suppliers emerged to fill these gaps, and did so fairly effectively. However, this was premised on the legitimization of non-state mechanisms to enforce contracts, requiring the threat, and use, of force. Also, it required the development of strong social networks, largely based in the ethnicity-driven settlement patterns of new migrants, in order to organize demand and supply mechanisms and transmit information regarding these informal markets (Buddhani et al, 2010).

This dissertation is premised on the argument that despite these strong social networks, the culture of violence gained strength in Karachi, largely in response to the need for informal providers to fill the void in public service delivery resulting from the limitations of the state. The paper argues that as a result of this, the informal social control of offending behavior across

[4] Source: Citizen Police Liaison Committee. Data available at http://www.cplc.org.pk/content.php?page=31

many parts of the city broke down. Thus, even when neighborhoods are strong, i.e. concentrated disadvantage, ethnic heterogeneity and population mobility are relatively low, offending rates across neighborhoods remain unaffected. This dissertation tests this argument.

Finally, the project responds to the critique that social disorganization theory is not grounded in the context of urban political economy (Sampson, 1997 *et* al; Kubrin and Weitzer, 2003b). Data on electoral participation are used as an indicator of state legitimacy and the public order of control, based on the argument that participation in democratic politics is a function of, amongst other things, state legitimacy – the belief that the state ought to be "deferred to and obeyed" (Sunshine and Tyler, 2003; Gonzalez and Tyler, 2008). Using these data, the project tests the impact of state legitimacy, and examines how it mediates the effect of neighborhood instability on offending patterns.

1.5 Research questions

This dissertation addresses the following questions:

1. Does the ecological framework apply to Karachi, i.e. can we see neighborhood level variation in criminal offending, poverty, ethnicity and average length of residence?
2. Are the structural attributes of neighborhoods associated with offending rates of residents?
3. Does state legitimacy influence offending across neighborhoods?
4. Is the relationship between structural factors and offending across neighborhoods mediated through legitimacy?

1.6 Research methodology

The study employed a cross sectional research design using data from three secondary sources. Data from the Citizen Police Liaison Committee on admissions to Karachi's jails in 2004-2005

provided information on criminal involvement across neighborhoods. National census data provided information on neighborhood characteristics including literacy, poverty, and residential mobility. Finally data on voting rates held by the Election Commission of Pakistan provided rates of voter registration and electoral participation across neighborhoods in the 2008 national election. Each dataset was aggregated to the census tract level, yielding a total sample size of 453.

A range of analytical methods were employed to address the research questions outlined above. In the first instance, descriptive statistics such as frequencies and scatter plots were employed to assess the distribution of key variables across neighborhoods with a view to examining ecological distributions and assessing the fundamental utility of this approach in the current context. Second, three types of multivariate regressions were used to examine the direct effect of the structural attributes of neighborhoods on total violent and robbery offence rates.[5] Results were compared with those obtained from an expanded regression model which included legitimacy as an independent variable, in order to examine the strength of legitimacy and the extent to which it mediated the effects of other predictors.

Finally, structural equation modeling (SEM) was used to assess path-wise significance of the entire, complex model. Both multivariate regression and SEM have been used in prior literature, and the comparison of results from both techniques contributes to the methodological discussion on the relative strengths of these methods.

1.7 Summary of results

Results found that the average total offending rates across Karachi was roughly 20 per 10,000.

[5] The three types of models were step wise weighted least squares (WLS), logged-dependent ordinary least squares , and negative-binomials. Each type of model estimated total offending, violent offending and robbery across circles. Each dependent variable was estimated twice, excluding and including legitimacy.

About half of these were violent offenses (M: 10 per 10,000), and robbery accounted for a little over a third of all violent offenses (M:3.6 per 10,000). Patterns of concentrated disadvantage, mobility, heterogeneity and legitimacy were fairly well-dispersed across the city, suggesting that ecological theories would be well suited to understand social phenomena in the context of Karachi.

Multivariate regression analyses suggested that WLS models did not meet basic assumptions of homoscedastic error terms logged-dependent models offered some improvement over WLS results in meeting model assumptions, but still displayed minor levels of heterogeneity. In addition, results were effected by diminished sample sizes. Instead, negative binomial regression models, based on the Poisson distribution, were found to be best suited to these data. Results found that concentrated disadvantage and heterogeneity were significantly and positively associated with the total offending, violent offending and robbery. Legitimacy was also seen to have a significant effect on offending. However contrary to study hypotheses, the coefficient for legitimacy was positive, suggesting that greater levels of legitimacy were associated with greater levels of offending. Legitimacy was found not to mediate the effects of traditional social disorganization variables.

Results from structural equation models presented in chapter 6 supported findings from multivariate regressions: concentrated disadvantage, heterogeneity and legitimacy had significant, positive effects on total offending. In addition, mobility and disadvantage were negatively associated with legitimacy: lower levels of mobility (i.e. the greater presence of families) and lower levels of disadvantage were associated with higher legitimacy. Finally, a significant, negative, indirect effect of mobility on offending was observed.

1.8 Implications for theory

The study supports the application of the ecological approach toward understanding offending patterns in Pakistan. Specifically, it speaks to the utility of the systemic model in explaining neighborhood variation in offending rates. As such, it provides one of the few quantitative assessments of social disorganization in a non-US and non-Europe context. As a large urban center in a developing country facing extreme economic, social and political challenges, the extent of variation in isolation across Karachi's neighborhoods may be far greater than that observed in the West. As a research laboratory, therefore, Karachi offers a context different from any other explored to date in this theoretical realm. That social disorganization variables of heterogeneity and concentrated disadvantage offer considerable insight into Karachi's offending patterns is a considerable advancement to the state of the theory.

The study also addresses concerns that the systemic model must explicitly address socio-political realities, by examining the importance of legitimacy as a predictor of crime, as well as its role in mediating the effect of other social disorganization variables. Although enough is not known about the factors that influence voting behavior in Karachi, the finding that the inclusion of legitimacy assists traditional social disorganization variables in understanding variation in offending is an important one. Some of the factors that contribute to voting, including the presence of family units and lower levels of poverty, have been identified through this project, but exploring the nature of the processes underlying this relationship is an important avenue for further research.

Methodologically, this study contributes to the literature in two important ways. Through the comparison of two competing methods of analysis – multivariate regression and structural equation modeling, it illustrates how the two techniques complement each other in predicting

outcomes. In addition, the study describes the limitations of two frequently used regression models – step-wise weighted least squares (WLS) and logged-dependent ordinary least squares (OLS) - by illustrating how results from these models violate basic assumptions. The study also speaks to the soundness of results obtained from negative binomial model, couched in the Poisson distribution, in predicting offending. Despite considerations of data accuracy, modest rates of data matching, and the presence of missing data, the comparison of results obtained through the use of different techniques makes an important contribution to the field.

The next chapter describes the theoretical orientation of the project. Chapter three discusses the research methods used in the study, including study variables, and analytical methods. Results from descriptive analyses are presented in chapter 4. Multivariate regression techniques, employing WLS, OLS and negative binomial models, are described in chapter 5. For each model, I present coefficients obtained through the regression as well as its ability to meet underlying assumptions. Chapter 5 presents results from structural equation modeling, which estimates the covariance matrix and assesses direct and indirect effects between endogenous and exogenous variables. Results are discussed with reference to study hypotheses, and broader empirical and theoretical implications, in chapter 6. Finally, an overview of the study and the implications of results is presented in chapter 7.

CHAPTER 2

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.1 Overview

This research has three goals. First, it examines the utility of the ecological framework in Karachi by assessing neighborhood variation in offending patterns and structural characteristics such as poverty, ethnic composition and residential mobility. Second, it tests the neighborhood effects posited in social disorganization theory, i.e. it examines the impact of the structural weaknesses of neighborhoods (extreme deprivation, ethnic heterogeneity and rapid residential turnover) on offending rates. Finally, the project responds to calls for extensions in the systemic approach to social disorganization by examining how the public order of informal control, operationalized as state legitimacy influences the ability of the private and parochial controls to function, and mediates the relationship between neighborhood structures and offending.

Section 2.2 reviews the theoretical and empirical literature on social disorganization and the systemic model of crime, and examines how these theories have evolved in recent years. Social disorganization theory posits that the lack of community attachment amongst short-term residents, communication gaps amongst ethnically diverse populations, and economic challenges faced by those who are extremely poor create socially disorganized communities which are unable to informally control the criminal behavior of their residents. The systemic approach to the theory adds that social networks provide the causal mechanisms necessary for neighborhood characteristics to impact informal social control, and thereby influence offending rates.

Section 2.3 describes theoretical perspectives on why some neighborhoods continue to be

high-risk despite strong social networks and persistent attachments to the community. There are three main arguments in this regard. The first is put forward by Anderson (1999), who suggests that severe deprivation and isolation from mainstream culture creates a 'self-help' subculture whereby youth engage in violence in the interest of their personal safety, respect, and in abidance with the 'code of the street'. The notion of legal cynicism - a mistrust of the criminal justice system and its actors - supports this theory (Sampson and Bartusch, 1998). The second perspective, mainly put forward by Tom Tyler and his colleagues, also supports the importance of the legal system and its actors. This view emphasizes public perceptions of the fairness of procedure, rather than the favorability of its outcome, as determining attitudes toward the criminal justice system and, subsequently legal socialization and rule abidance (Tyler, 2006; Fagan and Tyler, 2005). Finally, Wilson (1987, 1996) and Patillo (1998) suggest that well-networked, high risk communities are often characterized by residents with dual identities: while on the one hand they have positive interactions with community members and may provide protection or access to resources, on the other, their criminal activities may lead to increased risk and insecurity in the neighborhood. This duality blurs the distinction between acceptable and unacceptable behavior and allows negative behaviors to persist.

In section 2.4 I describe empirical evidence from Brazil, which broadly supports the Wilson-Patillo perspective. The case of Karachi is described in section 2.5, where, based largely on a theory of informality and legitimization of violence put forward by Buddhani et al (2010), it is argued that underlying causal processes are similar to those described by Anderson (1999) and Tyler (2006). In section 2.6, I develop a conceptual framework for this research and describe precise research questions and hypotheses in sections 2.7 and 2.8.

2.2 Ecological perspectives on crime

This research is grounded in the theory that neighborhoods possess certain characteristics that influence the behavior of their residents. Viewing society as an organism, each part of which performs a specific role, ecological theories look toward society and an individual's physical environment as housing the causes of crime. Park and Burgess (1924) conducted the first ecological study of the dynamics of neighborhood organization in Chicago. The "concentric zone" model emerging from their work argues that human beings organize cities in the same way that other species are organized: on the basis of self interest and competition. Central parts of the city – where the transportation lines converged – were in great demand for factories and warehouses. Areas adjacent to the central zone were acquired by investors who speculated that they would gain in value as industry in the city expanded. Because the purpose of the acquisition was to sell in the future, investors were not interested in the upkeep of these areas and they formed a supply of cheap, low quality rental housing for factory workers who worked in the inner city. These workers, according to Park and Burgess (1924), were often new immigrants, who moved out into better residential areas further out in the city as soon as they were able to afford it. Both the central and the second zones, therefore, were subject to fairly high population turnover, in addition to high population heterogeneity. The model posits that the geographical distribution of residents has implications for the development of neighborhoods, the formation of social networks, and as a result, levels of social organization and the ability of a community to control the activities within its borders.

Social disorganization theory is housed within the human ecology approach. The classical version of social disorganization was put forward by Shaw and McKay (1942), who simply stated that that regardless of ethnic or racial composition, neighborhoods in Chicago had persistent rates of delinquency over time, suggesting that neighborhoods had an inherent capacity

to facilitate or restrict the behavior of their residents. Subsequently, many researchers including Bursik (1988) and Kornhauser (1978) elaborated Shaw and McKay's theory and explained constituent constructs and causal mechanisms. Based on their descriptions, social disorganization refers to the "inability of local communities to realize the common values of their residents or solve commonly experienced problems" (Bursik, 1988:521). Socially disorganized communities are characterized by weak ties amongst residents, low membership in community based organizations, lack of common understanding of what is appropriate behavior, and lack of willingness to intervene if an unlawful or unsafe incident is witnessed (Bursik, 1988; Sampson and Groves 1989; Hunter 1974, Kasarda and Janowitz 1974, Kornhauser 1978). The theory posits that economically deprived areas are frequently characterized by high residential mobility and ethnic and racial heterogeneity. Short-term residents and cultural and linguistic barriers make it difficult to form the associations and institutions necessary for the enforcement of social control. This creates a socially disorganized environment, leading to higher rates of delinquency.

There are at least two sets of processes that cause socially disorganized communities to have higher delinquency rates. From the social control perspective, short-term residents do not have the willingness to invest in institutions of social control, such as neighborhood watch groups or other, small-scale, community-based organizations, since they do not plan to reside in the neighborhood long enough to take advantage of these structures. They are also less likely to build relationships with friends and neighbors that allow informal social control of behavior to take place e.g. neighbors are less likely to intervene in a fight amongst local youth if those involved have just moved into the neighborhood and the adults have not yet had a chance to develop relationships. Furthermore, ethnic diversity may hinder communication due to language

and cultural difference, and thus may prevent residents from developing a common understanding about problems and identifying shared goals (Kornhauser, 1978; Berry and Kasarda, 1977; Merry 1981). The theory of social control suggests that in such situations, when social controls are weak, and fail to produce behavior that conforms to the norms of the legal system, deviance is more likely to occur (Reiss, 1951). As noted by Bursik (1988:520), the social control perspective helps explain how the social structures identified through social disorganization theory, translate into higher delinquency rates.

The second set of processes which cause socially disorganized communities to have higher delinquency rates is based in simple economics. People earning lower wages generally live closer to the poverty line, and face greater uncertainty with regard to their own immediate existence (Suttles, 1972; Taylor, 1986). Their investment in their communities is limited by their need to invest in their own security, by working longer hours, ensuring adequate availability of funds to pay rent, pay bills, and juggle personal and family responsibilities with limited financial means. Not only are they less able to partake in formal or informal social control, they are also less willing to do so, simply because their priority is personal security, as manifested by stable housing, enough food etc., rather than stability within their community. Taylor (2001) notes that this preoccupation with financial survival causes economically deprived neighborhoods to experience higher levels of delinquency.

2.2.1 Empirical evaluation of social disorganization

Empirical evaluation and subsequent theoretical developments within social disorganization theory began in the early '80s (Bursik 1988). At that time, Taylor, Gottfredson and Brower (1984) identified the potential in treating residential blocks as distinct units of social analysis. Their findings also pointed to the insufficiency of defensible space theory (Newman, 1972) in

controlling crime, and the importance of what they referred to as "local social ties" (Taylor et al 1984:307). Simcha-Fagan and Shwartz' (1986) assessment of neighborhood effects found that levels of organizational participation and the extent of disorder in the community had significant effects on delinquency in the community (self-reported and official)[6]. Sampson and Groves (1989) conducted their analysis of 10,905 individuals in 238 localities in Great Britain. Their results also supported social disorganization theory: they found that between-community variation in social disorganization mediated much of the effect of structural characteristics of the community on victimization and offending[7]. Vessner and Meysey (1999) re-analyzed Sampson and Groves' (1989) data using more structural equation models . Their results offered less robust support for the theory. In particular, they found that social disorganization did not form one consistent construct, and that instead its indicators operated as distinct processes that could not be subsumed under one 'social disorganization' umbrella. Moreover, structural variables did not have a consistent effect across all indicators of crime. They concluded that while social disorganization theory held considerable potential as a neighborhood level explanation of crime, other theories, particularly with a socialization and social-learning bend, also deserved empirical evaluation. Assessing spatial interactions and change across neighborhoods, Taylor and Covington (1988) found that as the position of a neighborhood relative to other neighborhoods, either improved or worsened, crime rates in that neighborhood increased[8].

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[6]The Community Disorder-Criminal Subculture factor was defined as: community attachment, extent of network, anomie, social disorder, conflict subculture and illegal economy. The Community Organizational Participation factor consisted of average parental education level and community level of organizational involvement (Simcha-Fagan and Shwartz, 1986: 677).

[7]Social disorganization indicators were defined as willingness to intervene (operationalized as unsupervised peer groups), local friendship networks and local participation in organizations. Structural variables (endogenous community characteristics) included socioeconomic status, residential mobility, racial and ethnic heterogeneity, family disruption and urbanization (Sampson and Groves 1989, 782 – 785).

[8]'Crime' was defined as aggravated assault, and murder and non-negligent manslaughter. The 'ecological change' factor comprised of changes in socioeconomic status, proportion minority/youth residents, population stability.

2.2.2 Systemic model of crime

Partly in response to early critiques regarding the theory's lack of specificity (Bursik 1988), the systemic model was first applied to social disorganization theory to articulate the mechanisms through which structural attributes of neighborhoods impact social control and, subsequently, crime[9]. The traditional form of the systemic model states that residential mobility and ethnic heterogeneity weaken local networks of friendship, kinship and organizational membership, and thereby impede informal social control.

The origins of this approach lie in observations of military management and practice in World War II. Based on this research, Shils and Janowitz (1948) identified individuals' primary group as being the strongest determinant of individual actions: soldiers were most likely to surrender if other members of their troop did the same. Thomas (1967), and Park and Burgess (1924) juxtaposed these findings on neighborhoods in an attempt to explain the "social worlds and social solidarities which emerged in the urban metropolis." (Kasarda and Janowitz, 1974: 328). The systemic model views the community as a "complex system of friendship and kinship networks and formal and informal associational ties rooted in family life and on-going socialization processes" while simultaneously being influenced by "the large scale institution of mass society" (Berry and Kasarda, 1977:56).

Kasarda and Janowitz (1974), who first articulated the systemic model in its current form, examined the impact of various aspects of neighborhood structure – including population size and density, length of residence, social class, stage in life cycle - on various forms of social networks, including friendship, kinship, membership of local organizations, and local

[9]In fact Carr (2003) and others claim that social disorganization theory has today been "recast in terms of the systemic theory of control." (p. 1255).

attachments (Kasarda and Janowitz, 1974:331). They found that length of residence and stage in life cycle were the strongest predictors of friendship, kinship, and membership of formal organizations. They also found that the existence of these networks was significantly related to the presence of local social bonds (sense of community, interest in community, would be sorry to leave the community) (ibid:334-335). Explaining these results, Bursik and Grasmick (2001:13) point out that it takes time for social ties to develop and so people become increasingly grounded in local "networks of affiliation" *over time.* Research by Lewis and Salem (1986) and Sampson (1988) also supports the importance of the length of residence and life cycle variables.

2.2.3 Systemic approaches to social disorganization theory

The systemic approach has been applied to social disorganization theory with a view to specifying how the construct of social disorganization impacts crime across neighborhoods. Specifically, this approach contends that neighborhood stability allows for the formation and strengthening of social networks that exert social control upon neighborhood-residents. This curtails residents' involvement in crime and delinquency. Social control is defined as "the effort of the community to regulate itself and the behavior of residents and visitors to the neighborhood to achieve this specific goal." (Bursik and Grasmick, 2001:13). Hunter (1985) has identified three orders of social control: private – the informal kinship or friendship groups operating in an area; parochial – local institutions, such as schools, stores, places of religious congregation and voluntary organizations; and public – local relationships with non-local actors (Hunter 1985: 233). At the private level, social control is exerted through the allocation or withdrawal of attachment, social inclusion and respect. The parochial order of social control operates through acquaintances and "weak ties" (Granovetter, 1973) emerging through a shared interaction in local institutions. The public order is based on how effectively a community is able to acquire

external resources from governmental and nongovernmental actors (Bursik and Grasmick 2001:16)[10]. Empirical research generally studies either micro (individual level) or macro (community level) processes for enforcing social control.

Micro-social processes have been operationalized in different ways. Sampson (1988) operationalized individual associations as 'local social bonds'. He found that – as dictated by the systemic model – individuals' length of residence in a given locale influenced their local social bonds. At the macro level, residential stability (percent residents born within 15 minutes walk from their current home) influenced community level local friendship ties, collective attachment and rates of local social participation. Bellaire (1997) compared the effect of ten measures of social interaction on different types of crimes across multiple urban neighborhoods. He found that getting together with neighbors once a year or more was the strongest and most consistent predictor of burglary, motor vehicle theft and robbery. Moreover, as predicted by the systemic model, this variable mitigated a significant proportion of the effect of structural constraints on community crime. Bellaire (2000) focused on informal surveillance (do you watch your neighbors' property while they are out of town; does your neighbor watch your property while you are out of town) as a type of social network, and found that it reduced the risk of robbery and stranger assault. Density of friendship and acquaintance networks significantly mediated the relationship between residential stability and social cohesion in a study of 11,000 individuals across 500 localities in England and Wales (Sampson, 1991)[11]. The study also found that individuals' attachments were influenced by traits specific to themselves (i.e. number of years spent in the neighborhood) and the structural characteristics of the community (neighborhood

[10]Of the three levels of social order, least specificity exists at the parochial level. Taylor (1996) is an important exception.

[11]Social cohesion is based on "helping caring functions, control of deviance, guardianship, mutual trust, socialization of the young" (Sampson 1991:47).

level rates of residential stability: Sampson 1991).

Collective efficacy is defined as the "linkage of mutual trust and the willingness to intervene for the common good" (Sampson et al, 1997:919), and has also been examined as a mechanism of enforcing social control at the community level. Instead of focusing on only the neighborhood networks necessary for the enforcement of social order, proponents of collective efficacy argue that, "*collective capacity for social action,* even if rooted in weak personal ties, may constitute the more proximate social mechanism for understanding between-neighborhood variations in crime rates" (Morenoff et al 2001:521 emphasis added). Upon testing the hypotheses that a) concentrated disadvantage decreases, and residential stability increases collective efficacy and b) collective efficacy explained the association of these two variables on rates of interpersonal violence, Sampson et al (1997) found that mobility was negatively associated with collective efficacy while high SES, home ownership and years in age were positively associated. Gender, ethnicity and years in neighborhood were not associated with collective efficacy. At the neighborhood level, when individual effects were controlled, concentrated disadvantage and immigrant concentration were negatively correlated with collective efficacy, while residential stability was positively correlated. Together, these three variables explained over 70% of the variability in collective efficacy across neighborhoods. Collective efficacy also appeared to partially mediate the relationship between neighborhood composition and violence. However, the authors cautioned that what happens within communities is partially shaped by the wider social political economy, such as housing policy. "... (R)ecognizing that collective efficacy matters", they wrote, "does not imply that inequalities at the neighborhood level can be neglected." (p. 923).

Collective efficacy has been identified as the "opposite" of social disorganization (Taylor,

2001). It is based on a working trust and a shared willingness of residents to intervene in local social control, in response to things ranging from youth truancy to demanding increased resource allocation for community services and is argued to be key in influencing the opportunities available for interpersonal crime in neighborhoods (Sampson *et al* 1997). Results from Morenoff, Sampson and Raudenbusch (2001) described it as a more useful concept than social ties alone in explaining crime[12]. In understanding the precise role of collective efficacy within the social disorganization framework, Sampson and Raudenbusch (1999) found that collective efficacy was inversely related to social and physical disorder, and that it absorbed the effect of disorder on personal violence and household crime. Sampson et al (1997) theorize collective efficacy controls crime primarily due to two factors. First, neighborhoods possess differential capacities to a) recognize the common assets of individuals, and b) maintain social control. This reflects the effectiveness of informal mechanisms by which residents enforce public order, but also their willingness to enforce such order, such as preventing truancy and loitering on the street corner, confronting people who are disturbing public space, challenging illegal drug markets etc. Second and more importantly, collective efficacy reflects the community's ability to negotiate for collective goods such as garbage collection and housing code enforcement, a lack of which would result in public disorder.

Empirical evaluations have yielded mixed results. Lee (2000) found that individuals in

[12] Other research has also supported the existence of neighborhood effects, particularly in the areas of mental health and criminal behavior. An experimental test of neighborhood effects was conducted by the 'Moving to Opportunity' research. This project began in the 1990s when families below the poverty line and living in concentrated poverty in five big cities across the US were made eligible to apply for housing vouchers. Those who did were randomly assigned to one of the following groups: experimental, section 8, and control. Experimental families received a housing voucher that had to be applied in a upper-class neighborhood – one with less than 10% poverty. Those receiving section 8 vouchers had no restrictions imposed on where they could move. Control families received no treatment. Families in the research were predominantly Black or Latino, mostly female headed, receiving welfare and living in housing projects. Results of this project were mixed: significant positive differences between experimental and control groups were observed for adult mental health, and the education, physical and mental health, and risky behaviors for young girls. Negative differences were observed for physical health and risky behaviors of young males (Sampson 2008: 193).

communities that they themselves perceived to be cohesive had a lower risk of victimization than those in less cohesive communities. On the other hand Villareal and Silva (2006) found that in Brazil social cohesion had no effect on crime, although it did diminish the perception of the risk of crime. The same study found that social and public disorder were positively associated with crime, but had no association with its perceived risk (Villareal and Silva, 2006)[13]. Nielsen, Lee and Marinez' (2005) analysis across 200 census tracts in San Diego and Miami found that contrary to its theoretically applied association, 'proportion recent immigrants' in a neighborhood was negatively or not related with most types of motive specific homicide. Heitgerd and Bursik's study of 74 community areas in Chicago found that racial change in neighboring communities caused local crime rates to increase (Heitgerd and Bursik 1987). Sampson et al (2005) found that neighborhood social context, marital status and immigrant generation mediated racial differences in violence rates. These findings have been echoed by Anderson (1999:325), Sampson and Morenoff (2001) and Sampson (2009). Whether a neighborhood falls in a disadvantaged section of the city, and the length of time that the neighborhood has been poor have been shown to be associated with crime and violence.

2.2.4 Critiques of the systemic model of social disorganization

According to Taylor (2002), one of the most pervasive problems in researching the systemic model is that the inherent concepts related to the theory difficult to separate. He identifies the need to test for the conceptual discreteness of social integration and collective efficacy, particularly when it is argued that the former creates the latter. As discussed above, collective efficacy is a "specific type of social capital" (p.775) which is integrally related to informal social control, local control (Bursik and Grasmik, 1993), social disorganization (Bursik, 1988) and

[13]One of the useful aspects of this study is that the authors include details on the average size of the unit of analysis – in this case the neighborhood. Their research analyzed 3873 responses across 197 neighborhoods, an average of 19.7 responses per neighborhood. On average a neighborhood contains 915 residents and 215 households.

community disorganization (Sampson and Groves, 1989). He makes a strong case for the need to maintain the distinction between these concepts and also to design research to adequately establish causal and temporal relationships between them.

The 'ecological fallacy' also creates challenges in measuring micro-social processes. This refers to the fact that although it is an ecological model, i.e. the phenomena it seeks to explain take place at the community-level, much empirical investigation of the theory to date has taken place at the individual level (Fisher 1995, 548). One of the reasons for this is that community level measurements are often associated with costly and time consuming data collection. Person-level data, on the other hand, has simpler sampling procedures, since nested samples are not required, and can be collected more readily (Coulton et al, 2004). Moreover, the statistical software available for the analysis of nested data have only recently become more sophisticated and user-friendly, facilitating neighborhood level research.

There have also been challenges and inconsistencies in the operationalization of the 'crime' variable. The dependent variable in this case often draws on victimization or crime rates from neighborhood where networks are being studied (see e.g. Kubrin and Weitzer 2003b; Browning et al 2004, Bellair 1997 etc.), as opposed to *offending rates* of the residents of those neighborhoods. The implicit assumption therefore is that criminals most often offend close to their residence. However it has also been argued that while this is true for violent crime such as homicide, increasing distance to crime may also increase its rewards, particularly with respect to property crime (Levine, 2004; Bottoms and Wiles, 1986). Empirical studies should use offending rates of residents in a neighborhood, rather than offending within the neighborhood itself.

Finally, there have been observations of high crime in neighborhoods which are otherwise

'organized'. Strong networks and interactions in such neighborhoods suggest that process of social control would curtail offending behavior. However, sometimes this is seen not to be the case, and traditional social disorganization does not offer a rationale for why this might happen. Recent evidence has begun to dissect some of these phenomenon as discussed in the next section.

2.3 High offending despite strong networks: the role of the public order in allowing private and parochial controls to function

Recent evidence suggests that the ways in which neighborhoods control crime may be changing. Carr (2003) suggests that even in the absence of dense social networks, neighborhood organizations and their relationships with external agencies can create an environment where residents abide by a shared behavior code. Due to higher levels of engagement in the workforce, increasing juvenile crime, ethnic displacement and the advent of community based policing, communities have had to adapt their individual and collective responses to inappropriate behavior and activities by their residents. These findings suggest that while civic engagement is not declining (Putnam, 2000), the terms at which it occurs are shifting from the private toward the parochial and public levels of control. This section describes the theoretical perspectives that have emerged in response to the finding that some well-networked communities are also persistently unsafe.

The first perspective is based around the work of Wilson (1996) and Patillo (1998; Patillo-McCoy, 1999). Wilson's (1996) view of extremely disadvantaged populations identified isolated neighborhoods with stable populations but low skill levels and limited interaction with positive mainstream influences. In such neighborhoods, he contends, social networks are less likely to have the positive consequences identified in the systemic model. In fact strong networks in such neighborhoods may potentially facilitate the spread of criminal behavior,

particularly amongst children (Wilson 1996). According to Wilson, therefore, the effect of networks on crime control is conditional on whether those networks are able to transcend neighborhood boundaries. Patillo's (1998) research on a middle-class, black neighborhood in Chicago builds on this analysis and investigates why crime persists in such neighborhood despite their apparent stability. She found that as the systemic model would predict, residential stability in the neighborhood fostered dense social ties, leading to informal supervision and enhanced formal institutions. However, this particular neighborhood was home to a well-known gang-leader responsible for a large local drug trade. He and other gang members enjoyed a "plurality of associations and roles" (Patillo, 1998:521) in the eyes of many community members, particularly those who had been in the community for a long time, and often knew the criminal's parents, grand-parents or children. It therefore became difficult to label someone as purely 'good' or 'evil', and subsequently use informal control, or even the criminal justice system, to control them. Patillo argues that offenders benefit from the social capital of those to whom they are tied – such as the offending adolescent who is not reported to the police because of the witness' ties to his mother. Furthermore, offenders themselves may generate social capital through their own positive interactions with their community – providing protection against outside gangs, for example, or offering financial assistance to friends or family in need (Patillo-McCoy, 1999).

A related scenario applies to neighborhoods with strong networks and high crime, where the 'cultural transmission' model posits that negative behaviors would likely become a trend or the norm more readily than in a neighborhood with fewer attachments amongst residents (Browning et al 2004; Anderson 1990). In such neighborhoods, gangs may function as alternate sources of social control, through which oppositional culture and normative systems are reinforced and disbursed (Browning et al 2004, Venkatesh 1997, Padilla 1992, Taylor 1990). The

negotiated coexistence model incorporates both traditional systemic relationships as well as their 'cultural transmission' interpretation and offers a multi-directional perspective on the role of social networks in controlling crime (Browning et al 2004). This model posits that stronger networks lower crime by informally controlling the behaviors of residents in a neighborhood; at the same time, they mainstream crime by facilitating networks amongst offenders (Browning et al 2004:518).

The second perspective is articulated in the work of Tom Tyler and his colleagues. Tyler (1990) found that compliance with the law, and acceptance of legal decisions was associated with the extent to which individuals view the criminal justice system as legitimate and morally right. Tyler suggests that individuals place greater emphasis on procedural justice – whether their experience with the law was fair and just – rather than whether the outcome was in their favor. Tyler defines legitimacy as, "the belief that one ought to obey the law" (Tyler 1990:161), to which the notion of procedural justice is central. If they believe that lawmakers, enforcers, and individuals and institutions in power have the right to dictate laws and determine punishment, and that these agencies are acting within reasonable limits, individuals are more likely to comply with the law. Public support for political authorities, courts, and the judiciary, and belief in the integrity of these systems therefore has fundamental implications for whether individuals will abide by the dictates of these laws (Tyler, 1990).

Finally, the third perspective on high crime despite strong networks is articulated in the combined works of Sampson and Bartusch (1998) and Anderson (1990). Some neighborhoods, particularly those facing greater economic and racial "isolation" (Kapsis 1978), experience an "estrangement from legal norms and agencies". Sampson and his colleagues (1998) define this experience as legal cynicism, whereby communities have a lack of interaction with criminal

justice services, and a lack of trust in formal institutions of social control[14]. Ironically, these communities often display high rates of arrest and incarceration, and are therefore most affected by the policies and practices of this system. They found that legal cynicism often coincided with a personal condemnation of violence. This apparent paradox was explained by differences in neighborhood structures. Contrary to the predictions set forth by subcultural theorists, Sampson and Bartusch's findings suggested that Blacks and Hispanics were more condemning of violent behaviors than Whites. They further argued that legal cynicism was an individual level trait, distinct from more general societal normlessness or *anomie*. When legal cynicism takes root in strongly integrated neighborhoods it can lead to an alternate "cognitive landscape" of what constitutes appropriate behavior, potentially creating a tolerance for deviance (Sampson and Bartusch, 1998: 781, 800). This is particularly the case in persistently poor neighborhoods, as well as those where poverty levels are on the rise (Sampson and Graif, 2009). Articulating this relationship, Sampson (2009) wrote,

> *"Trust … is also lower in neighborhoods that decades earlier were characterized by pronounced, concentrated poverty. These findings are consistent with the scenario that certain urban neighborhoods get locked into structural dynamics that generate systematic social dynamics such as mistrust and cynicism, that in turn may contribute to their further stigmatization, disorder, out-migration, crime, withdrawal of civic involvement and eventually the deepening of poverty." (Sampson 2009: 270)*[15].

Sampson and Bartusch (1998) are careful to distinguish mistrust of the police and other criminal

[14]This is distinct from but may be related to a "policing vacuum" (Kubrin and Wetizer, 2003:175).

[15]The "pronounced, concentrated poverty" of which Sampson (2009) writes has been termed simultaneous inequality by Loury (2002), durable inequality by Tilly (1998), and cycle of poverty by Moynihan (1965). It refers to the persistent and increasing poverty that creates a poverty trap that can only end through policy which furthers cultural change and structural intervention (Sampson 2009).

justice agencies (legal cynicism) from existing criminological theory which views crime as a subcultural response to mainstream cultural impositions. They also observe that legally cynical communities are not submerged in anomie, i.e. norms about appropriate behavior do exist, however they are influenced by constraints based on the inner city experience.

Anderson (1999) describes the legitimation of violence as the adoption of the code of the code of the street, a "cultural adaptation to a profound lack of faith in the police and judicial system" (Anderson 1999:34). Dissatisfaction with police and criminal justice agencies has been documented in a cross-section of social groups, including racial and ethnic minorities as well as other minority groups (see Horowitz 1983 and Wilkinson 1998). The structural factors responsible for this "lack of faith" include over-policing of minorities, failing to respond (and delayed responses) to 911 calls, unreasonable use of force by the police, and disproportionate minority confinement.

Moreover, the 'code of the street' (Anderson, 1999) often provides the cultural compass for what is appropriate behavior in the inner city. This represents a set of informal norms, values and regulations around what is appropriate behavior. The failure to abide by this code could hold a risk of physical or psychological violence for an inner city resident. For example, Anderson (1999) notes that for many inner city youth, engaging in violence is a means to acquiring prestige and social stature. Walking away from a challenge to fight, for example, could mean shame and ridicule for a youth and/or his peer group. Adults may condone violence because of its ability to protect neighborhood residents and their property from invasions from outside communities, sometimes in the form of an 'invasion' of new immigrants or another racial group (Heitgerd and Bursik, 1987:785). In describing this phenomenon, Suttles (1972:21) employs the concept of the 'defended neighborhood' to note that when a neighborhood experiences shared external threats,

delinquency in that community may be an organize response to that threat. Wider or continued violence may be condoned by the family and friends of those involved in a small-scale dispute, and members of the community may be afraid of reporting violence to authorities, for fear of social retribution (Kubrin and Weitzer 2003a).

2.3.1 Legitimacy of the state

In the classical Weberian sense sole legitimacy over the use of force is one of the conditions necessary for a state to remain sovereign (Gerth and Mills, 1946). Weber described three basic "justifications" for the legitimation of domination: traditional domination, exercised by the patriarch based on the "authority of the eternal yesterday"; the authority of charisma, exercised by the ruler, war-lord or political party leader; and domination by virtue of legality, based on belief in the validity of the law and the state. For Weber, obedience to the state is based on self-interest: fear of the power-holder, and hope for reward. Other theorists have linked the legitimacy of the state and that of violence. For example, Arendt (1970) argues that the legitimacy of government and that of violence are at two ends of a continuum: if the state enjoys complete legitimacy, then there is no space for violence. In this sense, legitimate violence is may be seen as a source to attain what an illegitimate state fails to provide. She describes the legitimacy of violence as its acceptance as a legitimate means in pursuit of a common good. John H. Schaar (1981) also relates the legitimacy of violence and the state by focusing on the state's ability to provide law and order. Increasing social agitation and law and order concerns, he claims, present the ultimate challenge to the traditional notion of legitimate power.

Broadly speaking, states require some degree of public legitimacy in order to maintain public order and retain power and authority. According to Putzel (2007),

"A state enjoys political legitimacy when the people over whom the state exercises its

> *authority accept 'its right to rule'. In order to manage the conflicts within a society peacefully, a state needs (at least) passive acceptance of its right to rule by the majority of the people … Even non-democratic regimes need to achieve a degree of legitimacy to survive over time." (Putzel 2007:1)*

Using the example of Indonesia (1967 - 1998), Putzel points out that "despite its military origins and authoritarian character" the Suhartu regime (1967 – 1998) was able to enjoy enough legitimacy to enable it to maintain power for over thirty years. This was done through focusing on the delivery of basic services, particularly with regard to health, education, and rural development. Once the focus shifted to "personal enrichment", the regime began to lose its legitimacy. Putzel attributes the basic source of legitimacy to the performance of the state: "the extent to which those who control public authority deliver what they promise" (ibid), both in terms of economic well-being, but also non-economic factors such as safety and security.

Tyler's social-psychological approach views legitimacy as a "psychological property" of an institution , due to which people feel they should "obey or defer to" its authority (Tyler, 2006b). Legitimacy is an important aspect of governance because without it, individuals must be forced to obey the law, which is less effective than their doing so willingly. In particular, Tyler emphasizes the role of procedural justice in determining the legitimacy of criminal justice institutions (Tyler, 2009). He argues that if a process is deemed to be fair and just, the institution will be seen as being legitimate, regardless of the favorability of the outcome of that process (Tyler, 2006a). For example, he claims that the act of voting is a ritual conducted by democratic institutions that awards them a certain amount of legitimacy simply by virtue of having been conducted. The sense of participation and that their stake in the system is meaningful – whether accurate or misplaced – buys the democratic state a certain amount of legitimacy (Gonzalez and

Tyler, 2008).

2.4 Persistent gaps: incorporating the public dimension

The previous section described the systemic argument regarding the ways in which persistent attachments foster informal control and control crime in disadvantaged neighborhoods. It also described how the model has been extended particularly with regard to situations where violence, rather than the state, attain legitimacy. To reiterate, the three arguments identified specific causal mechanisms for the isolation of communities: Wilson (1996) and Patillo (1998) argue that low skill levels, limited interaction with positive mainstream influences and a plurality of positive and negative roles acquired by prominent personalities prevent informal controls from inhibiting criminal behaviors. Tyler (2006a) points out that it procedural justice and the legitimacy of criminal justice institutions, which foster law-abiding sentiments; without legitimacy, individuals obey the law only out of self-interest, and – by extension - break it whenever the gains from doing so surpass those that are associated with following it. Finally Anderson (1999) posits that the pursuance of respect in the inner-city requires embracing the code of the street, premised on the use and show of force and violent behavior. The objective of using this code is merely self preservation, but it necessitates the legitimization of violence as a means to this end, thereby increasing its acceptability and necessitating the extent to which it can be informally controlled.

All three of these theories deal explicitly with the isolation and marginalization of poor, urban communities. They also deal with negative interactions between community residents, and the state, particularly the criminal justice system and agents of formal social control. The theories do not, however, examine the role of state legitimacy. Although they imply that the quality of state service provision plays an important role in the extent of community isolation and offending , state service provision or attitudes toward its overall legitimacy are not included

as an independent variable in the examination of offending rates across ecological units. Kubrin and Weitzer (2003b) articulate this gap, and point out that social disorganization theory is still limited in the extent to which it is grounded in the urban context, including culture, formal mechanisms of social control and political economy, and they call for the need to "reconsider culture" in "disadvantaged neighborhoods" (pp.379-380). Specifically, they note that concentrated disadvantage[16] has been shown to contribute to the social isolation and collective efficacy within neighborhoods (see Sampson and Wilson, 1995) and to the legal cynicism and adoption of alternate definitions of acceptable behavior (see Sampson and Bartusch, 1998; Anderson 1999). Synthesizing this evidence, they note the need for deeper evaluation of cultural factors by stating, *"... this research shows that structural conditions, and subcultural and normative responses to these conditions jointly shape neighborhood crime, indicating that cultural factors deserve greater attention in social disorganization theory."* (Kubrin and Weitzer 2003b:380).

As discussed in this review, social disorganization theory is built around the concept of informal social control, and its systemic reformulations have been fairly successful in specifying the mechanisms through which such control is attained. However the theory fails to incorporate the factors related to formal social control, particularly policing and mass incarceration, and the public dimension. Specifically, there are gaps regarding the direct relationship between these factors and crime and violence in neighborhoods. Moreover even recent systemic research is limited in the extent to which it incorporates the effect of formal control mechanisms on informal control (Kubrin and Weitzer 2003b).

The extent to which social disorganization in general and the systemic model in particular

have been applied outside Europe and the US is also a concern for the generalizability of the theory to other contexts. I conducted a simple search for publications containing the terms 'social disorganization' and 'crime' published between 1990 and 2001. A total of 206 sources were identified. Only 10 (6%) of these were based on data from Africa or Asia, and the majority of these drew on small samples or quantitative data.[17] A complete breakdown of the geographical source of the sample for these studies is presented in table 1. A similar search on the terms, 'systemic model' and 'crime' yielded 13 sources, 11 of which were based on North America.

Table 1

GEOGRAPHICAL SOURCE OF SOCIAL DISORGANIZATION AND CRIME RESEARCH[18]

Geographical source of data	N	%
US	151	73.3%
Canada	12	5.8%
Europe	16	7.2%
Asia	7	3.3%
Australia	6	1.5%
Africa	3	4.4%
South America	0	0.0%
None – solely theoretical or based on internet phenomena	11	5.3%

Finally the theory also falls short in an examination of the urban political economy of the neighborhoods (Kubrin and Weitzer 2003b). Few studies focus on spatial interactions across neighborhoods[19] and even fewer examine the impact of public policy on neighborhood dynamics[20]. The public order of control – the extent to which neighborhoods are linked to external institutions and are able to influence decision making with regard to their community –

[17] Two notable exceptions were Robert and Lafree (2004) on Japan's postwar crime trends, and Zhang et al (2007), on the risk of burglary in Tianjin, China.
[18] Search performed on academic database EBSCOhost on 12/2/2011; English language, academic publications only, since 1/1/1990. A total of 206 books and articles were generated through the search.
[19] See Moreoff et al 2001.
[20] Bursik 1989 is a notable exception in this regard.

differs across neighborhoods and has been identified as an important level of informal social control. However the theory does not address the neighborhood's ability to influence external decision making, and crime within a neighborhood. Access to credit and ability to influence decisions regarding the neighborhood's urban architecture, such as the location of a park or of a public housing project, may have direct and indirect impacts on local crime and violence, and may interact with other contributing factors.

2.5 The case of Brazil: examining social organization in a disjunctive democracy

A small but growing literature which draws on the interaction between human rights, democratization, social control, and crime has begun to address these gaps. This largely ethnographic body of work addresses associations between the conditions of disjunctive democracy, mistrust of police, dense social networks, concentrated disadvantage and the persistence crime and violence in the severely disadvantaged favelas (shanty-towns) of Brazil. This research is generally premised in two dual, and sometimes conflicting arguments. On the one hand, the lack of participatory, civil democracy in Brazil has created violence and insecurity by failing to reign in the state forces who target the poor and marginalized residents of Brazil's favelas On the other hand, linkages of favela residents with these corrupt state forces have a direct relationship with residents' perceptions of safety.

Brazil's political democratization in the 1980s after twenty years was initially thought to be the panacea for widespread criminal violence. Instead, nearly thirty years on, the country is still in a state of disjunctive democracy. Elections are fair and regular, and the flourishing of grass-root social movements, NGOs and trade unions suggests that democratic institutions are gaining ground. Simultaneously, the state apparatus has not emerged in the efficient, unbiased way in which western theory of democratization predicted they would (O'Donnell, 1983; Ahnen,

2003). Police brutality is still rampant: the proportion of total killings in Sao Paolo committed by the police rose from ten per cent from 1986 to 1990, to over twenty-seven percent in 1992. Violence is more pervasive than it was prior to democratic rule (Arias, 2004; 2006; Ahnen, 2003). Human rights abuses are rampant (Caldeira and Holston, 1999; Ahnen, 2003).

In this disjunctive environment, it is no surprise that the majority of Brazilians support a police force that uses heavy handed tactics in dealing with criminals, including torture and killing; at the same time, majority Brazilians fear the police, most having experienced their violent practices first-hand. The police is not directly associated with the rule of law: rather, it is viewed "in terms of incompetence, corruption, injustice and brutal force." (ibid p. 707). The judiciary is also viewed as being incapable of punishing criminals or enforcing the rights of citizens.

This lack of trust of the police and justice system create a situation in which most people either take the law into their own hands and subscribe to public vigilantism, or support the brutal use of force against criminals: a paradoxical attitude toward violence which Caldeira and Holston (1999) term a " 'new' culture of fear" (p.715). Arias and Rodrigues (2006) report that in the favelas – the large slums surrounding major cities – traffickers take responsibility for enforcing community norms and controlling crime. The irony is that the drug trade is responsible for much of the violence that residents of the favela incur. However they do not enforce community norms equitably, and residents with higher social status in the favela are less likely to be punished than those at the margins of this complex social group. An example quoted by Arias and Rodrigues (2006) is in regard to the trafficker's girlfriend. She was treated fairly and with respect until her relationship with the trafficker ended, and subsequently her complaints of harassment went unnoticed. Regardless, due to their (rational and self-motivated) investment

in maintaining authority and controlling violence in the favela, the resident trafficker and his gang enjoy a legitimacy that prevents them from being turned in to the authorities. This suggests the emergence of an oppositional set of values within the favelas, one that tolerates violence despite negative attitudes toward it. At times, this manifests in the form of a key political or military figure, who is able to negotiate with the state's military and paramilitary on the one hand, and traffickers on the other, so as to maintain a level of peace in the favela. This duality of positive and negative associations is similar to what has been suggested in Patillo's (1998) argument that private and parochial controls are not enough to prevent offending, and the role of the public order is key. Further supporting this thesis is Rodrigues' research, which showed that private and parochial controls in favelas had no impact on perceptions of safety. However, public level bonds, including attitudes toward the legitimacy of police, were instrumental in this regard (Rodrigues 2006).

Quantitative research on violence in Brazil's favelas has also attempted to unravel how the deep and persistent networks of attachment within the favelas interact with the high levels of criminal and state violence that residents face. Results suggest that such deep attachments are not successful in reducing violence, and in fact social cohesion is associated with higher perceptions of victimization (Villareal and Silva 2006)[21]. In fact, neither perceptions of insecurity nor insecurity itself were found to be related with private or parochial orders of informal control. However public level bonds including police legitimacy had an inverse relationship with perceptions of security. Support for authoritarianism and distrust of the police also have positive effects on perceptions of security (Rodrigues, 2006). The isolation that is described in the favellas is similar, though perhaps more extreme than what is identified by

[21]"Disorder" examined the extent of abandoned buildings, litter, empty lots and rowdy, disruptive neighbors.

Wilson (1996). It has been noted that strong networks and private level bonds bring criminals and non-criminals and create higher violence in favelas (Arias 2006). However, in the same vein as Wilson (1996), it has also been suggested that strengthening public level bonds can halt this increase (Arias 2004).

2.6 The case of Karachi: non-state violence amidst the salience of informality

2.6.1 Historical and political background

Pakistan is a diverse country with a turbulent history and complex geo-political context. The country was formed in 1947 when then Indian subcontinent split into India and Pakistan, following the end of the British occupation. The country covers a land area of 307,374 sq. miles, roughly the size of Texas[22] and is one of the most populous countries in the world, ranked 6th overall, with a population of roughly 170 million[23]. With an annual GDP per capita of $991, Pakistan is also one of the poorest, ranked 167 out of 175 overall[24]. In the aftermath of 9/11/2001 Pakistan attained center stage in the US-led war against the Taliban and Al-Qaeda. Subsequently, terrorism-related violence within the has country surged: in 2009, over three thousand civilians and security personnel were killed as a result of terrorism related incidents[25].

Pakistan is comprised of four provinces and several 'tribal areas', notably distinct in their culture and traditions, but sharing a common religion and history. The Punjabi, Sindhi, Pushtun and Baloch ethnicities represent these provinces. In addition, the *muhajir* comprise a sizeable minority, with a stronghold in Karachi, the capital city of the Sindh province[26]. Karachi is

[22] Source: CIA World Factbook
[23] Source: US Census Organization, http://www.census.gov/cgi-bin/broker downloaded 4/28/2010
[24] Source: World Bank data, 2008
[25] Source: South Asia Terrorism Portal http://www.satp.org/satporgtp/countries/pakistan/# downloaded 4/28/2010.
[26] *Muhajir* literally means migrants fleeing religious persecution. In the Pakistani context this refers to those who fled other parts of the subcontinent to settle in Pakistani territory in 1947. These migrants and subsequently their descendents subscribe to a *muhajir* ethnic identity.

Pakistan's largest city, and, according to recent estimates, one of the largest cities in the world, with a population of 15.5 million[27]. The city accounts for one third of national output in large scale manufacturing, and nearly one fourth in finance, insurance, transport, storage and communications. It also generated 54% of the central government's tax revenues. To a great extent the national economy hinges on the smooth functioning of industry and business in Karachi (Buddhani et al 2010:11)[28]. As a result of the economic opportunities it offers, Karachi is highly ethnically diverse, and hosts migrants from across the country. Ethnic minorities are a majority in Karachi: while forty eight percent residents cite Urdu as their mother-tongue (commonly known as the language spoken by the *muhajir*), over fifty percent cite one of several other regional languages (ibid:13).

2.6.2 Religious and ethnic-political violence

A brief rendition of the historical review presented by Buddhani et al (2010) may assist in understanding the complex backdrop of criminal violence in Karachi. Karachi has faced several waves of non-state violence since the early '70s. This violence is fostered by several factors: the armed cadres of political parties, the widespread use of firearms, alleged links between criminal gangs, junior party works and feudal patrons, and a leaning toward *jihadi* violence that manifests through various sectarian confrontations (ibid)[29]. What began in the early '70s as mob-oriented ethnic conflict, mostly between the *muhajirs* against the then-Sindhi dominated establishment, escalated into widespread violence between right-wing political parties and the left-of-center, Sindhi dominated Pakistan People's Party following the national elections in 1977. This presented itself as an opportunity for Zia-ul-Haq to establish a repressive martial law regime, and

[27] Source: http://www.citymayors.com downloaded on 5/18/2010
[28] Buddhani et al: 2010: 11 based on Government of Pakistan and World Bank data 2006-07.
[29] *Jihadi* literally means to struggle. Here, it refers to combat in the name of Islam (Buddhani et al, 2010:3).

while political activism was publicly banned, pro-Islamist college-based youth-groups who supported Zia's regime began to receive weapons and training from state agencies. In response, several ethnic youth-groups with an ethnic mandate also began to develop a political identity. As Pakistan's involvement in the Afghan war between the Soviets and the US-backed *mujahideen* increased, so did this weaponization of Pakistani youth, leading to the proliferation of small arms and an active illegal local arms market. By the mid-eighties, campus politics had become highly militarized. The *Muhajir Qaumi Movement* (MQM), representing the *muhajir* ethnic group emerged from the leftist campus-based youth-groups, and were strong contenders in the 1988 national elections, immediately following the assassination of Zia. At this time, the culture of armed politics left college and university campuses and entered Karachi's neighborhoods and as a result of conflict with the Pashtun and Sindhi communities, the MQM established a violent and militaristic reputation. The height of the political-ethnic violence in Karachi was seen between 1989 and 1996. During this time, at least three state-backed attempts at curtailing the violence were carried out, which eventually resulted in a calming of the violence. The cost, however, included widespread targeting of the *muhajir* community by state forces, including arrests, torture, and killings in real and staged encounters between police, paramilitary, and MQM workers and supporters. Estimates of resulting deaths range between several hundred and several thousand. Subsequently, Karachi suffered internal displacement and many *muhajirs* sought protection in other parts of the country and abroad (Buddhani *et al* 2010).

Rifts amongst Karachi's ethnic communities and related political groups continue to rupture at the slightest pretext, although the situation has abetted since the mid-nineties. For example, in May 2007, violent clashes erupted between the MQM and supporters of the then-deposed (now reinstated) Chief Justice of the Supreme Court, resulting in the death of over fifty

people. In October of the same year, explosions in a rally arranged to welcome Pakistan People's Party leader Benazir Bhutto back to Pakistan after a ten year exile claimed 130 lives. The clashes that erupted in Karachi, in the wake of Ms.Bhutto's assassination in December 2007 brought the city to a halt for several days. Although there were fewer fatalities on this occasion, there was widespread rioting and arson: nearly forty banks, factories and gas stations were burnt or robbed and more than seven hundred vehicles were set on fire In each case, the events were characterized by lax security preparations, and security personnel were notably absent for several hours before they arrived and attempted to quell the violence (Buddhani *et al* 2010).

Sectarian and religious violence experienced a dramatic increase between 1994 and 2006. During this period extremist Sunni militants launched a bombing and assassination campaign against the Shia minority in Karachi. The protagonists in this case were thought to be members of the Sunni Deobandi sect. After 9/11/2001, their targets expanded to include Western interests; the bombing of several French engineers is attributed to this group. In 2006 explosions at a religious gathering for Barelvi Sunnis eliminated the entire leadership of that sect. In 2009 and early 2010, two major explosions in prominent Shia processions killed over sixty people (Buddhani et al 2010).

2.6.3 Criminal violence in Karachi

Criminal violence has also increased in recent years. According to data published by the Citizen Police Liaison Committee, motor cycle snatching/theft increased almost 200% between 2001 and 2008 (although numbers fell slightly in 2009). Similarly, car snatching/theft also increased, although not as dramatically, between 2001 and 2008 – about 43% - and then fell slightly in 2009. Cell-phone snatching/theft has recently become a major problem, with an average of over 3000

reports per month between April 2009 and March 2010[30]. Nationally, kidnapping for ransom increased by over 50% between 2000 and 2007; much of this increase is attributed to Karachi's crime figures[31]. In fact, the Citizen Police Liaison Committee was created in part to partner with the Police and address the surge in these types of cases.

Ethnic-political and religious violence, and criminal violence are not unrelated. The most obvious relationship is through known and suspected links between criminal gangs, junior political workers and feudal patrons. However, an alternate set of relationships is also argued to exist, one that builds upon the core processes of informality and migration. This research subscribes to the view that Karachi is characterized by strong informal provision of services including water, public transport and the enforcement of land rights, necessitated by the state's failure to provide the same (Budhanni et al, 2010). This view posits that the success of this informal market required two non-traditional institutional arrangements: the legitimization of private, non-state arrangements that involved the use of violence or the threat of violence for contract enforcement, and the strengthening of informal and formal social networks. This project proposes that these strong networks identified by Buddhani et al are unsuccessful in controlling residents' involvement in crime precisely because of the legitimization of non-state violence required for informal contract enforcement, coupled with the loss in legitimacy of the state for its failure to provide basic infrastructure. Private and parochial orders of control, therefore, are unable to control offending due to a loss of legitimacy of the public dimension of control. This view is partially an extension of Tyler (2006a, 2009): although his work deals explicitly with the criminal justice system, we argue that when procedural justice suffers in multiple respects, the notion of legitimacy transcends that particular institution and acquires relevance in attitudes

[30] Source: http://www.cplc.org.pk/content.php?page=7 downloaded 4/29/2010
[31] Government of Pakistan, 2008b

toward the state in general.

Further, as Anderson (1990) would argue, this suggests that the atmosphere of insecurity, coupled with the impression that the state is an active or passive protagonist in creating this insecurity foster the legitimization of informal means for residents to ensure security for themselves. In fact, multiple incidents apparently mimicking street justice scenarios have recently been reported in the press[32]. Incidents of vigilantism include mobs of citizens attacking groups of alleged robbers and burning them to death in broad daylight. Key informant interviews in a middle class neighborhood notably more secure than those surrounding it also supported this. On the one occasion that outside youth on motor cycles had entered the neighborhood to make trouble, residents had grouped together, beat the young men, and ensured that this kind of trouble did not reoccur[33]. Further, there are indications of the emergence of an oppositional subculture, particularly with regard to the culture within popular political parties, as suggested by Verkaaik's identification of the notion of *fun* within the MQM. Operating dually as an initiation into the parties ranks and as a way to command respect, youth engaging in *fun* were often responsible for arson, looting and the public humiliation of their victims.

2.7 Conceptual framework

This project has three goals. The first is to use the ecological framework to examine patterns of offending and the structural attributes of neighborhoods including poverty, ethnic composition, and rates of population turnover, across Karachi's neighborhoods. This is useful because it allows us to understand variation in the nature and extent of offending at a level of disaggregation that has, prior to this, not been examined in this city. It allows us to ask

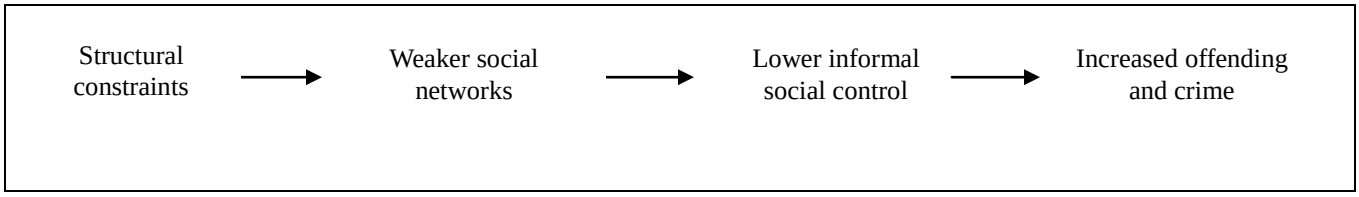
[32] Jang 2/2/2007, The News 5/15/2008, Jang 5/17/2008, Jang 4/10/2010
[33] Gazdarabad, June 2005

fundamental questions, including whether offending and other social phenomena in Karachi are concentrated or well-dispersed across neighborhoods.

The second goal of the study is to conduct a quantitative assessment of the basic arguments of social disorganization theory: the impact of the concentrated disadvantage, ethnic heterogeneity and residential mobility across Karachi's neighborhoods. Available data allow us to do this across 453 census tracts.[34] A study of the theory at this scale has not been done outside the US and the UK.

Finally, the project will assess the role of state legitimacy in the relationship between neighborhood factors and offending patterns. From a theoretical stand-point, this examines the interaction of the public dimension of control, with the operation of the private and parochial dimensions. From the practical point of view, it examines the extent to which trust in the state mitigates neighborhood disadvantages.

Figure 1
TRADITIONAL SYSTEMIC MODEL



In the traditional formulation of the systemic model (see figure 1), neighborhood structures (concentration of poverty, ethnic heterogeneity, residential mobility) lead to lower social networks, thereby impeding informal social control, and resulting in higher crime and delinquency.

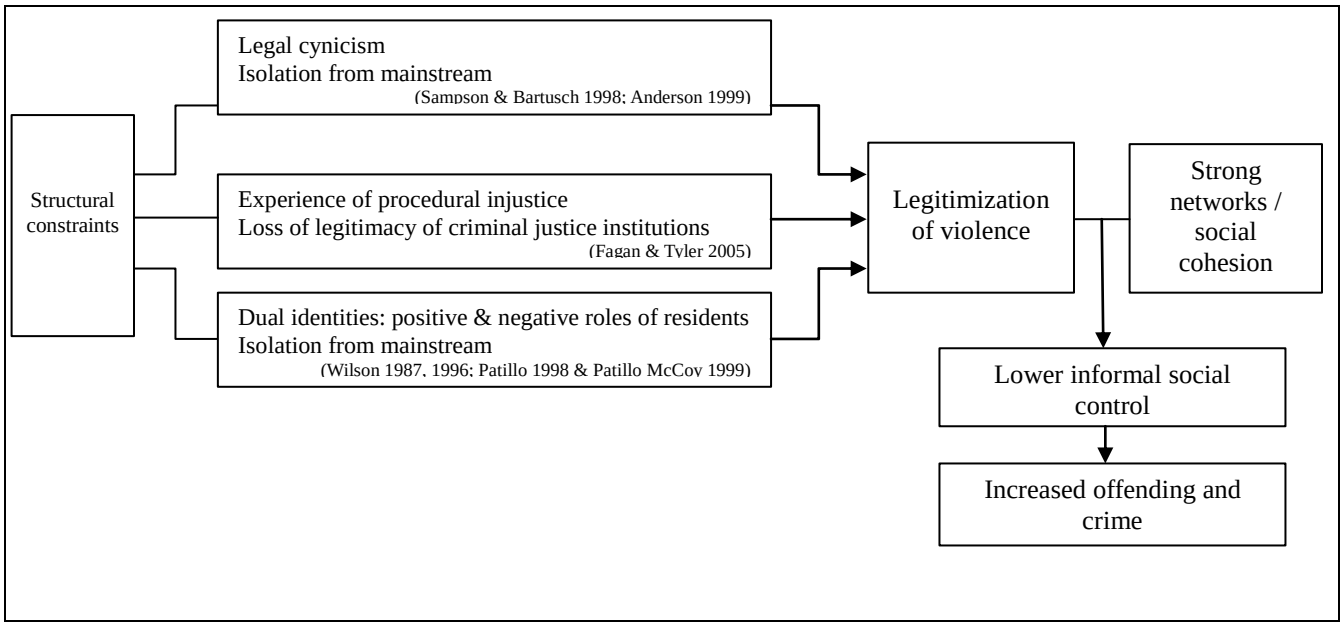
[34] Urban Karachi is comprisded of 1220 circles, but listwise deletion resulted in a final sample of N=453.

The alternate formulation attempts to explain the persistence of high crime despite strong social networks. These formulations do not negate the importance or the impact of neighborhood effects, but instead study scenarios where the networks that transmit these effects to not function in the theorized way. When poverty, disadvantage and isolation are extreme, for example, even strong networks may not be able to prevent youth from succumbing to the "code of the street" Anderson (1990). The resulting legitimization of violence as a necessary means of survival, often coupled with a lack of trust in the criminal justice system, limits the effectiveness of informal social controls (Anderson, 1990; Sampson and Bartusch 1998). Fagan and Tyler's perspective puts the onus on legal actors and procedural justice, or the legitimacy of the system. They find that "legal socialization" is impacted by youths' interaction with the law, and that compliance with the legal system is influenced by the perception of fairness in these interactions (Fagan and Tyler, 2005). Finally, Wilson (1996) and Patillo (1998, 1999) posit that low skill levels of residents, and limited interaction with positive mainstream influences may in fact cause strong networks to increase negative behavior amongst residents, particularly youth (Wilson, 1996). Further, the long-term presence of negative influences in a community may legitimate their actions, particularly because of the positive investments they make in the community (Patillo, 1998; Patillo-McCoy, 1999). Research on favela violence in Brazil supports this perspective, where strong networks are associated with increased violence and insecurity as strong gangs and criminal elements within the favela make it a target for rival gangs and state forces (Villareal and Silva, 2006; Arias, 2006).

Figure 2 illustrates this alternate specification of the model. It suggests that when strong networks are combined with low state legitimacy – broadly defined, and specified in various ways - it results in the legitimization of violence, and, as a result, prevents traditional control

mechanisms (private and parochial orders of informal control) from controlling criminal offending.

Figure 2
ALTERNATE SYSTEMIC MODEL



Karachi is characterized by high rates of internal migration, and a dynamic and effective informal sector, which has grown and evolved to compensate inadequate state provision in the face of rapid population growth. In particular, the informal sector is a key enforcer and regulator of land rights, and water and public transport systems. One of the pre-conditions necessary for this fairly sophisticated and efficient informal provision was the legitimization of non-state mechanisms for contract enforcement, which included the use, or threat, of force. Another pre-condition was the strengthening of ethnicity oriented social networks which allowed both the demand and supply sides of these informal markets to thrive (Buddhani et al, 2010).

This paper builds on the premise that this, seemingly conflicting state of events – a high legitimization of the use of non-state violence despite strong social networks allows criminal

violence to flourish. If the use or threat of force can be used to enforce contracts, it becomes a legitimate means to an end, thus blurring the distinction between acceptable and condemnable attitudes toward violence. Strong social networks thus are unable to informally control criminally offending behavior.

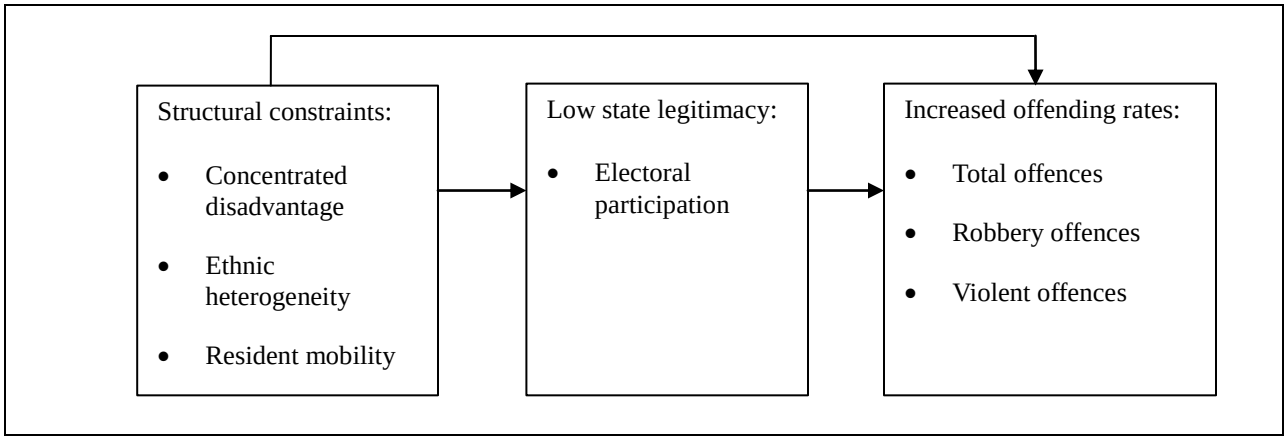
This partially subscribes to Anderson's approach toward the legitimization of non-state violence. The compulsions are different: in the case of the modern inner city, it is the need for attaining personal respect and subscription to the code of the street that creates the need to accept the violent 'code of the street' (Anderson, 1990), whereas in Karachi's case it is the need for respecting informal providers who use force as a means to provide (Buddhani et al, 2010).

Moreover in Karachi, the need for informal provision is created by the failure of the state to provide or regulate basic services. Another result of this is that the state loses legitimacy as the sole, rightful agent of law making and contract enforcement. Using Tyler's framework, one can posit that this has implications for law-abidance and respect for the rule of law. Again, the causal processes either case may differ. In Tyler's case legitimacy (or its lack) is premised on procedural justice and the actions and behaviors of agents of criminal justice. In Karachi, we argue that the state's failure to provide basic goods and services alters every day priorities and forces residents to depend on multiple informal systems simply to attain basic services like protection from eviction, acquiring water, and getting to work. While these services may function considerably well given that they are informally run, they are still by definition, not regulated by the state and susceptible to being drastically affected by the ethnic-political rifts that permeate Karachi. The absence of the state thus supersedes negative experiences of the criminal justice system in determining attitudes toward violence, although such experiences would worsen these perceptions. In this project, we combine date from three secondary data sources to test a

reduced form of this model, as illustrated in figure 3.

Available data do not allow for the measurement and evaluation of the causal processes depicted in figure 2. While each theoretical strand linking structural constraints and the legitimization of violence is a distinct argument and merits deeper research, it is beyond the scope of this research to do so. Instead, this project specifies two, broader sets of relationships; these depict a reduced form of figure 2, and are illustrated in figure 3.

Figure 3
CONDENSED MODEL FOR CURRENT STUDY



In the first instance, this project examines the direct effect of structural variables identified in social disorganization theory – concentrated disadvantage, ethnic heterogeneity and residential mobility - on offending behaviors, across neighborhoods. Second, it examines the extent to which behaviors which mirror attitudes toward state legitimacy – specifically voting patterns – mediate this relationship. As a precursor to this analysis, the project examines the fundamental feasibility of the ecological framework in understanding crime in Karachi by examining offending patterns in neighborhoods across the city. This research tests the argument that despite the strength of social networks, weak state legitimacy weaken the private and

parochial controls necessary for the control of offending. Structural factors may impact offending patterns, but to a large extent, these effects are absorbed by attitudes toward state legitimacy. In areas where the state functions well: is successful in delivering public services and ensuring security, it will enjoy greater legitimacy, and this will neutralize the negative effects of concentrated disadvantage, ethnic mobility and population heterogeneity of offending rates. Similarly, where the state has low legitimacy, offending rates will be higher, even if neighborhoods are structurally sound.

As shown in the figure 3, state legitimacy is measured using data on electoral participation: proportion of residents who voted in the 2008 national election. Similarly, the chart shows that involvement in crime is measured using data on admissions to the city's jails. The next section describes the research questions in more detail.

2.8 Research questions and study hypotheses

2.8.1 Does the ecological framework apply to Karachi, i.e. can we see neighborhood level variation in criminal offending, poverty, ethnicity and average length of residence?

H1. Offending is concentrated in certain neighborhoods, i.e. most offenders reside in a few key neighborhoods.

H2. Poverty is concentrated in certain neighborhoods, i.e. few neighborhoods have very high rates of poverty, thus housing large proportions of the city's poor population.

H3. Neighborhoods are clearly divided along ethnic lines.

H4. Average length of residence is significantly different across neighborhoods, with some consisting of largely longer stay residents, while others consist of short-stay residents.

2.8.2 Are the structural attributes of neighborhoods associated with variation in residents' criminal involvement?

H5. Higher concentrations of disadvantage are associated with higher levels offending of all types.

H6. Higher residential mobility is not associated with higher offending rates.

H7. Higher ethnic heterogeneity is not associated with higher offending rates.

2.8.3 Do residents' attitudes toward state legitimacy influence criminal involvement across neighborhoods?

H8. State legitimacy and offending rates are inversely related. This is particularly true for violent crimes.

2.8.4 In the extended model, is the relationship between structural factors and criminal involvement mediated through legitimacy?

H9. State legitimacy absorbs a significant proportion of the direct effect of concentrated disadvantage on offending, particularly for violent offending.

H10. State legitimacy absorbs a significant proportion of the direct effect of residential mobility on offending, particularly for violent offending.

H11. State legitimacy absorbs a significant proportion of the direct effect of ethnic heterogeneity on offending, particularly for violent offending.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Overview

The objective of this research is to examine offending and structural aspects of the neighborhoods across Karachi; explore neighborhood effects on offending patterns; and examine the effect of state legitimacy on this relationship. The unit of analysis is the census tract and the study sample is comprised of 453 census tracts across Karachi. The study employs a cross-sectional research design, combining data from three secondary sources: the Census Bureau of Pakistan, Citizen Police Liaison Committee (CPLC), and the Election Commission of Pakistan. Approval to conduct the research was obtained from the Institutional Review Board of John Jay College in 2010 and renewed in 2011.

3.2 Administrative breakdown of Karachi

Karachi is the largest city in Pakistan and, one of the largest cities in the world with a population of 15.5 million[35]. Recently, the city has been growing at a rate of over 5% per annum, due in large part to its large economy and attractiveness to migrants from around the country and region. Karachi is home to a variety of ethnic groups, and the estimated linguistic breakdown for the city is as follows: Urdu: 48.52%; Sindhi: 7.38%; Punjabi: 13.98%; Pashto: 12.59%; Balochi: 4.34%; Saraiki: 2.11%; Kashmiri 2%; Other: 12.81%. The 'Other' category includes Dari, Gujarati, Brahui, Makrani, Hindko, Khowar, Burushaski, Arabic, Persian and Bengali[36].

Karachi underwent an administrative overhaul in 2000 as part of a nation-wide approach

[35] Estimated, 2007. Data obtained from http//:www.citymayors.com 5/18/2010
[36] Data from 1998 Census, downloaded from *http://www.findpk.com/cities/html/kara*chi.html accessed on 8/7/2008

toward the devolution of authority and responsibility for most local service provision to the community (rather than the national or provincial level). At that time, the city's five constituent districts (North, South, West, East and Malir) were merged together under a single district government (City-District Government, Karachi). The City-District is then divided into eighteen towns, governed by elected municipal officials (*nazim*) who are responsible for infrastructure and spatial planning, development facilitation and municipal services including water, sanitation and road maintenance. Towns are then further divided into 178 union councils[37]. The civil administration of the city is currently organized according to this breakdown.

However data from the most recent, 1998 census of Pakistan is not published according to the town-union council breakdown. Census data are published according to the pre-2000 system of administrative units, in terms of 'Charge' and 'Circle'. For this reason, the unit of analysis for this dissertation is also the 'Charge-circle', also described in places as the 'census tract' in keeping with US terminology. An advantage of using this less current level of disaggregation is that the 'circle' unit is smaller than the 'union-council'; on average, the population of a 'circle' is about 8,000 individuals while for a union-council it is about 52,000. Therefore while the demarcation of a circle is not based on informally or officially determined neighborhood boundaries, its relatively limited composition more closely resembles the neighborhood construct than the union council.

[37] http://www.karachicity.gov.pk/

3.3 Data sources

The three data sources for this research are presented in table 2. Each of these is discussed below.

Table 2

DATA SOURCES

	Dataset	Government source	Years	Level of disaggregation
A	Jail admissions	Citizen Police Liaison Committee	2004-2005	Offense level (i.e. multiple charges per case, multiple cases per individual); data include address of arrestee and police station of arrest
B	Census of Pakistan	Population Census Organization	1998	Tables disaggregated to charge-circle
C	Election data	Election Commission of Pakistan	2008	Polling station level

3.3.1 Jail Admissions Data, 2005

The jail admissions database contains a log of admissions into Karachi's four jails (Landhi Jail, Central Jail, Youthful Jail and Women's Jail) between 1/1/2004 and 12/31/2005. Data were provided by the Citizen Police Liaison Committee (CPLC), who record these logs in electronic format based on the paper records maintained by jail staff. The database includes about 85 thousand lines, representing 48 thousand offenses and 33 thousand offenders. Data included:

- Admission data including: name of jail, date of admission,
- detainee specific information including: name, address, religion and denomination (e.g. Islam-Shia, Islam-Sunni), ethnicity, tribe (e.g. Baloch, Rajput), educational level, profession, age, primary language spoken,
- offense specific information including: police station where first information report (FIR)

was lodged[38], FIR number, section charged, crime name and court name.

Location specific variables include home 'address of detainee' and 'police station where first information report was lodged'. Data were aggregated to the charge-circle level based on 'address of detainee' with the invaluable assistance of researchers at the Collective for Social Science Research, Karachi.

3.3.2 Census of Pakistan Data, 1998

The most recent census data available for analysis is from 1998. Certain substantive tables form the 1998 census are available at the charge-circle level; geographically, they cover four of Karachi's five districts. Together, these four districts are divided into 177 charges, and further sub-divided into 1220 charge-circles. Disaggregated variables include:

- demographic indicators (e.g. sex, age group, household size)
- social indicators (e.g. religion, marital status, education and literacy)
- urban planning indicators (including housing units by type of construction; access to drinking water, and electricity, and latrines)

[38] First information report (FIR) is a written document prepared by the police when they receive information that a cognizable offense has been committed (an offense in which police can make an arrest without a warrant from court). This information can be provided by the victim, a witness, or anyone else who has information of the offense. The police are required to register this report "without delay or excuse" and not doing so is a crime. Downloaded on 4/21/10 from http://www.cplc.org.pk/content.php?page=40

3.3.3 Election data, 2002

Election data were obtained from the Election Commission of Pakistan in paper form and were entered into Excel spreadsheets with the assistance of research assistants at the John Jay College of Criminal Justice, New York. Received data were disaggregated to the polling station level and were available for most of Karachi's polling stations (approximately 3414). I aggregated the data to the charge-circle level based on the location of the polling station. Substantive variables include:

- Number of registered voters, total votes, valid votes, rejected votes
- Total votes across candidates with party affiliation

3.4 Dependent and independent variables

The dependent variable in this analysis is offending. As noted by Fischer (1995) the most theoretically sound measure of crime in this case of assessment of neighborhood effects would have been number of criminal acts committed by all residents in the neighborhood[39]. However, data constraints necessitate the use of admissions to jail as a measure of offending in this research. A similar measure was used by Park and Burgess (1924) in their pioneering study on social structure. Using this measure, three classes of offending are estimated in this dissertation: total, violent and robbery offending. Total offending is the closest representation of law breaking behavior. Violent offending indicates more extreme behavior which not only represents breaking the law but also less consideration for the value of fellow citizen rights and security. Robbery was included for two reasons. First, it has been called the "quintessential crime", on account of its relative accuracy in reporting due to insurance claims, and less susceptibility to being

[39] This is how Shaw and McKay operationalized their 'delinquency' variable

manipulated by state agents responsible for data collection[40]. Second, the robbery problem in Karachi is of particular concern and residents report that it contributes greatly to the perception of insecurity and fear of crime; understanding the factors that contribute to robbery offending is thus of particular concern to this project. Each of these three types of offending draws on a slightly different theoretical rationale, therefore modeling each type of dependent variable contributes in a unique way to the overall goals of the project.

Independent variables of theoretical relevance include: concentrated disadvantage, ethnic heterogeneity, residential mobility and legitimacy. This information is presented in table 3, below.

Table 3
STUDY VARIABLES

Dependent variables	Independent variables	Mediating variables
Total offending Robbery offending Violent offending	Concentrated disadvantage Ethnic heterogeneity Residential mobility	State legitimacy

3.5 Operationalization of variables

The unit of analysis is the neighborhood, which has been operationalized as the charge-circle – a geographically cohesive unit of approximately 8000 individuals. This is comparable with the size of neighborhood as operationalized in prior research[41]. Table 4 provides details on the operationalization of variables in this research.

[40] Original quote, Jim Lynch, NY, 2008.
[41] Sampson (1988) notes that the average size of the unit of analysis employed in his assessment of neighborhood effects, the 'electoral ward' in England and Wales, is approximately the same as a US census tract, i.e. approximately 5000 individuals. The 'police beat' employed by Bellair (1997) in his assessment of informal surveillance in crime prevention consisted of approximately 9500 individuals. The size of the charge-circle thus falls within this range.

Table 4

OPERATIONALIZATION OF STUDY VARIABLES

Construct	Database	Operationalization
Offending	Jail database and census data	Jail admission data from CPLC was aggregated to the charge-circle level based on address of admit. Offending rate for each charge-circle was determined where the denominator was the charge-circle population from the 1998 census and numerator was number of offenses of a specific type in 2004-2005. Rates were calculated for total offending, violent offending, and robbery by coding the 'under-section' variable into these categories.
Concentrated disadvantage	Census data	Factor analysis determined that the most robust measure of disadvantage was based upon: proportion illiterate, access to water, access to electricity, access to latrines (see chapter 4)[42].
Ethnic heterogeneity	Jail database[43]	Ethnic heterogeneity (H) in each charge-circle was calculated based on the following equation: $H = 1 - \sum_1^n p_i^2$ (Blau, Blum and Schwartz, 1982) where p is the proportion population in each charge-circle with ethnicity *i* which may vary from 1 to n.
Population mobility	Census data[44]	Mobility was operationalized as percent male in a charge circle.
Legitimacy	Election data	Legitimacy was defined as number votes counted as a proportion of total population.

[42] This is based on Sampson et al (1996) operationalization of concentrated disadvantage, modified according to local socio-economic conditions and availability of data.

[43] Census data on mother-tongue was not available at charge-circle level, therefore I used data on detainee's ethnicity from the jail database to develop this variable.

[44] A potentially stronger operationalization in line with prior research would have been a factor based on proportion living at current residence for five years or more' and 'owner occupied residence' (Sampson et al, 1996). The census of Pakistan does not collect this information. The weaknesses underlying tenancy and ownership contracts make these questions particularly sensitive. The census does ask the question, "How long have you lived at your current residence?" however these data are currently not available at the charge-circle level of disaggregation (Gazdar, 2003). Census data on migration were also not available at charge-circle level. Mobility was operationalized in two ways: percent female and percent *katcha* housing structure. The former definition has the strength of incorporating Karachi's tradition of attracting economic migrants. Such migrants are often male and do not travel with their families – wives, mothers and sisters are financially supported by the migrant worker, but they usually do not travel with him. Circles with more women represent more settled, family based neighborhoods, whereas circles with more men may indicate more economic migrants and fewer families. Housing structure was based on percent *katcha* houses i.e. temporary housing structures (as opposed to *pakka* – semi-permanent, or *pakka* – permanent). Both definitions were used in statistical modeling; however for clarity only percent male is referred to as mobility from here on. Percent *katcha* houses is noted only where it was significant.

3.6 Data analysis

This project had three goals. The first was to assess neighborhood patterns of offending across Karachi's neighborhoods. The second goal of the project was to examine the direct effects of concentrated disadvantage, ethnic heterogeneity and residential mobility on offending rates. Finally, the project aimed to assess the extent to which these relationships are mediated by state legitimacy. The following section describes the analytical methods to be employed in each case.

3.6.1 Assessing distributions: descriptive analysis

A number of descriptive analysis techniques were employed to understand rates and types of offending patterns across Karachi's neighborhoods. The dependent variable was subdivided into total crime, violent crime and robbery by coding the 'under-section' variable into these categories. Frequencies across categories were used to determine concentration in specific neighborhoods. Measures of the non-normality of data, including skewness and kurtosis statistics compared concentrations across neighborhoods to determine the distribution and patterns of offending across census tracts. Scatter plots further assisted in the examination of clustering across neighborhoods.

3.6.2 Assessing complex relationships: multivariate analysis

The conceptual model presented in figure 3 is subject to various complexities. First, the model is complex: variables have a direct and indirect effect on the dependent variable. Therefore it is necessary to estimate the model as a series of equations and not just one equation[45]. Second, the community level data employed in this research may be subject to spatial autocorrelation i.e. variables may be correlated with themselves across space. Moreover in the case of the dependent variable, number of individual cases aggregated to compile a community level crime rate differ

[45] Lynch, *et al* 2002.

across community. Therefore OLS assumptions of random observations and homoscedastic errors may be violated[46].

Prior research has estimated such complex neighborhood effects using two analytical methods: multivariate regression, and structural equation modeling. The two measures are also sometimes used to validate each other (Vessey and Messner, 1999). Both analytical methods were used in this process. This allowed for the most rigorous evaluation of the data as well as further comparison of the two methods.[47]

3.6.2.1 *Multivariate regression*

Multivariate regressions are traditionally used to examine relationships across variables. The basic models were:

$$Eq.1: OFFEND = \beta_0 + \beta_1 DISADVANTAGE + \beta_2 MOBILITY + \beta_3 HETEROGENEITY$$

$$Eq.2: OFFEND = \beta_4 + \beta_5 DISADVANTAGE + \beta_6 MOBILITY + \beta_7 HETEROGENEITY + \beta_8 LEGITIMACY$$

where OFFEND measures total, robbery, violent, non-violent offending rates across census tracts; DISADVANTAGE is concentrated disadvantage; MOBILITY is residential mobility; HETEROGENEITY is ethnic heterogeneity; LEGITIMACY is state legitimacy; β_0 and β_4 are intercept terms and β_1 through β_3 and β_5 through β_8 are the estimated regression coefficients. A comparison of equation 1 with equation 2 lead to the assessment of the role of legitimacy in mediating the impact of the other three independent variables. This basic technique was employed in the assessment of three kinds of regression models: step-wise, weighted least squares (WLS), logged-dependent ordinary least squares, and negative binomial regressions.

[46] The model specified in figure 2 is not non-recursive (i.e. relationships between variables are theorized in only one direction). (In fact, using lagged variables is a commonly used method of correcting for endogenous models). Therefore we do not need to use GLS or 2SLS, or identify suitable IVs. We are not using nested data therefore do not need HLM techniques.

[47] Simcha-Fagan and Schwartz (1986) also used this dual analytical strategy in their research.

As a starting point, weighted least squares models were estimated to assess the impact of social disorganization factors on offending, and the ability of legitimacy to mediate this effect. Sampson *et al* 1997 used this technique to assess the effect of collective efficacy on violence and the extent to which this variable mediated the impact of structural variables. Similarly, Bellair 1997 used this method to assess the impact of neighborhood networks on crime, and the extent to which this variable mediates the effect of structural variables on crime. Sampson and Groves (1988) also used the same methodology to test the relationship between structural factors, indicators of social disorganization, and crime.

In WLS, each case is weighted by the square root of the unweighted sample size of that aggregate to induce homoscedastic errors (Sampson and Groves 1988; Sampson 1988). Then, standardized beta coefficients obtained through equations 1 and 2 above are compared. This analysis was conducted separately for total offending (chapter 5, models 1 and 2), violent offending (models 3 and 4) and robbery (models 5 and 6). Dependent variables in each case included the rate of total, violent and robbery offences per 10,000 of the circle population, respectively. Despite weighting each case, WLS results violated model assumptions, and a second type of regression model, using logged dependent variables was used to induce homoscedasticity in error terms.

Logged-dependent regressions simply require taking the log of the dependent variable before estimating equations 1 and 2, and then comparing the results for the two equations to assess direct effects and mediation. In this case, the dependent variable was the logged rate of total offenses per 10,000 (chapter 5, models 7 and 8), logged violent rate of offenses per 10,000 (models 9 and 10) and logged rate of robbery offenses per 10,000 (models 11 and 12). Such models are better at meeting homoscedasticity assumptions because the log transformation helps

induce the normal distribution of the dependent variable. However, error terms were still observed to be mildly heteroscedastic, and sample size sacrifices had to be made in cases where rate of violent offences or rate of robbery offences was zero (since the log of zero is undetermined). Poisson models, which do not assume homoscedastic errors, may be helpful in such situations (Osgood 2000).

The dependent variables used in this study closely resemble a Poisson distribution, with an abundance of zeros and highly skewed distributions. Poisson models are ideal for estimating such dependent variables, but assume that the variance of the dependent variable equals its mean. In the case of this study, where offending variance is considerably greater, negative binomial models are more appropriate.[48] In negative binomial models, dependent variables are counts of total, violent and robbery offences for each circle (chapter 5, models 13 through 18, respectively). To control for differences in the size of each circle, total population was included as an independent variable for these estimations. Results from negative binomial models were found to be most robust.

The disadvantage of multivariate analytical methods is that it does not maximize the use of theoretical arguments about the relationships between variables (Veysey and Messner, 1999). Structural equation models on the other hand are not limited to minimizing least squared errors between two variables, and instead, estimate the covariance matrix across all variables. Thus these build upon all relationships and estimate direct as well as indirect effect coefficients between variables. These are described in further detail in the next section.

3.6.2.2 *Structural equation modeling (SEM)*

Structural equation modeling techniques allow for the testing of specific, theorized orientations of complex, multiple, multivariate regressions (ibid). This technique maximizes the use of

[48] Adamczyk, forthcoming; Rengifo 2007, Osgood 2000.

available information about theorized inter-relationships amongst variables. SEM also provides goodness of fit information using a variety of indices, including chi-square, comparative fit index (CFI, Bentler, 1990), and the root mean squared error of approximation (RMSEA, Hu & Bentler, 1999).

The path model in figure 3 depicts a two-equation causal model, where state legitimacy (LEGIT) is an independent variable for offending (OFFEND), but is endogenous to (i.e. dependent upon) concentrated disadvantage (CONDIS), ethnic heterogeneity (ETHHET) and residential mobility (RESMOB). LEGIT is thus an intervening variable in this model (McClendon, 1994). In SEM, unbiased parameters for the recursive model in figure 3 are achieved by estimating the two equations below:

$$\textit{Eq.1: OFFEND} = \beta_{15} + \beta_{11}\,\textit{CONDIS} + \beta_{11}\textit{RESMOB} + \beta_{12}\,\textit{ETHHET} + \beta_{13}\,\textit{LEGIT}$$

$$\textit{Eq.2: LEGIT} = \beta_{14} + \beta_{15}\textit{CONDIS} + \beta_{16}\textit{RESMOB} + \beta_{17}\textit{ETHHET}$$

3.7 Limitations in proposed methodology

This project used data from jail, census and election records in Karachi, Pakistan to assess the impact of structural characteristics of neighborhoods and residents' investment in the state apparatus on crime. Lack of available data, limitations in access to existing data due to confidentiality and government ownership, particularly during sensitive political times, and resource constraints preventing original fieldwork lead to limitations in the proposed methodology for this research. This section describes these limitations and discusses their implications.

Data from varying time periods: The three data sources for this project - jail data (2004-05), election data (2008) and census data (1998) were collected at different points over a ten year

period, resulting in a time displaced, cross-sectional dataset. Models in this study are therefore estimating effects which did not occur concurrently. For example, the study hypothesis that poverty effects offending is empirically translated into poverty in year (Y-6) effecting offending in year Y. This could lead to the failure of models to capture relationships between actual variables. Limited data availability prevents the use of concurrent or time-ordered datasets.

Out-of-date data: Each dataset is fairly outdated, particularly the census data. A revised version of the census began in 2010 but results have not yet been published. This could lead to invalid results with low generalizability due to changes that have since occurred in the socio-political context. In particular, a nine-year military regime ended in 2008 when the Pakistan People's Party was voted into power, and co-chairperson of the party, Asif Zardari, was nominated to be President. This major political event would likely have an impact on police practices and potentially offending patterns. Constraints on the availability and indeed existence of data prevent the use of more current measures.

Corruptibility of official and semi-official data: There are concerns about the quality of official and semi-official data. One of the institutional reasons for this is that these data may be used for several sensitive purposes, including resource allocation across provincial, district, and union council divisions (Bursik, 1988; Gazdar, 2003). Further, arrests for 'false' offenses and subsequent abuse by the police are widely considered to be sources of persecution and discrimination by the state. Operationalizing offending based on admissions to jail potentially involves four levels of undercounting crime: offences not reported to the police, reported offences not recorded by the police, recorded offences not resulted in arrest; and arrest not resulted in jail admission. Conversely, it is also subject to over-counting based on the extent of offenders jailed for 'false' arrests. Further inaccuracy results from those who are wrongfully

arrested. The inclusion of robbery offenses as a dependent variable (in addition to total and violent crimes) was to control for such inaccuracies and data manipulations, since it expected that robbery is better reported, recorded and processed in the criminal justice system than other types of crime. This draws on insurance-based incentives to report crime and the lack of political sensitivity of robbery so that police are more likely to record and investigate robbery complaints fairly. Further, it is expected that the extent of overall inaccuracy would not systematically differ across communities, and therefore would not bias results from the analysis.

Assumption of stable ecological structures: Social disorganization is an ecological theory based on the premise that neighborhoods are constantly evolving. The most classical interpretation of the theory relates to the impact of rapid change on disorganization and crime. The theory has been critiqued on the grounds that many of its empirical tests assume the stability of neighborhood structures (Bursik, 1988). Resource constraints prevent this, and many other, empirical assessments of neighborhood effect from incorporating change scores, and results from the analysis would still be comparable with that from other literature in the field.

Operationalization of 'legitimacy': The legitimacy variable has been operationalized on the basis of voting data, including voter registration and voter turnout. Both these variables are effected by factors other than attitudes toward state legitimacy, however, including most notably socio-economic status (SES): areas which are better off are generally considered to be more active in electoral politics. These patterns have not yet been verified in Karachi and this dissertation provides an opportunity to do so. Moreover, it may be argued that in including concentrated disadvantage (a measure of SES) explicitly in our models we are controlling for this bias. Finally, the reflection of SES impacts on voting patterns may also be a valid impact on legitimacy rates. Moreover, the identification of the process of voting on sentiments of inclusion

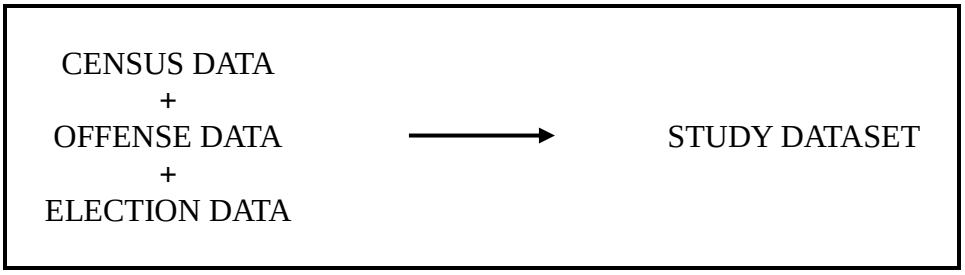
and participation (Gonzalez and Tyler, 2008) creates a precedent for the use of electoral data as a measure of overall sentiments toward the state.

CHAPTER 4

DATA EXPLORATION AND BIVARIATE ECOLOGICAL PATTERNS

The purpose of this dissertation is to understand the ways in which the systemic model of social disorganization theory operates in the context of Karachi, Pakistan. The census of Pakistan provided data on social disorganization variables. The Citizen Police Liaison Committee (CLPC) provided information on Karachi's jail population which yielded the dependent variable, offending. Voter data from the 2008 national election, obtained from the Election Commission of Pakistan, allowed for the calculation of legitimacy rates across the city. Thus, three unique government datasets: census, offense and election were combined to form the study dataset. Figure 4 presents a visual representation of this relationship. The current chapter presents the first set of results from the analyses. Sections 4.1 to 4.3 describe each of the substantive components of the project: demographics, offending, and legitimacy. Sections 4.4 and 4.5 discuss the univariate and bivariate characteristics of study variables. Finally, section 4.6 addresses questions around the viability of the ecological approach in understanding offending and other social processes in Karachi through visual depictions of charge-circle distributions.

Figure 4
COMPOSITION OF THE STUDY DATASET



4.1 Census Database

The census of Pakistan (1991) provided the universe for the sample. In total, Karachi is divided into 177 charges, which are further sub-divided into 1220 circles. The sample included 453 circles from across Karachi: those for which offending, election and census data were available. Table 5 includes descriptive statistics for the demographic characteristics across the city.

Table 5[49]

DEMOGRAPHIC CHARACTERISTICS

	Valid N	Mean	Min-Max
Population			
Total population (persons)	1220	7654 (2880)	1939 – 21,059
Female proportion	1220	46% (0.04)	0.14 - 0.50
Under 18	1220	44% (0.05)	0.20 - 0.57
Household size (persons)	1220	6.8 (0.75)	4.90 - 9.70
Religious minority	1220	2.9% (0.08)	0.00 - 0.92
Education			
Illiteracy	1220	32.8% (0.19)	0.04 - 0.88
Male education achievement	1220	25.4% (0.08)	0.03 - 0.45
Female education achievement	1220	18.6% (0.09)	0.00 - 0.57
Gender gap (% points)	1220	6.8 (0.04)	-0.02 - 0.31
Infrastructure			
Pakka houses	1220	96.6% (0.05)	0.57 – 1.00
Semi-pakka houses	1220	2.9% (0.05)	0.00 - 0.37
Katcha houses	1220	0.6% (0.03)	0.00 - 0.23
No electricity	1220	6.0% (0.12)	0.00 - 1.00
No potable water	1220	25.4% (0.27)	0.00 - 1.00
No toilet	1220	46.7% (0.20)	0.02 - 0.98

Each circle includes roughly 7654 individuals. Females are underrepresented (46%, on average, never higher than 50%), probably due to the large number of male economic migrants who travel to Karachi from the rest of the country. Proportion population under18 years is 44%. Average household size is close to 7 persons. Religious minorities constitute roughly 3% of the population, these include Qadhiani (a minority sect of Islam), Christian, Hindu, and Buddhist.

[49] This table is based on all urban circles of Karachi (N=1220). The same statistics for the study sample (N=453) are presented in appendix 1.

Karachi has the country's highest literacy rate, however the illiterate proportion within each circle still stands at over 32%. This includes individuals who are unable to read or write their name. An average of 25% males and 19% women have completed high school or above. Based on this criteria, the average gender gap in educational attainment is roughly 6.8 percentage points.

The census of Pakistan categorizes residential dwellings into three types: *pakka, semi-pakka* and *katcha*. *Pakka* houses are permanent structures with concrete roofing; *semi-pakka* dwellings have brick walls but corrugated iron roofing; finally, *katcha* dwellings are grass-thatched, or mud-covered. Majority houses in each tract are *pakka* (default), with an average of 2.9% *semi-pakka* and 0.6% *katcha*. This lack of residential infrastructure is typical of an urban city in an under-developed country. Over 46% households did not have access to toilet facilities, over 25% did not have drinkable water, and 6% did not have access to electricity.

4.2 Offense Database

The offense database contained data on jail admits to Karachi's three jails from2004-2005. The database contained information on the offender's name, father's name, alias, age, address, phone number, police station of arrest, offense, applicable section of legal code, court, physical characteristics such as height, eye color, and risk levels. This database consisted of 85,387 cases. This database contained multiple admissions per offender, multiple offenses per admission, multiple sections under which the offense would be prosecuted, and multiple courts in which a prosecution would be pursued. These cases represented 48,471 offenses, which in turn were attributed to 33,239 offenders.

4.2.1 *Matching addresses with circles*

In order to link the offense and census databases, each address in the offense database had to be manually matched with a circle from the census. The matching was carried out by a group of researchers based at the Collective for Social Science Research, Karachi, who possess extensive knowledge of the administrative boundaries within the city. The accuracy of the match depended on largely on the quality of the address variable, since it had to match with published descriptions of charge-circle boundaries, as well as researchers' knowledge regarding the neighborhood within which an address was situated. In total, 14,242 offenses (29.4%) were attributed to a unique circle, and could be included in the final analysis. 16,599 offenses (34.2%) could not be matched to any circle, largely due to incomplete or incorrect information in the offense database. The remaining 17,630 cases (36.4%) were matched to multiple cases – specifically between 2 and 12. The lack of unique identification excluded these cases from the analysis. Additional resources, not available for this project, were needed for more accurate matching between address and circle. This information is summarized in table 6.

Table 6

OFFENSE CASE MATCHING TO CIRCLE

Offenses matched	Included in analysis	N	Percent
Uniquely matched	Yes	14,242	29.4%
Multiple matches	No	17,630	36.4%
No match achieved	No	16,599	34.2%
Total		48,471	100%

When translated to offenders in the database, the breakdown is as shown in table 7.

Table 7

OFFENDER CASE MATCHING TO CIRCLE

Offenders matched	Included in analysis	Number	Percent
Uniquely matched	Yes	9,968	30.0%
Multiple matches	No	11,020	33.2%
No match achieved	No	12,251	36.9%
Total		33,239	100%

As shown in table 7, 30% of all offender addresses were matched to a unique circle and included in the analysis. The remaining 70% of offenders were not included as they could not be matched with certainty to one specific circle.

Further, offenses were not matched uniformly across circles in the city. In fact, the 14,242 offenses uniquely matched were identified in only 543 (45% of a total of 1220). This was most likely due to a lack of ability to identify the addresses, either due to inaccurate or incomplete addresses, or lack regarding the unmatched sections of the city. Missing values for the remaining 677 circles (55%) cannot be attributed to the lack of offenders residing in these neighborhoods. Coding these circles as zero, and including them in the analysis would have falsely represented a lack of offending in specific areas, biasing the data. Therefore these cases were excluded from the analysis.

The exclusion of 55% of all circles from the analysis due to missing data on the dependent variable is a limitation of this analysis and may have serious implications for measurement validity and the ability of the conclusions to be generalized to the entire city. The precise nature and extent of this limitation is beyond the scope of this dissertation and will be assessed through comparative studies with more robust data at a later date. However it is prudent to understand and estimate the seriousness of this threat at this point.

Two levels of missingness are present in this analysis: offender addresses which could not be matched with a unique circle were not included; and circles which did not match with an offense were also not included. The study is therefore based on 30% of all offenders, and 45% of all circles across Karachi. However, certain aspects of the research reinforce its validity. Similarities in characteristics across all circles (n=1220, table 5) and the study sample (n=453, appendix A) suggest that excluded and included circles have comparable demographic and socioeconomic profiles. Further, non-matched offender addresses seem to be random, as there is no reason to suspect that the quality of the address variable would systematically vary across circles. Finally, circles which did not match with an offender address were excluded, instead of being included with zero level offending. This likely reduced the power of the analysis and statistical significance of the results, but did not bias results by introducing possibly false zeros. These factors suggest that the findings of the study are valid and may be generalized to the wider context of Karachi.

4.2.2 Describing the offense database

In most cases, each offender had several recorded offenses. Maintaining the distinction between offense and offender aggregations is useful because while some characteristics, such as type of offense, are useful to analyze at the offense level, others, such as demographics, are more interpretable at the level of the offender. This section provides descriptions of the data at both the offender and offense level, as appropriate.

Table 8

OFFENDER CHARACTERISTICS

Sex	
Male	97.0%
Female	3.0%
Age	
17 years or less	4.9%

18-35 years	75.5%
36-55 years	17.5%
56 years or more	2.2%
Main language	
Urdu	22.0%
Pashto	21.0%
Punjabi	18.4%
Sindhi	8.5%
Balochi	8.5%
Hindko	5.3%
Saraiki	4.6%
Bengali	2.2%
Burmi	0.6%
Other	8.7%
Education	
None	71.2%
Primary	5.3%
Middle	9.8%
Matric (High school)	7.6%
Inter (Associates degree)	2.8%
Bachelors	2.7%
Graduate	0.6%
Employment	
None	3.9%
Day-labor	48.4%
Private	45.8%
Government	1.9%

N=33,239

As shown in table 8, the vast majority of offenders were male (97%), and more than three fourth were between 18 and 35 years old. Over 70% did not have any educational qualification. Most offenders (48.4%) were employed as daily-wage workers or private employees (45.8%). The latter category includes workers in shops, tea boys, domestic workers, factory employees and several other professions. Missing data for each category in table 8 ranged between n=0 and n=7151.

Table 9

OFFENSE TYPE

Offense Type	
Robbery	17.19%
Weapons	14.73%
Drugs	10.71%
Murder	7.91%
Public order	7.78%
Assault	7.57%
Fraud	5.63%
Anti-govt	4.29%
Theft	3.38%
MVT	2.62%
Property	2.55%
Rape	2.16%
Sex offense	1.76%
Kidnap	1.72%
I&C	0.54%
Arson	0.39%
Explosives	0.30%
Other	8.80%

n=42,670

The most common offense type was robbery (17.2%) as shown in table 9. This included home (4.8), car (3.0), business (1.9) and other (7.5 percentage points) kinds of robbery in which 3 or more armed persons attempted to or succeeded in depriving a victim of items of value. Weapons offenses were the second most common (14.73%), followed by drug offenses including sale (0.4), possession (9.5) and use (0.8 percentage points). Missing values for table 5 were n=5801.[50]

[50] There is considerable missing data in the offense database. Data on type of offense is missing in around 13.6% of cases (table 9), while data on some offender characteristics is missing for up to 21.5% of cases (table 8). Data were collected by CPLC enumerators in Karachi's jails through a combination of inmate interviews and case file review. Government datasets, generally recorded for management and logistical purposes, often display high levels of missing data as enumerators have little incentive to ensure the accuracy or clarity of each field. CPLC's data verification system is unclear.

4.3 Election Database

Election data were obtained from the headquarters of the Election Commission of Pakistan, located in Islamabad. Karachi is divided into 42 provincial assembly constituencies. Constituency-level publications of the Special Edition of the Gazette of Pakistan provided data on voter registration, while Form XVI, also completed at the constituency level, provided data on electoral counts.[51] Both sources were most readily available for the national elections of 2008. Each constituency contained an average of 81 polling stations. Both the Gazette and Form XVI contained information at the polling station level. Polling station boundaries are synchronized with charge-circle boundaries, and this facilitated aggregation of the election data to match with census data.

Data were obtained in paper form and entered into an Excel spreadsheet by four data entry staff over a period of six weeks. The Gazette yielded the majority of the variables: for each polling station, it provided the numerical code and location-descriptive name of the station itself, number of male and female booths at the station, the charge-circle blocks that it covered, and the number of male and female voters registered to that station. Form XVI provided the name and number of the polling station, as well as the number of votes secured by each candidate, and the total number of votes counted, rejected, and accepted.

The complete dataset contained information on 3414 polling stations representing Karachi's 42 provincial assembly constituencies. Most polling stations included polling booths for men and women, while around 17% catered exclusively to male voters and 13% catered exclusively to female voters. On average, each polling station covered 2.7 charge circle blocks; 18% had 1, 58% had 2 or 3, and 24% covered four or more blocks. Table 10 summarizes this

[51] Government of Pakistan: 2007, 2008a.

information.

Table 10

POLLING STATION DESCRIPTIVES

Polling station sex[a]	
Male	12.6%
Female	16.6%
Both	70.9%
No. census blocks per polling station[a]	
1	18.1%
2 – 3	57.9%
4 – 13	24.0%
Polling station votes[a,b]	Mean (SD)
Registered [a]	1923 (604)
Counted [b]	949 (416)
Rejected [b]	10 (29)
Valid [b]	938 (413)

[a] N=3414; [b] N=2881

Table 10 also lists the number of votes registered, counted, rejected and accepted (valid) at each polling station. The mean registered vote per polling station is 1923 (per polling station) and mean counted vote is 949. On average, ten votes were rejected from each polling station, bringing the average accepted vote to 938 per polling station. When aggregated to the charge-circle level, this dataset was reduced to 1234 cases, i.e. it represented 1234 unique circles across Karachi. A portion of these were rural, and not included in the census charge-circle data. Missing data affected counted, rejected and valid votes in 533 polling stations (15.6%) where form XVI were not available.[52]

Using data provided in the Gazette, I aggregated polling stations to the charge-circle level in order to match with the census and offending datasets. The data aligned to 1234 circles. Table 11 presents mean and standard deviation for registered, counted, rejected and valid votes by charge-circle.

[52] Rural-urban distinctions prevented perfect synchronicity across election and census data. The election database contained information on rural circles, not included in the census database. Similarly, missing election data affected around 137 circles of the total 1220 circles from the census data, approximately 12%.

Table 11

CHARGE-CIRCLE VOTERS

Charge-circle voters	Valid N	Mean (SD)
Registered	1234	5317 (15,528)
Counted	1083	2424 (4,836)
Rejected	1083	27 (74)
Valid	1083	2495 (4,782)

At the circle level, the lack of form XVI affected counts for 151 circles resulting in missing values in 12.1% of all (election) cases.

4.4 Study Dataset: Combining Census, Offending and Election Data

Once each database was aggregated to the charge-circle level, census, offending and election data were combined to form the study dataset. The study dataset was therefore aggregated to the circle level. The final sample consisted of N = 453 census tracts.[53]

Key study constructs and associated operationalization is presented in table 3 of chapter 3. This section presents descriptive statistics for study variables.

4.4.1 Dependent variables

This study examines socio-demographic and offending patterns in Karachi, and the relevance of the systemic model in explaining these patterns. The dependent variables for the study were based on offense type and patterns of residence for jail admits in the city jails across the city.[54] Offenses were coded into three categories: total, violent and robbery. Total offending included all offenses recorded in the database. Robbery offenses included home, car, business and other robbery categories. The violent offense category was based on definitions from the Uniform

[53] Census and offending data were available for 543 circles, but of these, election data was missing in 90 cases, resulting in a final sample of N=453 for all three sources provided data.

[54] As described above, the data reported through these variables are based on jail data, and thus only record offenses for which an arrest occurred.

Crime Report and included the following offenses: robbery, assault, rape, murder, kidnapping, any weapons offenses, any explosives offenses, sex offenses, drugs sale and arson.[55] The variables were constructed by dividing number of offenses by the total population in a circle, and scaling the resulting ratio by a factor of 10,000. The rationale for selecting these dependent variables is discussed in chapter 3, section 3.4.

4.4.2 Independent variables

In keeping with study objectives, independent variables included measures of social disorganization and legitimacy. The variables are described below:

- Concentrated disadvantage: this latent construct was based on the combination of several census variables, including percent residents without access to a) clean water, b) electricity, c) latrines and d) percent illiterate residents. The scale was empirically derived using a principal components factor analysis (see section 4.4.2.1). Variables were selected based on data availability and an understanding of the manifestation of economic and social difference across Karachi.
- Population heterogeneity: this was derived based on a measure of diversity in reported mother-tongue amongst residents from the circle. Due to the lack of data on mother-tongue in the census data for this scale were based on variables in the Offense database (section 4.4.2.2)
- Residential mobility: this scale was based on the proportion of residents of a circle who were male. The presence of females suggest family oriented neighborhoods, which may represent longer length of stay in Karachi's highly migrant oriented society. Economic migrants who travel to Karachi from abroad or from other parts of Pakistan are generally

[55] Some adjustments were made to account for differences in coding across US and Pakistan criminal justice systems. Downloaded on 9/28/11 from http://public.getlegal.com/legal-info-center/types-of-crimes

male and do not travel with female family members, thus neighborhoods with higher proportions of migrants would suggest less settled residents.[56]

- Legitimacy: this variable measured the number of votes counted as a proportion of the total population of a circle.

Table 12 presents descriptive statistics for key variables used in the study.

Table 12

DESCRIPTIVE STATISTICS FOR KEY STUDY VARIABLES

	N	Mean (SD)	Min – Max
Dependent variables			
Total offending rate [a]	453	20.42 (29.32)	0.60 – 238.24
Violent offending rate [a]	453	10.70 (16.24)	0 .00 – 135.80
Robbery offending rate [a]	453	3.55 (5.70)	0.00 – 46.44
Independent variables			
Concentrated disadvantage scale	453	0.00 (1.00)	-1.57 – 4.25
Population heterogeneity	453	0.59 (0.32)	0.00 – 1.00
Residential mobility (male proportion)	453	0.54 (0.03)	0.50 – 0.86
Legitimacy	453	0.33 (0.15)	0.02 – 1.00

[a] Rate per 10,000 of the circle population

Total offending rates (M = 20.42 offense/10,000, SD = 29.32) are about twice as high as violent offending rates (M=10.70 offenses/10,000, SD=16.24). Robbery offending accounted for about a third of all violent offending (M=3.55, SD=5.70). As a principal components scale constructed using regression based values on component variables (see 4.4.2.1), concentrated disadvantage had standardized values for mean and SD (M=0, SD=1). Mean heterogeneity was 0.59 (SD=0.32). Residential mobility (M=0.54, SD=0.03) data suggest that on average, 54% residents of a circle were male. Finally, legitimacy data (M=0.33, SD=0.15) suggest that on average across circles, a third of the population participated in the 2008 general election. This is consistent with press reports regarding voter turnout at that election.

[56] Mobility was also measured as proportion *katcha* (mud or thatched) houses in a locale. When significant, it is so noted.

4.4.2.1 *Scaling concentrated disadvantage*

Following prior research, this study developed a scale based on several variables, representative of poverty and social marginalization, to measure concentrated disadvantage. Table 13 presents factor loadings of each item on the concentrated disadvantage factor.

Table 13

FACTOR LOADINGS FOR CONCENTRATED DISADVANTAGE SCALE

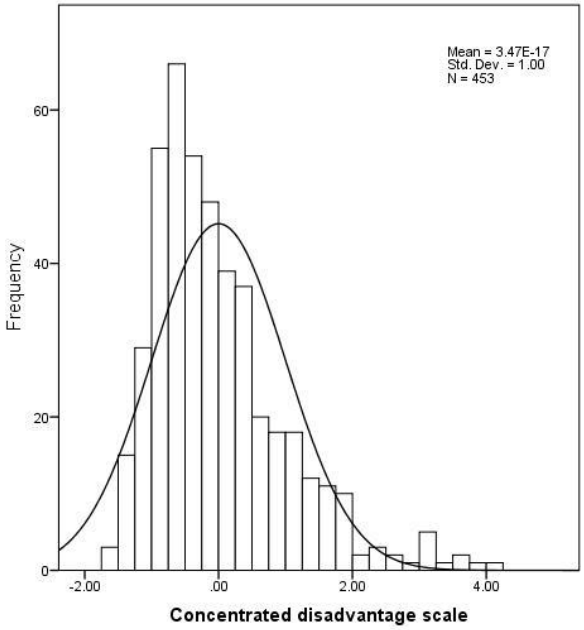
Variable	Principal components factor loading
Proportion illiterate population	0.820
Proportion houses without water	0.817
Proportion houses without electricity	0.718
Proportion houses without latrines	0.477

N=453

Results reveal that the factor is able to explain 52.06% of total variation in the four component variables. The KMO alpha value of 0.653 and the significance of the Bartlett's test (chi sq=363.50, df = 6, p<0.001) support scale reliability and correspond to previous studies[57].

Figure 5

DISTRIBUTION OF DISADVANTAGE



[57] Rengifo, 2007.

An examination of the distribution of concentrated disadvantage reveals fairly well dispersed patterns of poverty around the city. The circles falling in the top 50% on the disadvantage scale (i.e. above the median) house roughly 48% of the city's population. The poorest 20% circles (i.e. below the 80th percentile on the scale) house roughly 19% of the population, while around 20% of the population live in the least poor 20% (i.e. above the 20th percentile) locations. The histogram in figure 5 displays the distribution of this variable.

4.4.2.2 *Examining heterogeneity*

The heterogeneity index represents diversity within circles. It was constructed using the jail database and assessed the number of languages spoken by offenders who were resident of a specific circle.

Few circles represented only one spoken language (n=86, 19%), and most (n=365, 81%) displayed some degree of heterogeneity. The breakdown of spoken language in circles which appear to be homogenous is displayed in table 14:

Table 14

DISTRIBUTION OF 'MOTHER-TONGUE' ACROSS HOMOGENOUS CIRCLES

Language	n	%
Urdu	50	58%
Punjabi	13	15%
Pashto	9	10%
Siraiki	3	3%
Bengali	2	2%
Sindhi	2	2%
Hindko	2	2%
Other	5	6%
Total	86	100

However, note that most homogenous circles are based on statistics for small numbers of offenders. In fact, fewer than 6% are based on more than two offenders, and the majority (94%,

n=75) are based on one or two offenders per circle. This small inter-circle sample base limits the generalizability of these findings.

4.5 Bivariate Relationships Across Study Variables

The correlation matrix across key variables in the study is presented in table 15.

Table 15

PEARSON'S BIVARIATE CORRELATIONS

	1	2	3	4	5	6	7
(1) Concentrated disadvantage	1.000						
(2) Heterogeneity	0.045	1.000					
(3) Mobility	0.366**	0.051	1.000				
(4) Legitimacy	-.290**	-.092*	-.414**	1.000			
(5) Robbery offenses	0.146**	0.273**	.075	.015	1.000		
(6) Violent offenses	0.165**	0.296**	.071	0.004	0.940**	1.000	
(7) Total offenses	0.156**	0.315**	.100*	-.002	0.911**	0.974**	1.000

N = 453; ** p<0.01, * p<0.05, two-tailed

Low correlations between the social disorganization indicators support their discriminant validity and suggest that multivariate analyses will not be challenged by problems of autocorrelation. The correlation between concentrated disadvantage and residential mobility (r=0.366) displays statistical significance (p<0.01) but has a fairly small coefficient size. Similarly, the relationship between concentrated disadvantage and legitimacy (r=-0.290) is also significant (p<0.01) but is below levels considered worrying for autocorrelation[58]. As expected, robbery, violent offending, and total offending are significantly correlated. The next section examines bivariate distributions in further detail.

4.6 Examining Bivariate Distributions Across Charge-Circles

The underlying premise of this project is that neighborhoods across Karachi are not uniform in

[58]Autocorrelation is considered to be problematic when magnitude of bivatiate correlations is greater than 0.6. Fields (2000).

their socio-economic, political and offending profiles and that in fact, the extent of social disorganization, offending, and political involvement vary across charge-circles. Figures 6A through 6D present a visual depiction of variation in key study variables across Karachi's charge-circles. For the sake of clarity in understanding these relationships, the scatter plots presented in this section are based on a randomly selected sub-sample (n=88).[59] All variables were standardized based on their mean and standard deviation for consistency in measurement scales.

Figure 6A

DISADVANTAGE AND VIOLENT OFFENDING

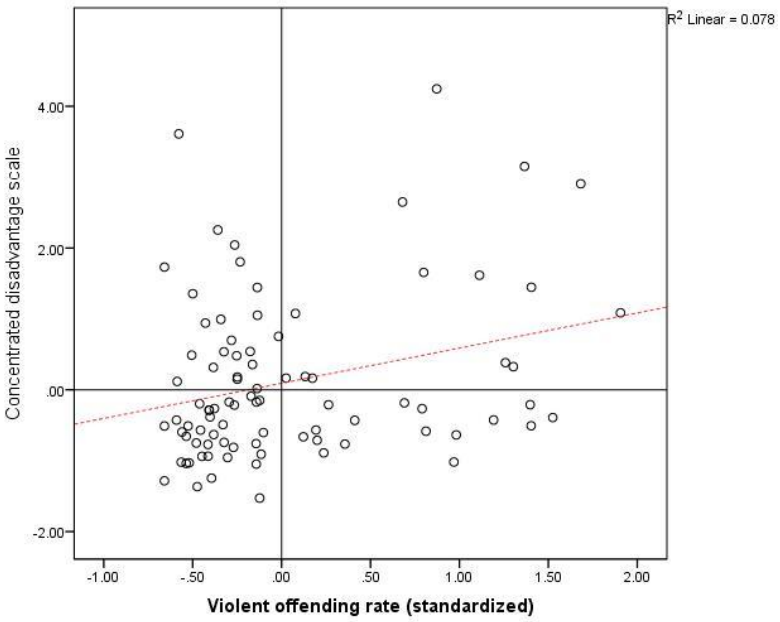


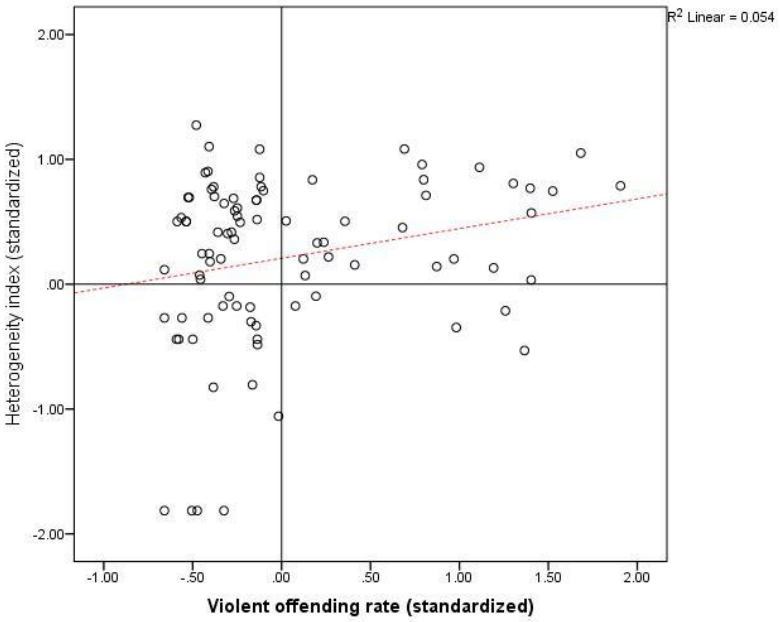
Figure 6A illustrates the bivariate distribution of concentrated disadvantage and violent offending. Each circle on the plot represents a charge-circle. Cases are distributed across the four quadrants of the graph, but are generally seen to cluster in the third quadrant, displaying low

[59] To control for outliers, circles with violent offending rates more than 2 standard deviations away from the mean were excluded from the analysis, as were circles based on only one offender. This eliminated 101 cases. In order to observe patterns in the data more clearly, 25% of the remaining 352 cases were randomly selected and formed -the sub-sample for this analysis.

(less than average) violent offending rates, and low (again, less than average) concentrations of disadvantage. In the first instance this suggests that mean values for the two variables are influenced by positive outliers and may not be an accurate depiction of typical values. Further, the line of linear fit, based on the least sum of squared errors, is sloping upwards, suggesting a positive relationship between the two variables: as concentrated disadvantage increases, so does the violent offending rate. Both variables display considerable variation across circles.

Figure 6B

HETEROGENEITY AND VIOLENT OFFENDING



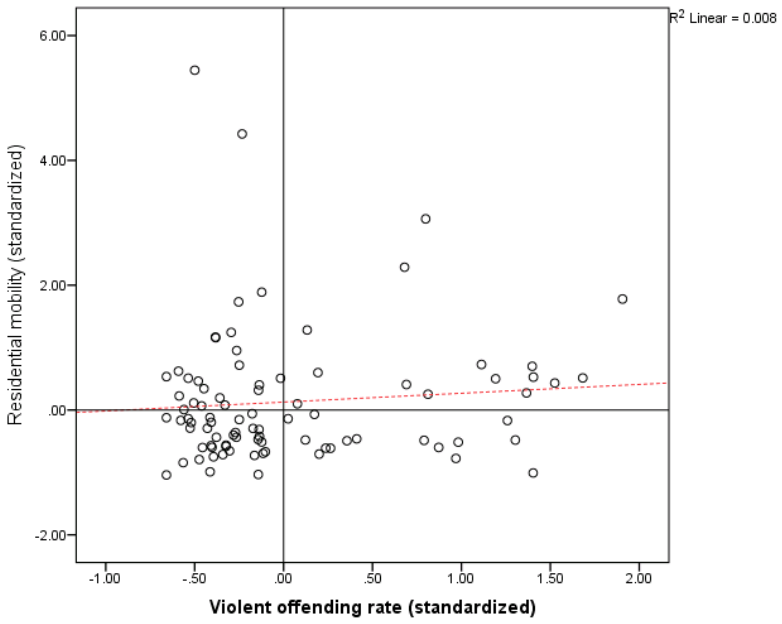
Population heterogeneity also displays considerable variation across circles. Figure 6B illustrates the bivariate distribution of population heterogeneity and violent offending. Cases tend to cluster in the fourth quadrant, with generally low rates of violent offending and higher rates of heterogeneity. Virtually all cases with above average rates of violent offending also have above average rates of heterogeneity. Cases with lower than average rates of violent offending

are distributed fairly evenly across low and high values on the heterogeneity index. Neighborhoods represent a considerable degree of variation across both axes.

Note that a cluster of four cases in the third quadrant appear to be outliers. These represent circles where offending rates are based on very few offenders.[60] Each of these cases has zero heterogeneity, i.e. offenders had the same mother-tongue. This is not typical of the dataset, as most circles contain a larger number of offenders (M=11.1, MED=6).

Figure 6C

MOBILITY AND VIOLENT OFFENDING



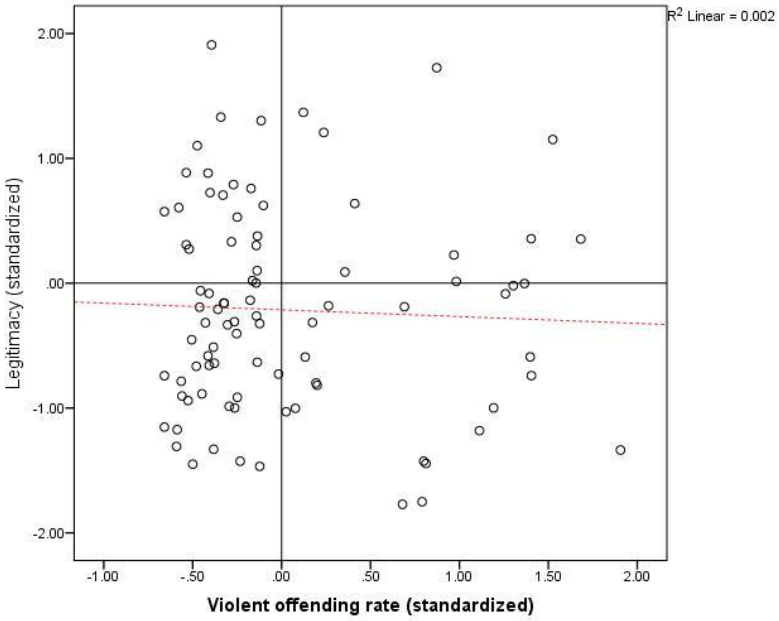
Residential mobility has been defined as the proportion male residents in a neighborhood. As described earlier the rationale for this definition is based on the importance of male, migrant workers in Karachi's social structures: neighborhoods with a more equal distribution of women and men suggest family oriented settlements, indicative of longer term residents. On the other hand, neighborhoods with predominantly male residents may indicate large proportion of migrant workers, who still have ties with their families in native villages, and therefore are

[60] Two of these cases were based on 2 offenders, while the remaining two were based on 3 offenders.

arguably shorter term residents and less well-tied to their neighborhood of residence.

Based on this definition, it would be expected that mobility would display a fairly uniform distribution. Instead, mobility is surprisingly well dispersed, with cases falling on all levels of the y-axis. In fact the two cases at the top of the fourth quadrant have proportion male residents as high as 71% and 68% respectively. Although some of this over-representation of men may be because of under-reporting to census authorities, this is still a surprisingly well dispersed distribution. Lower levels of violent offending appear to be slightly associated with lower levels of mobility (i.e. more equal distributions of males and females).

Figure 6D
LEGITIMACY AND VIOLENT OFFENDING



Legitimacy is also seen to display considerable variation across charge circles, as seen in figure 6D. Few cases are seen in the first quadrant, i.e. with high offending rates and high rates of legitimacy. Data are fairly uniformly distributed across the remaining three quadrants, suggesting that low legitimacy neighborhoods may see low or high offending rates, and neighborhoods with low offending rates may have low or high legitimacy measures. High

legitimacy areas generally display lower levels of violent offending. The negative slope of the linear fit line supports this relationship. This stands in contrast to coefficient signs for legitimacy observed when other predictors are controlled in multivariate models, discussed in chapter 5.

4.7 Conclusion

This is the first of three results-oriented chapters in this dissertation. The study dataset was based on three component datasets and data management and aggregation techniques as well as descriptive statistics for specific variables were discussed. Results support the robustness of the dataset. The dispersed nature of specific variables as well as bivariate scatter plots suggests that there is sufficient variation across variables to support neighborhood based studies such as the one undertaken in this dissertation. Further, bivariate correlation statistics suggest that independent variables are robust to multicollinearity. The next chapter presents results from multivariate modeling of the dependent variables.

CHAPTER 5

MULTIVARIATE REGRESSIONS ESTIMATING OFFENDING ACROSS KARACHI'S NEIGHBORHOODS

The purpose of this dissertation is to examine the ability of key social disorganization variables to explain offending patterns across Karachi. Further, competing explanations of offending are tested by including voting rates as an indicator of legitimacy in a multivariate model. The previous chapter presented descriptive statistics for key variables used in the study. This chapter estimates multivariate regression equations in an effort to quantitatively analyze the relationship between social disorganization variables and offending, and compare the predictive capacity of the traditional model with the more inclusive version, which includes legitimacy as an independent variable. Section 5.1 presents the statistical description of our modeling techniques. This is followed by sections 5.2 to 5.4, which present model results from weighted least squares, logged dependant, and negative binomial models respectively. Section 5.5 presents a summary of the results and sets the stage for a complementary set of structural equation analyses presented in chapter 6.

5.1 Regression Models

The objective of linear regression is to find the best, linear, unbiased estimator for a dependent variable. Ordinary least squares regression (OLS) does this by minimizing the sum of squared errors between the predicted value and the actual value of the dependent variable. Three key assumptions underlying the OLS technique require a) low correlations across predictors, b) no correlation across error terms, and c) constant variance across error terms. Data which violate

any of these assumptions do not meet criteria for OLS and resulting estimates may be biased.

Data on offending and social disorganization often do not lend themselves well to OLS techniques. In particular, the assumption of homoscedasticity is frequently violated. Sampson and Groves (1988) have used weighted least squares models (WLS), whereby each aggregate case is weighted by the square root of the sample size used in its construction. Following their precedent, results from WLS models on the dataset are presented in section 5.2. However, as will be shown, WLS results did not meet the assumption of homoscedastic errors. Therefore a series of OLS models using logged dependent variables was conducted, results from which are presented in section 5.3. The log transformation induces a normal distribution of the dependent variable failed to completely control for heteroscedasticity. To further control for this, a set of negative binomial models was estimated and results from these models are presented in section 5.4

Three dependent variables were estimated for each set of regressions: total offending (TOTAL), violent offending (VIOLENT), and robbery offending (ROBBERY). For each dependent variable, two models were assessed, excluding and including legitimacy (LEGITIMACY), respectively. Both models included the key social disorganization indicators – concentrated disadvantage (DISADVANTAGE), ethnic heterogeneity (HETEROGENEITY) and residential mobility (MOBILITY) as predictors. In total, therefore, results from eighteen regression models are presented in this chapter.

5.2 Weighted Least Squares (WLS) Regressions

A series of weighted least squares regressions was conducted to estimate the effects of concentrated disadvantage, ethnic heterogeneity, residential mobility and legitimacy on total, violent and robbery offending. As described in chapter three, these analyses seek to examine

effects of traditional social disorganization variables on offending, as well as a broader interpretation of the theory which incorporates political realities as well as structural constraints. Therefore two regression models were estimated for each dependent variable, excluding and including the legitimacy variable. Comparing the two models for each dependent variable allows for the assessment of the incremental value of including the legitimacy variable. Results are presented in table 16.

Table 16

WLS REGRESSIONS ESTIMATING EFFECT OF SOCIAL DISORGANIZATION AND LEGITIMACY ON OFFENDING[a]

	Total offending rate		Violent offending rate		Robbery offending rate	
	(1)	(2)	(3)	(4)	(5)	(6)
Disadvantage	.157*** (2.09)	.188*** (2.11)	.178*** (1.16)	.207*** (1.18)	.160** (.39)	.190*** (.40)
Heterogeneity	.318*** (7.88)	.326*** (7.801)	.307*** (4.38)	.315*** (4.35)	.296*** (1.48)	.304*** (1.47)
Mobility	.012 (67.13)	.064 (69.94)	-.029 (37.34)	.019 (38.98)	-.026 (12.64)	.024 (13.19)
Legitimacy		.161** (13.78)		.147** (7.68)		.153** (2.60)
Constant	-10.736 (36.15)	-66.01 (39.46)	10.73 (20.11)	-17.274 (21.99)	3.380 (2.81)	-6.439 (7.442)
Valid N	453	453	453	453	453	453
F	22.803***	20.227***	21.692***	18.829***	19.225***	17.134***
R2	.133	.153	.127	.144	.114	.133
Change in R2	.020		.017		.019	

***<0.001 **<0.01 *<0.05 (two tailed tests). Standard errors in brackets.

[a] Standardized regression coefficients presented for all variables except constant

As illustrated by the significance of the F statistics in table 16, each of the regression equations estimated was highly significant in explaining the variation in the outcome variable, when compared with a model containing the constant term alone. The results presented above clearly indicate that concentrated disadvantage and ethnic heterogeneity are statistically significant predictors for each of the dependent variables: total offending, violent offending, and

robbery. Consistent with the literature on social disorganization, increases in the concentration of poverty and ethnic diversity are associated with higher levels of offending. This is true when legitimacy is excluded (models 1, 3 and 5) and included (models 2, 4 and 6) in the model. Mobility is not a significant predictor for any of the models 1 through 6.

Results also indicate that legitimacy is a significant predictor of total offending, violent offending and robbery. When legitimacy is included in the models, the R square statistic - which represents the proportion of variance explained in the model - increases by between 13% and 15% over the original, for each of the dependent variables. This shows that including legitimacy represents a fairly substantial increase in the proportion of variance that the model is able to explain. Further, including the legitimacy variable does not diminish the coefficient size of the other variables. This suggests that the effect of the traditional predictors is not being mediated through legitimacy and that the predictive effect of legitimacy is complementary to that being offered by the other social disorganization variables of disorganization and heterogeneity.

5.2.1 Evaluating the assumptions of the WLS models

This section presents an evaluation of the assumptions underlying the validity and reliability of the WLS models. As described in the introduction to this chapter, there are generally three types of assumptions that affect the reliability of least square models: multicollinearity, autocorrelation and heteroscedasticity.

5.2.1.1 *Multicollinearity*

Multicollinearity refers to high correlations across independent variables. Excessive multicollinearity is problematic for the validity of the model because it increases the probability that a good predictor of the outcome will be found non-significant due to inflated standard errors (Field, 2005). Bowerman and O'Connel (1990) suggest that the variance inflation factor (VIF) is

a useful statistic to assess multicollinearity across models: if the largest VIF is greater than 10 or the average VIF is substantially greater than 1 there may be cause for concern. VIF statistics presented in table 17 suggest that data used in models 1 through 6 did not present problems of multicollinearity.

Table 17

VIF and DW STATISTICS FOR WLS MODELS[a]

	Models(1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Disadvantage	1.19	1.24	1.19	1.24	1.19	1.24
Heterogeneity	1.01	1.01	1.01	1.01	1.01	1.01
Mobility	1.19	1.32	1.19	1.32	1.19	1.32
Legitimacy		1.25		1.25		1.25
Average VIF	1.13	1.61	1.13	1.61	1.13	1.61
DW Statistic	1.951	1.961	1.935	1.948	1.902	1.919

[a] VIF statistics are dependent on the sample and not on the model, therefore values across all models are the same (N=453).

5.2.1.2 *Autocorrelation*

The presence of autocorrelation indicates a violation of the assumption that the error terms (difference between an estimated and observed value of the dependent variable) are independent. Autocorrelation is problematic for the generalizability of the model from the sample to the population. The Durbin Watson (DW) statistic is commonly used to assess this assumption. Values that are close to 2 are generally indicative of independent error terms, but specific critical values for this sample size (N) and number of variables (K) is slightly lower.[61] Results presented in table 12 illustrate that although DW statistics are fairly close to 2, they are not within the critical bounds and may represent low levels of autocorrelation. Section 5.3 describes OLS regressions using a logarithmic transformation on the dependent variable, which one way of inducing the normal distribution of the dependent variable, associated with randomly distributed errors.

[61] For models 1,3 and 5, critical values boundaries for dw_c (450, 4): 1.832 – 1.859; for models 2,4 and 6, critical values boundaries for dw_c (450, 5): 1.827 – 1.863 (Savin and White, 1977).

5.2.1.3 *Heteroscedasticity*

Heteroscedasticity refers to non-constant variance of the residual across the predictor variables. The absence of constant variance may indicate biased regression coefficients and limits the generalizability of the model. Heteroscedasticity has been noted as a problem for neighborhood analyses of offending, and its presence in our data is indicated by the funnel shaped plots in the figures 7A to 7F.

Figure 7A
HETEROSCEDASTICITY IN MODEL 1:
RESIDUALS & PREDICTED Y

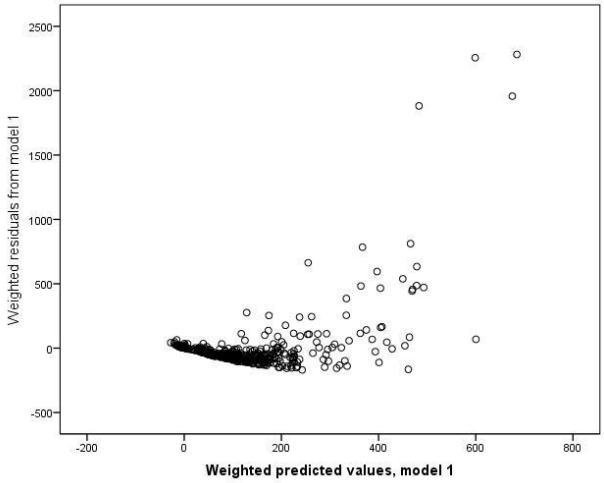


Figure 7C
HETEROSCEDASTICITY IN MODEL 3:
RESIDUALS & PREDICTED Y

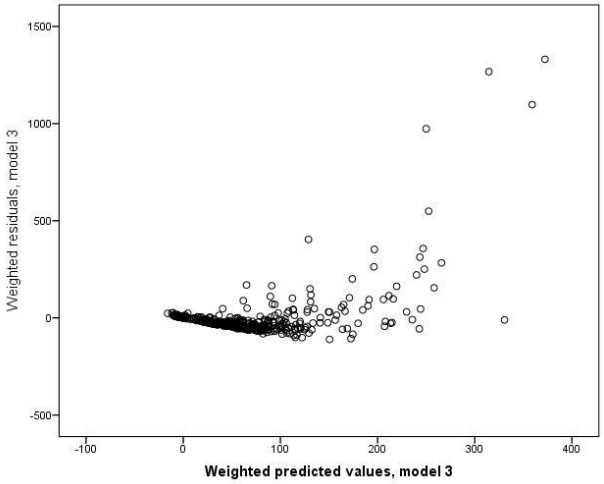


Figure 7B
HETEROSCEDASTICITY IN MODEL 2:
RESIDUALS & PREDICTED Y

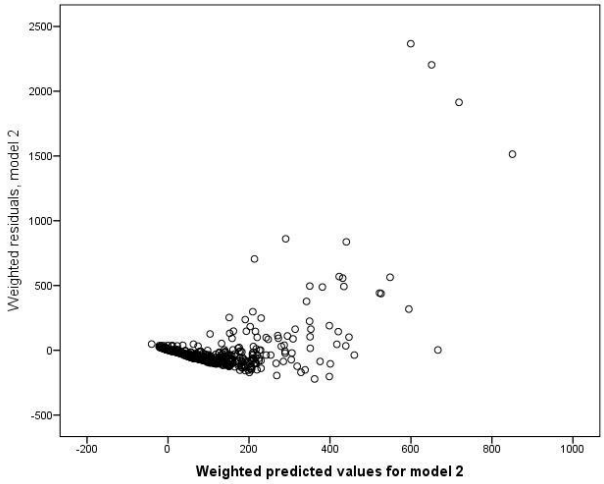


Figure 7D
HETEROSCEDASTICITY IN MODEL 4:
RESIDUALS & PREDICTED Y

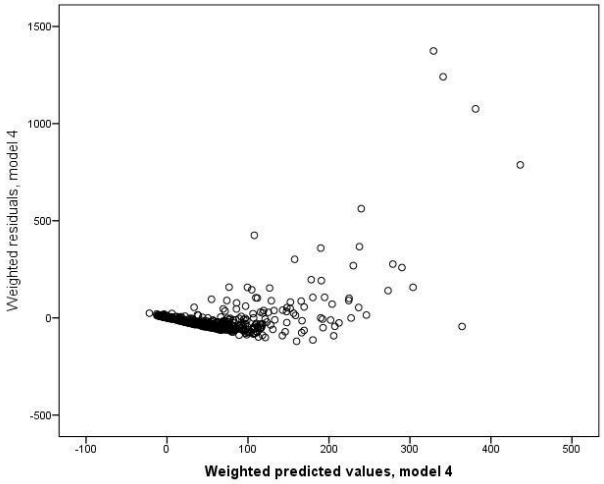


Figure 7E
HETEROSCEDASTICITY IN MODEL 5:
RESIDUALS & PREDICTED Y

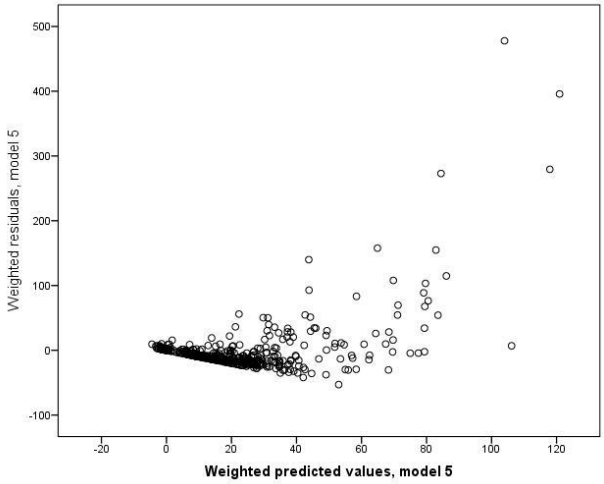
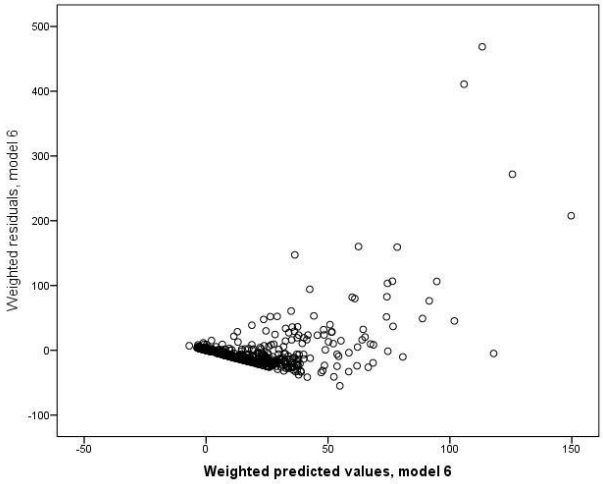


Figure 7F
HETEROSCEDASTICITY IN MODEL 6:
RESIDUALS & PREDICTED Y



The funnel shaped scatter plots indicate that error terms tend to have greater variance as the predicted values of the dependent variable increase. This is true for each of the three dependent variables: total offending (models 1 and 2), violent offending (models 3 and 4) and robbery (models 5 and 6). As noted, this is problematic for the generalizability of the model and should be addressed before results can be deemed reliable. However before steps can be taken to induce homoscedastic errors, the distribution of the residuals was further analyzed by plotting residuals from model 2 (which regresses total offending on heterogeneity, disadvantage, mobility and legitimacy) against the predicted value of the dependent variable in that model.[62] Resulting scatter plots are presented in figures 8A through 8D below

.

[62] Model 2 was selected for a deeper exploration of the source of heteroscedasticity because it is the most inclusive of the WLS series, including all offenses as the dependent, and all predictors as independent variables.

Figure 8A
IDENTIFYING SOURCE OF HETEROSCEDASTICITY IN MODEL 2: RESIDUALS & HETEROGENEITY

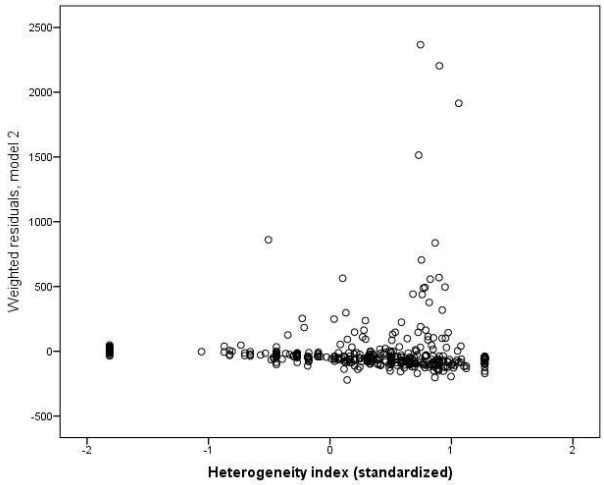


Figure 8C
IDENTIFYING SOURCE OF HETEROSCEDASTICITY IN MODEL 2: RESIDUALS & MOBILITY

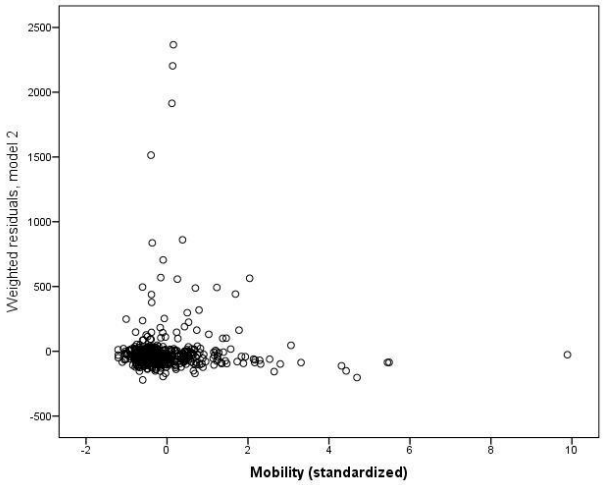


Figure 8B
IDENTIFYING SOURCE OF HETEROSCEDASTICITY IN MODEL 2: RESIDUALS & DISADVANTAGE

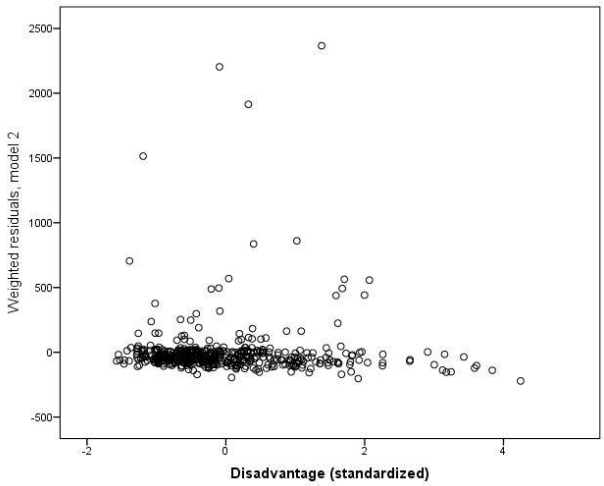
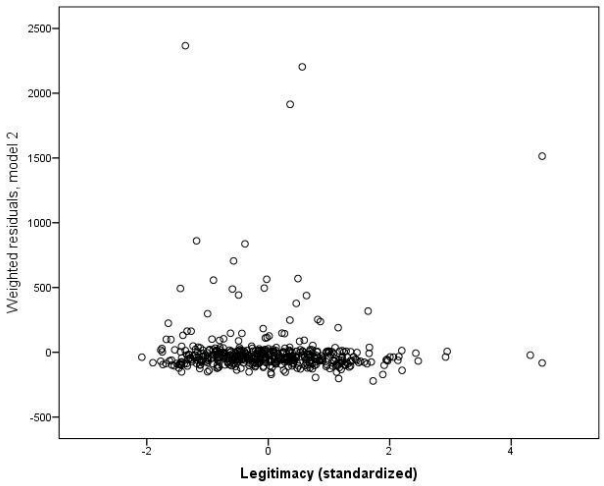


Figure 8D
IDENTIFYING SOURCE OF HETEROSCEDASTICITY IN MODEL 2: RESIDUALS & LEGITIMACY



The funnel shaped scatter plots observed in figure 8A display the relationship between residuals and heterogeneity. Lower variance in residuals is observed at lower levels of heterogeneity, while higher levels of heterogeneity are associated with wider dispersion (greater variance) in the error terms. This is the same pattern observed in figure 7A through 7F, suggesting that the heterogeneity variable may be the source of the non-constant variance in the

error terms.

In order to address the problems of autocorrelation and heteroscedasticity associated with the WLS models, a series of OLS regressions using a logarithmic transformation on the dependent variable was estimated. This transformation induces a normal distribution on the dependant variable in order to control heteroscedasticity. Results from OLS on the logged dependent variable are presented in section 5.3.

5.3 Ordinary Least Squares (OLS) with Logged Dependent Variables

Table 17 presents the standardized regression coefficients for the models estimated on log-transformed dependent variables. In these models, the dependent variable was transformed by taking its log, with a view to inducing a normal distribution of the dependent variable and eliminating problems of autocorrelation and heteroscedasticity, observed in the WLS series of models. This table requires careful interpretation: each standardized coefficient b_1 represents 10^{b1} SDs of an impact on the dependent variable, Y, given one SD increase in independent variable, X_1. For example, the coefficient of disadvantage in model 7 (B=0.121) represents an increase of $10^{0.121}$ SDs in the outcome (logged offending rate per 10,000; M=1.002, SD=.538) given an increase of one standard deviation in the concentrated disadvantage scale (M=0, SD=1). In other words, if disadvantage increases by 1 unit, we would expect the offending rate to increase by: $10^{0.121}$ SDs = 1.321 x 0.538 = 0.711 units.

Table 18

OLS REGRESSIONS ESTIMATING LOGGED DEPENDENT VARIABLES[a]

	LG(Total rate)		LG(Violent rate)		LG(Robbery rate)	
	(7)	(8)	(9)	(10)	(11)	(12)
Disadvantage	.121** (.024)	.139** (.024)	.190*** (.023)	.215*** (.023)	.220*** (.025)	.236*** (.025)
Heterogeneity	.473** (.068)	.481*** (.068)	.382*** (.074)	.391*** (.073)	.272*** (.085)	.280*** (.085)
Mobility	.055*** (.728)	.096* (.771)	-.022 (.781)	.029 (.832)	-.067 (.757)	-.034 (.815)
Legitimacy		.118** (.164)		.137** (.161)		.088 (.164)
Constant	.053 (.391)	-.468 (.437)	.629 (.417)	.044 (.468)	.720 (.406)	.403 (.463)
Valid N[b]	453	453	400	400	299	299
F	51.025***	40.471***	26.696***	24.411***	12.737***	10.082***
R2	.254	.265	.184	.198	.115	.121
Change in R2	.011		.014		.006	

***<0.001 **<0.01 *<0.05 (two tailed tests). Standard errors in brackets.

[a] Standardized regression coefficients presented for all variables except constant

[b] Note that N decreases as zero value dependents have undetermined logs and are excluded from analyses

Similarly, the coefficient of heterogeneity (M=.587, SD=.323) in model 7 (B=.473) represents an increase in the outcome by $10^{0.473}$ SDs. Therefore, if heterogeneity increased by .323 units, we would expect the offending rate to increase by:

$10^{0.473}$ SDs = 2.972 x 0.538 = 1.599 units. See appendix 2 for standard deviations for all model-variables.

Results in table 18 broadly support the WLS models presented in table 18. As in the results from WLS, concentrated disadvantage and ethnic heterogeneity exhibit a consistent and highly significant impact on total, violent and robbery offending. Also, as seen earlier, coefficient sizes for these variables do not shrink when legitimacy is added to the model, in fact they display small increases. Finally, the proportion of variance explained by the legitimacy-

inclusive models continues to be slightly higher than when models do not include legitimacy.

The logged dependent models in table 18 are, however, different from the WLS models in two important respects. First, the mobility variable attains significance as a predictor of total offending. Increases of one standard deviation in mobility are associated with increases of between $10^{0.055}$ and $10^{0.096}$ standard deviations in logged total offending in models 7 and 8, respectively. This is consistent with traditional theory, which predicts higher offending in areas with higher residential mobility.

Another important difference when the log-dependent models are compared with WLS models of offending is that the significance of the legitimacy variable diminishes for robbery. However, it retains its significance in the prediction of total and violent offending.

To further evaluate logged dependent models, their tenability for multicollinearity, autocorrelation and heteroscedasticity are evaluated below.

5.3.1 Assessing model assumptions

One of the reasons for conducting the series of logged-dependent regressions described in section 5.3 was to improve the adherence of the model to the key OLS assumptions of non-correlated predictors, independent error terms, and constant variance of the residuals. Table 18 displays VIF and DW statistics for the logged dependent models. Low VIFs indicate that multicollinearity is affecting the validity of these models. However, the DW statistics for models 7 through 10 fall outside the critical bounds, suggesting that low levels of autocorrelation persist for estimations of total and violent offending.[63]

[63] For models 1,3 and 5, critical values boundaries for dw_c (450, 4): 1.832 – 1.859; for models 2,4 and 6, critical values boundaries for dw_c (450, 5): 1.827 – 1.863 (Savin and White, 1977).

Table 19

VIF AND DW STATISTICS FOR LOG-DEPENDENT OLS MODELS

	Model (7)	Model (8)	Model (9)	Model (10)	Model (11)	Model (12)
Disadvantage	1.156	1.187	1.155	1.197	1.155	1.193
Heterogeneity	1.003	1.009	1.011	1.016	1.007	1.017
Mobility	1.157	1.312	1.166	1.343	1.162	1.353
Legitimacy		1.247		1.295		1.309
Average VIF	1.1053	1.189	1.111	1.213	1.108	1.218
DW statistic	1.964	1.984	1.987	1.993	1.857	1.834

Furthermore, an examination of scatter plots of standardized residuals against the predicted values of Y (9A through 9F), shows that for models 7 through 10, the dispersion of the residual generally increases as predicted values increase. In models 11 and 12, however, the dispersion of residuals appears to be more random. This suggests that that while heteroscedasticity has improved, particularly for robbery offending (figures 9E and 9F), it continues to be a problem for the estimation of total and violent offending (9A through 9D).

Figure 9A
HETEROSCEDASTICITY IN MODEL 7:
RESIDUALS & PREDICTED Y

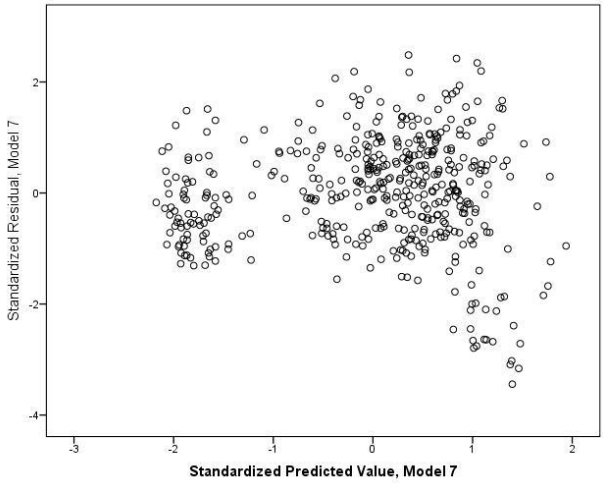


Figure 9B
HETEROSCEDASTICITY IN MODEL 8:
RESIDUALS & PREDICTED Y

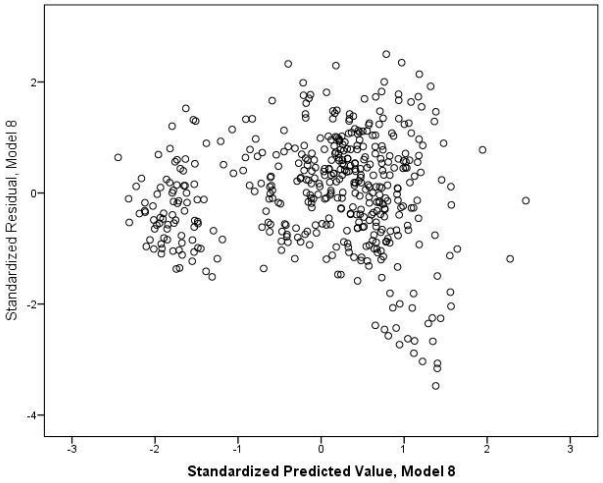


Figure 9C
HETEROSCEDASTICITY IN MODEL 9:
RESIDUALS & PREDICTED Y

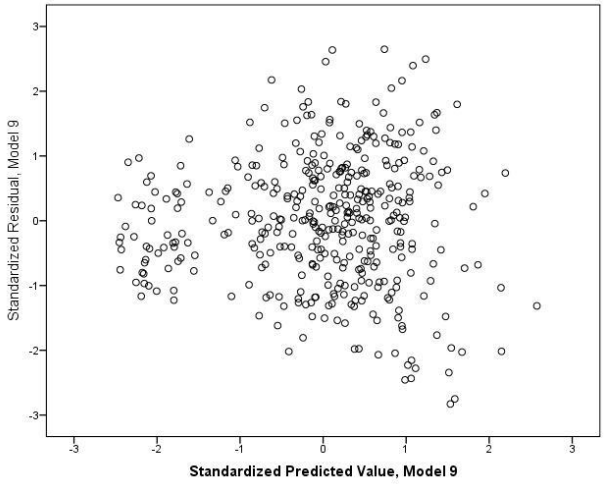


Figure 9E
HETEROSCEDASTICITY IN MODEL 11:
RESIDUALS & PREDICTED Y

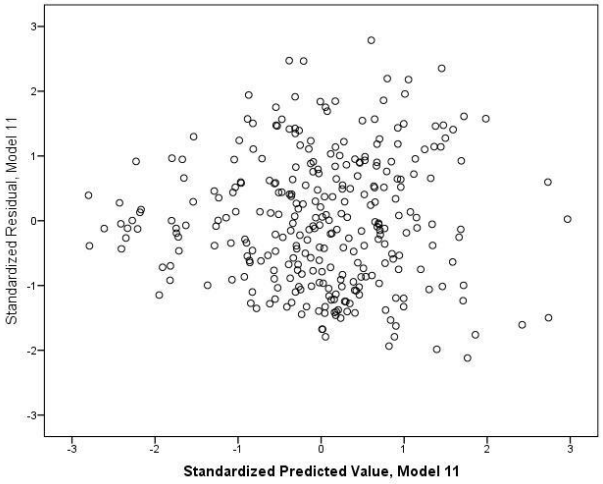


Figure 9D
HETEROSCEDASTICITY IN MODEL 10:
RESIDUALS & PREDICTED Y

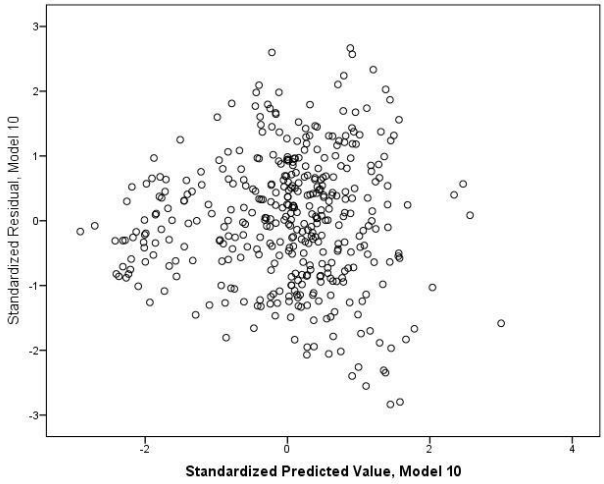
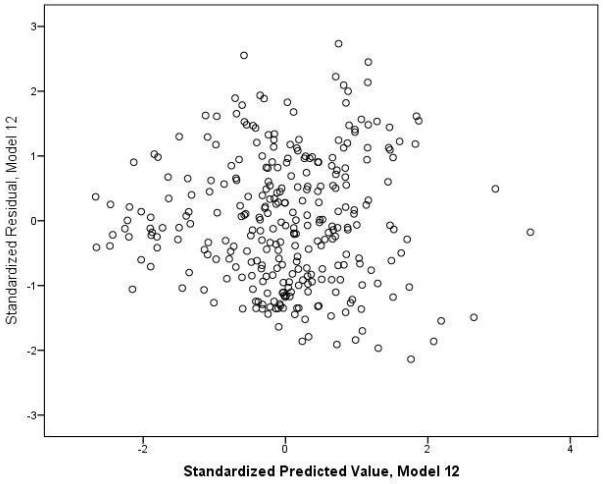


Figure 9F
HETEROSCEDASTICITY IN MODEL 12:
RESIDUALS & PREDICTED Y



Despite logging the dependent variable to induce its normal distribution, heteroscedasticity, and mild autocorrelation continue to surface in the results. Further, reduced sample sizes for this series may have contributed to a lack of significance for key predictors (see Ns in table 17). This lead to the estimation of a third set of models, using negative binomial techniques consistent with non-normal distributions of the dependent variable.

5.4 Negative Binomial Regressions

Negative binomial models allow for the estimation of non-normal dependent variables in count form. Estimating models which more closely resemble the distribution of the data reduce the chance that OLS assumptions will be violated. Dependent variables for these models are therefore counts, and not rates, as previously used. To control for the size of a circle, circle population (Population) has been used as a control variable in these models.

Table 20 presents results from a series of six negative binomial regressions, estimating counts of total offending, violent offending and robbery. As before, the models estimated for each dependent variable first exclude, and then include legitimacy as a predictor.

Table 20

NEGATIVE BINOMIAL MODELS ESTIMATING COUNTS OF OFFENDING ACROSS CHARGE-CIRCLES[a]

	Total_count		Violent_count		Robbery_count	
	(13)	(14)	(15)	(16)	(17)	(18)
Disadvantage	1.174*** (.056)	1.214*** (.058)	1.230*** (.058)	1.270*** (.060)	1.190** (.065)	1.227** (.074)
Heterogeneity	11.426** (.176)	11.650** (.176)	10.834*** (.189)	11.013*** (.189)	8.778*** (.224)	8.933*** (.225)
Mobility	2.30 (1.777)	7.846 (1.911)	.303 (2.028)	1.270 (2.166)	.628 (2.178)	2.610 (2.304)
Legitimacy		2.264* (.350)		2.275* (.359)		2.466* (.402)
Population	1.000*** (0.00)	1.000*** (0.00)	1.000*** (0.00)	1.000*** (0.00)	1.000*** (0.00)	1.000*** (0.00)
Constant	.833 (.960)	.313 (1.076)	1.351 (1.084)	.456 (1.207)	.333 (1.173)	.110 (1.293)
Valid N	453	453	453	453	453	453
LRχ^2	222.3,4***	228.0,5***	201,4***	207.0,5***	144.2,4***	149.4,5***
DEVIANCE	.862	.851	1.055	1.045	1.168	1.159

***<0.001 **<0.01 *<0.05 (two tailed tests).

[a] Standardized coefficients, exp(β) presented for all variables. Standard errors in brackets.

Negative binomial models are highly significant when compared with models containing the intercept term only, indicated by the highly significant χ^2 for the likelihood ratio. Deviance

statistics being close to 1 indicate that the negative binomial distribution is a good fit for these data.[64] Results for negative binomial models are generally consistent with results observed earlier. Concentrated disadvantage, heterogeneity and legitimacy are consistently, significantly and positively predictive of total, violent and robbery offending. In addition, circle population is also highly significant, as would be expected since the dependent variables for this set of models is counts of offenses by circle. Residential mobility is positive, but not significant. As before, inclusion of the legitimacy variable does not limit the size or significance of other social disorganization variables.

5.4.1 Assessing residuals for negative binomial models

As noted earlier, the advantage of using negative binomial techniques is that they cater to non-normal, over-dispersed data and do not require homogeneous error terms. Instead, error variance is expected to be a function of the predicted number of offenses. This relationship is evident in figures 10A through 10D which display the association across standardized residuals and the predicted value of mean response.

[64] Additional tests of normality as well as BIC support the use of these models.

Figure 10A
HETEROSCEDASTICITY IN MODEL 13: RESIDUALS & PREDICTED VALUE OF MEAN RESPONSE

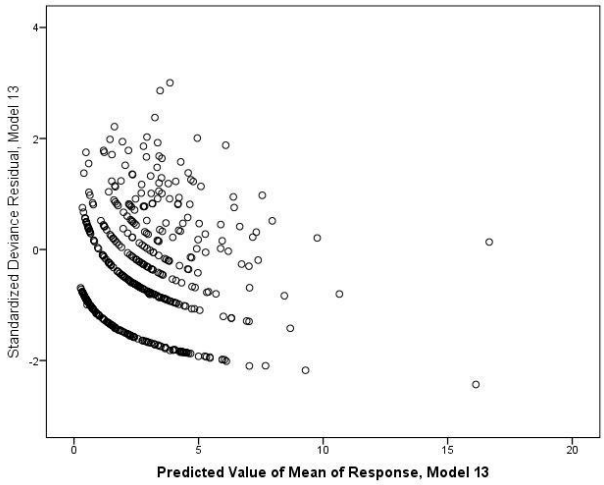


Figure 10B
HETEROSCEDASTICITY IN MODEL 14: RESIDUALS & PREDICTED VALUE OF MEAN RESPONSE

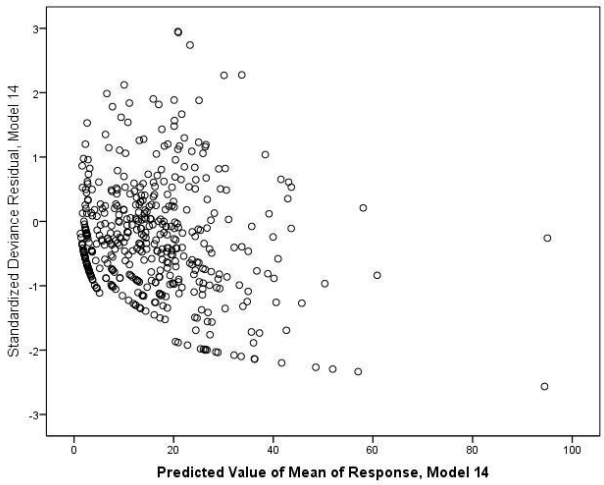


Figure 10C
HETEROSCEDASTICITY IN MODEL 15: RESIDUALS & PREDICTED VALUE OF MEAN RESPONSE

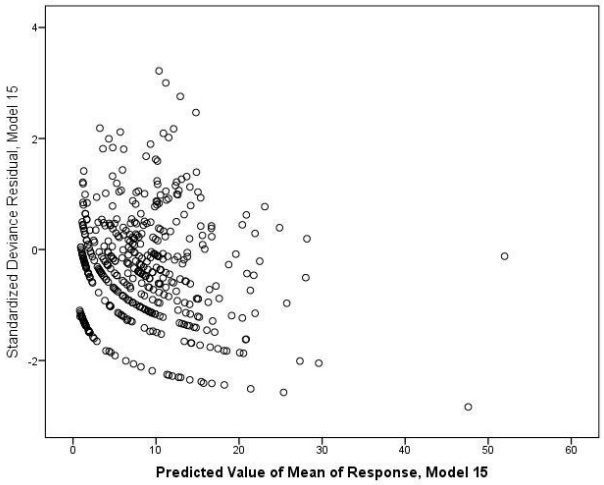


Figure 10D
HETEROSCEDASTICITY IN MODEL 16: RESIDUALS & PREDICTED VALUE OF MEAN RESPONSE

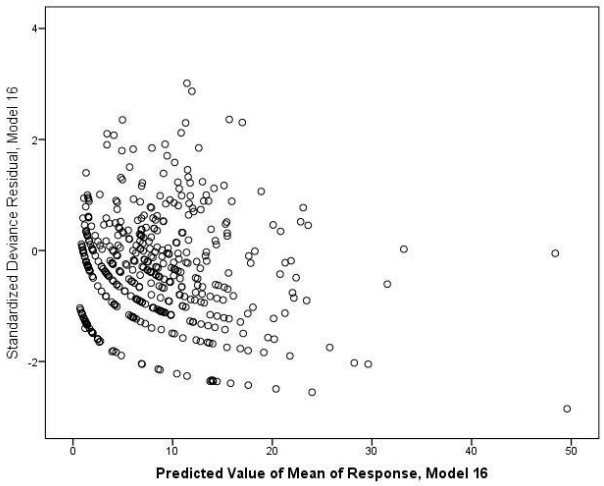


Figure 10E
HETEROSCEDASTICITY IN MODEL 17: RESIDUALS & PREDICTED VALUE OF MEAN RESPONSE

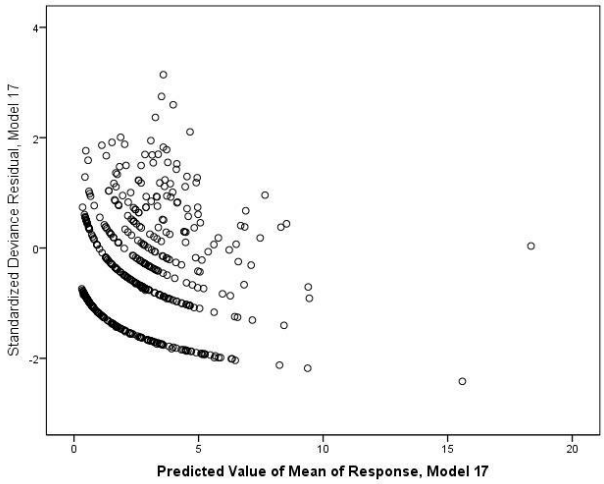
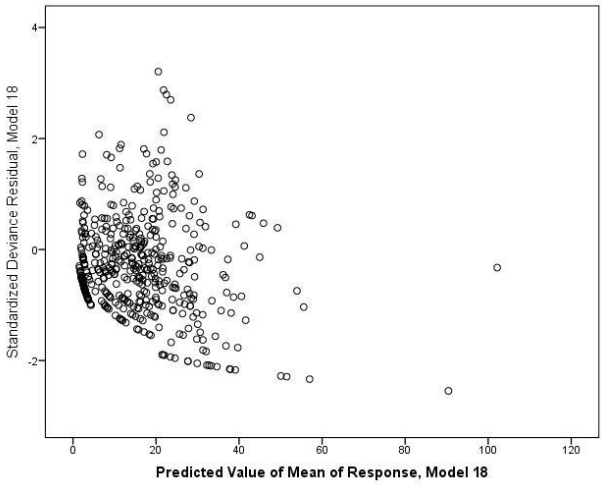


Figure 10F
HETEROSCEDASTICITY IN MODEL 18: RESIDUALS & PREDICTED VALUE OF MEAN RESPONSE



5.5 Summary

Chapter 5 described results from multivariate regressions for total, violent and robbery offending. For each dependent variable, two types of models were assessed. The first model included only traditional social disorganization variables – concentrated disadvantage, ethnic heterogeneity and residential mobility. The second model extended the traditional version to include state legitimacy, assessed based on the extent of residents' involvement in elections.'

In order to induce robust errors, three series of regression models were estimated. The first was based on WLS techniques whereby each case was weighted by the sample size used to compile the aggregate for the case. Results from this technique violated assumptions related to independent and homoscedastic errors. The second series attempted to control for these limitations by inducing the normal distribution of the dependent variable through a logarithmic transformation. However, this failed to eliminate the problems of autocorrelation and heteroscedasticity. Further, sample sizes used in this analysis were severely curtailed because of

the high occurrence of zeros for violent and robbery offending dependent variables. In response to these problems, a series of negative binomial regressions was estimated. This technique does not assume constant variance of the error term and instead expects error terms to be associated with the predicted value of mean response. This assumption is being upheld.

Coefficient sizes and significance values for predictors differ somewhat across the three series of estimations. Concentrated disadvantage and ethnic heterogeneity are consistently, positively, and significantly associated with total, violent and robbery offending. The legitimacy variable also maintains a significant positive coefficient in all models except 11 and 12. On the other hand, residential mobility maintains a positive coefficient, but is generally not signficant. Such ambiguity is not uncommon in estimations of neighborhood effects on offending, and some researchers have adopted the use of confirmatory structural equation techniques to further validate results from multivariate regressions. These include the path analyses presented in the next chapter.

CHAPTER 6

STRUCTURAL EQUATION MODELS OF TOTAL OFFENDING

The previous chapter presented considerable evidence of interconnectedness between traditional social disorganization variables – concentrated disadvantage, ethnic heterogeneity and residential mobility - and legitimacy, as indicated by voting rates, on the one hand, and offending rates on the other, across Karachi's neighborhoods. Results consistently support the ability of concentrated disadvantage and ethnic heterogeneity in predicting robbery, violent offending and total offending. Results also indicated that legitimacy helped explain offending, but did not support its mediation effect.

However the models presented in chapter 5 were limited in some important ways. In particular, more evidence is needed to explain how legitimacy fits in the complex model. Also, methodological constraints in estimating skewed dependent variables further hindered consistent estimates. In this chapter I evaluate theorized and hypothesized models of offending using structural equation models. Structural equation models (SEM) allow for the simultaneous estimation of multiple, multivariate regression models. This technique allows for a dependent variable in one model to serve as an independent variable in another. In this sense, it allows the questions addressed in chapter 5 to be estimated using a different set of analytical tools.

The following section presents an overview of general SEM techniques. Section 6.2 presents the analytical methods employed in this chapter, as well as illustrations of estimated models. In section 6.3 I present results from these estimations. Finally, a chapter summary is presented in section 6.4.

6.1 Structural Equation Models (SEM)

As noted by Fox (2002), SEM has been critiqued as portraying the legitimacy of causal explanations of theoretical relationships across variables which employ, in fact, the same or similar explanations to descriptions of effect size and significance in traditional multivariate modeling. Like multiple regressions, this technique cannot prove causation (Kline, 2011:8). As Fox states, the interpretation of effect size and model fit in SEM is subject to similar constraints as more traditional multivariate regressions. However, the ability of SEM to allow the simultaneous estimation of several multivariate equations reflects the way social scientists often think about their theories (Fox, 2002:1). Therefore this technique lends itself well to the testing of complex, multi-equation research models. As a result, SEM analysis is a useful companion to traditional multivariate modeling.

6.1.1 Structural equation studies in social disorganization

A variety of recent studies have used SEM to examine specific causal links within the broader social disorganization framework. Kohen *et al* (2008) found evidence which supported their multivariate equation model testing the importance of family stress and social disorganization in predicting children's verbal and behavior outcomes (Kohen *et al*, 2008: 156). The study was based on three waves of data from the Canadian National Longitudinal Survey of Children and Youth (Kohen *et al*, 2008: 158). Chan *et al* (2011) assessed the impact of socio-economic status on volunteerism by selecting a cross-sectional sample of volunteers from the association of Taichung City Community Development Volunteers in Taiwan (Chan *et al*, 2011: 481). Onder (2011) examined the causes of changes in public trust in government in the United States between 1953 and 1998, using structural equation models applied to data from the National Election Study (Onder, 2011: 157). Ferguson and Mindel (2006) used this technique in

estimating the impact of collective efficacy and social capital on neighborhood fear of crime in Dallas (Fergus and Mindel, 2006). Their study was based on a large, cross-sectional survey of residents in Dallas neighborhoods. Deng *et al* explored the extent to which family processes mediate the effect of neighborhood disadvantage on youth adjustment (Deng et al, 2006). There is therefore considerable geographical and methodological variation for recent applications of SEM to social disorganization.

Interpretation of results from these studies has, similarly, been varied. Some studies have emphasized the importance of the causal links they have uncovered through their research (Kohen et al 2008, Onder 2011). Given recent discussions on causation in structural equation modeling (Markus, 2010), these studies may be misguided in the certainty of their conclusions, even if they draw on longitudinal research designs. In addition to that on causation, there is also an active debate in the SEM literature regarding indicators of model fit (see Barrett 2007, Hayduk 2007 and Bentler 2007) and standardization of reporting practices (Kline, 2011). Given these debates, a more cautious interpretation, such as that put forth by Lee (2004), is more prudent. Presenting evidence in support of Akers social learning and social structures theory (1998), Lee *et al* write, "The findings tend to support the theoretical expectations, but caveats and limitations of the study are outlined that have implications for future research to test the theory more fully." (Lee *et al*, 2004:17). Such caution is well-merited, and is employed in the discussion of results in this chapter.

6.1.2 A brief overview of SEM

6.1.2.1 *Analytical basis*

SEM is based on the analysis of the covariance structure underlying a dataset. As such, a SEM model approximates the covariance matrix, and not any one dependent variable. SEM may

also be used to approximate means, particularly through the explicit use of intercepts in a model, but, given the exploratory nature of this study, this is beyond the requirements of this project. Statistically, SEM is an extension of the general linear model and uses techniques similar to ANOVA tests in its maximum likelihood estimation of results.

A key assumption for most SEM methods is that the covariance matrix to be analyzed should be positive definite (Kline, 2008:49). This means that a) the matrix will be invertible, i.e. nonsingular; b) all eigenvalues in the matrix, which represent the proportion of variance explained by a corresponding eigenvector (linear combination of variables), should be greater than zero; c) the determinant of the matrix is not zero, and d) none of the correlations or covariances in the matrix should be out of bounds, i.e. have a mathematically impossible value. In order to ensure a positive definite data matrix, the dataset must be evaluated on the basis of several considerations, including collinearity (excessive correlation) across variables, outliers, missing data, multivariate normality, univariate normality, linearity and homoscedasticity (the uniform variance of error terms). Violation of any one of these considerations may cause the analysis to fail.

6.1.2.2 *SEM techniques*

SEM allows the estimation of several different types of models, of which two are most commonly used – confirmatory factor analysis (CFA), and structural regression (SR). CFA is used in SEM the same way it is used in traditional multiple regression – to consider the loadings of observed (exogenous) variables on an unobserved (latent) construct. Also resembling traditional multiple regression, SR predicts the effect of predictor variables upon an outcome, which may be observed or latent. Unlike traditional methods, however, SEM facilitates the simultaneous estimation of multiple outcomes simultaneously. Path models are often used to

display SEM relationships and the models estimated in this chapter are presented in the following section. A fundamental requirement of both CFA and SR in SEM is that the model be identified, i.e. the number of known pieces in a model is equal to or greater than the number of unknown pieces. Saturated models – those for which the number of known items equals the number of unknown items – fit the data perfectly, and therefore probability values for goodness of fit statistics and effect size are unreliable. In practice this consideration may influence the nature of the models to be estimated.

6.1.2.3 *Evaluating results from SEM*

It should be noted that directionality cannot be imputed in results from SEM through any means other than theoretical relationships. The estimate of the impact of legitimacy on offending, for example, may in fact be measuring the reverse, i.e. the impact of offending on legitimacy. It should also be noted that SEM cannot be used to confirm a model (i.e. prove causation). However, goodness of fit indices can be used to distinguish a bad model, which does not fit the data, from a better model. (Kline, 2011:8). When SEM is used for exploratory analysis, as in this chapter, this becomes less of a consideration, as the objective of the analysis is to evaluate the hypothesized relationships with reference to the null. The consideration of goodness of fit indices in conjunction with and of direct, indirect and total effect size is important for this purpose.

6.2 SEM Analytical Methodology

Additional data screening was undertaken for the SEM analysis. From the original sample of n=453 described previously, outliers were identified using Mahalanobis distances of greater than 26, and such cases were eliminated from the sample (n=17). Data were screened for skewness and kurtosis, and due to excessive non-normality (greater than two standard deviations in

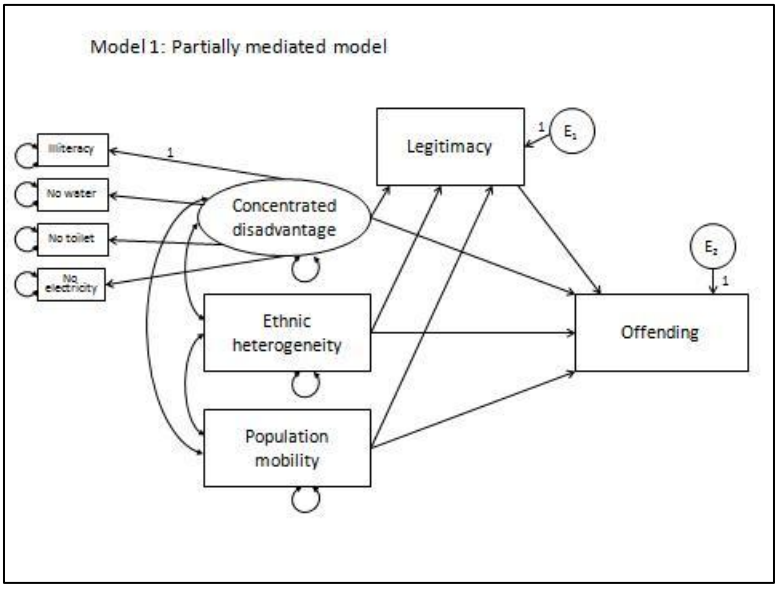
skewness and kurtosis ratios) in the offending, no water, and no electricity variables, these were transformed using logarithms. Listwise deletion was employed, leading to the elimination of 8 cases which could not be estimated due to the aforementioned transformation. This lead to a total sample of n=428.

An examination of variances across study variables showed that the ratio of the greatest to the least variance was greater than 100. Therefore, four variables were scaled by a factor of 5 to ensure scaled variances (these were illiteracy, no water, no toilet, and legitimacy).

The open-source software R (version 2.13.0, copyright, The R Foundation for Statistical Computing) was used for all analyses. Path diagrams illustrating the estimated structural regression models were created in Microsoft Powerpoint.

Four models were estimated in this chapter. Each model presents an alternate view of the relationship across social disorganization, legitimacy, and offending. The first model describes a partially mediated relationship between social disorganization variables – concentrated disadvantage, residential mobility, and ethnic heterogeneity – and offending.

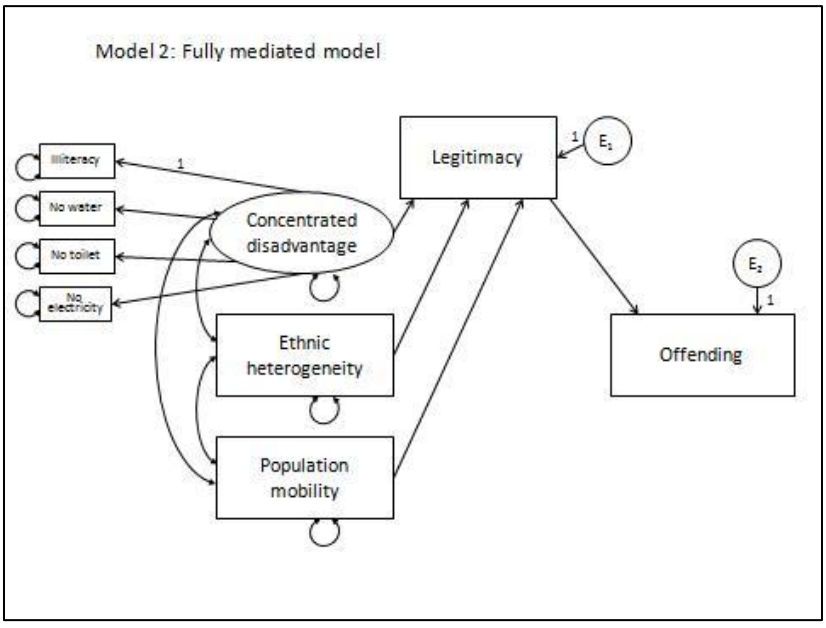
Figure 11
Model 1: Partially mediated model of total offending



As displayed in figure 11, legitimacy acts as a mediator in the relationship between social disogranization variables and offending, but also allows for these variables to have a direct effect on offending. The curved arrows in the model indicate the estimated variances and covariances across exogenous predictors, and, in the case of the endogenous outcomes (legitimacy and offending), associated estimated residuals (E). Straight lines indicate effects. Rectangular boxes indicate observed variables, whereas the latent variable, concentrated disadvantage, is displayed in an elipse.

In figure 12, model 2 expresses a reduced form of the relationship between the variables which suggests that the impact of social disorganization on offending occurs entirely through legitimacy. In essense the model holds the direct effects between social disorganization and offending (see model 1) to zero.

Figure 12
Model 2: Fully mediated model of total offending

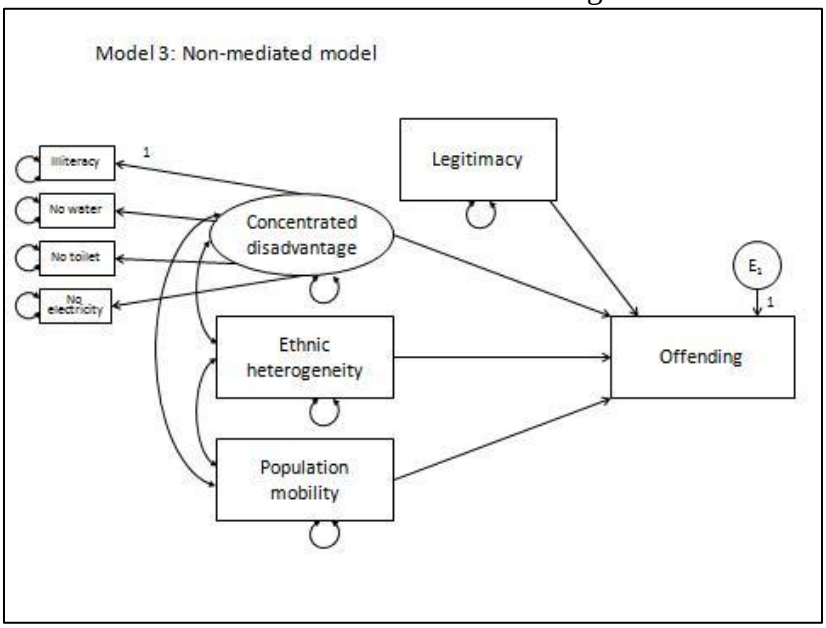


Model 2 suggests that while concentrated disdvantage, ethnic heterogeneity and population mobility are important determinants of offending, their impact is only evident when legitimacy is

included as a mediating variable, i.e. social disorganization variables have only indirect effects on offending.

In figure 13, model 3 presents an alternative to model 1 and 2 – i.e. that social disorganization variables have only direct effects on offending, as does legitimacy. In this model legitimacy is considered to be a simple predictor, and is exogenous to (i.e. not estimated by) the model. Direct relationships between social disorganization factors and legitimacy are fixed to zero.

Figure 13
Model 3: Non-mediated model of total offending: direct effects only



This model provides the opportunity to re-assess several direct effects presented in chapter 5. The next section presents fit measures for each of the models described above.

6.3 Results from SEM Analysis

Models 1, 2 and 3 were estimated using the SEM package within R. Model 3 was then respecified based on modifications suggested by the software. Results for this respecified model are presented in model 4. Sample size for all models is N=428.

Table 21 presents unstandardized parameter estimates and goodness of fit for SEM models 1 through 3. Overall, the models do not fit the data well, indicated by the low p-value of the chi-square statistic (for SEM models, low significance for the chi-square indicate high significance of the estimated model). The RMSEA statistic is also indicative of poor fit. RMSEA indicates the amount of ill-fit of the model proportional to the model degrees of freedom, and values of 0.05 or less are acceptable. Even the 90% confidence interval for the RMSEA is higher than desirable, and therefore preclude the chance that the population parameter for RMSEA is more robust. CFI indicates the proportion of variance explained by the model relative to the baseline model – an automatically generated model which has near-perfect fit - and as illustrated in table 21, this index is worsening over the course of the specification from model 1 through model 3 (acceptable values for CFI are generally greater than .95). The goodness of fit index, which represents the proportion of explained variance in the covariance matrix, also decreases from .970 to .973; this decline is also observed when the GFI is adjusted for sample size.

Table 21

PARAMETER ESTIMATES & GOODNESS-OF-FIT FOR HYPOTHESIZED SEM MODELS

	Endogenous / latent variable	Exogenous variable	Model 1 Partially mediated	Model 2 Fully mediated	Model 3 Non-mediated
	Offending				
1		Disadvantage	.117*	NA	.119*
2		Heterogeneity	.762***	NA	.789***
3		Mobility	1.632	NA	1.519
4		Legitimacy	.083*	-0.038	.077*
	Legitimacy				
5		Disadvantage	-0.241***	-0.242***	NA
6		Heterogeneity	-0.144	-0.144	NA
7		Mobility	-12.689***	-12.689***	NA
	Disadvantage (latent estimation)				
8		Illiteracy	Fixed to 1	Fixed to 1	Fixed to 1
9		No water	2.349***	2.370***	2.461***

10		No toilet	.439***	.439***	.453***
11		No electricity	.519***	.522***	.544***
df			14	17	17
χ^2 statistic (p-value)			52.55 (0.00)	176.21 (0.00)	203.31
RMSEA statistic (90% CI)			0.080 (.058-.104)	0.148 (.129-.168)	.160 (.141-.180)
Bentler Comparative Fit Index (CFI)			0.953	0.807	0.774
Goodness of fit index (GFI)			0.970	0.913	0.903
Adjusted goodness of fit (AGFI)			0.922	0.817	0.795

***p<.0001 **p<0.001 *p<.05

It is important to keep in mind the low significance of the overall model when interpreting the fairly highly-significant values of the individual parameters. Concentrated disadvantage, ethnic heterogeneity and legitimacy were significant in determining offending. On the other hand, the relationship between mobility and offending was not significant. Note that legitimacy only attains significance when social disorganization variables are included in the model, i.e. line 4, models 1 and 3. Concentrated disadvantage and ethnic heterogeneity also have a consistently significant relationship with legitimacy. The magnitude of direct effects is comparable across the three models. A comparison across models 1 and 2 suggest that legitimacy does not mediate the relationship between social disorganization variables and offending, indicated by the stability of coefficients in lines 7 through 9 of table 21.

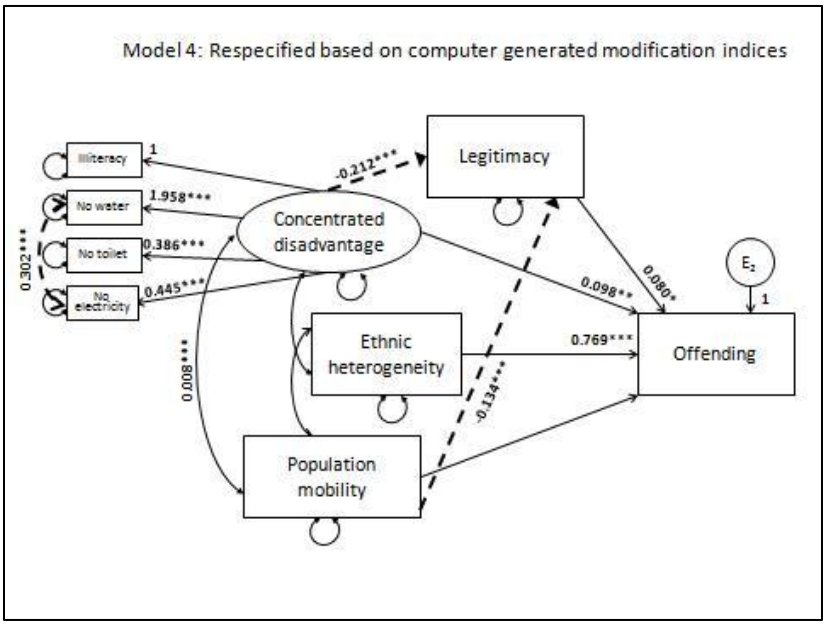
6.3.1 *Improving model fit using modification indices*

Modification indices are statistical assessments of relationships which could improve the fit of the overall model. SEM generates these indices in order to suggest relatinships which may not have been originally specified. In this case, modification indices from model 3 were used to create a respecified model, which presented a better fit to the data. It should be noted that the respecified model, model 4, is limited in its generalizability since relationships are based on what is seen in the data, although they do have theoretical resonance.

Modification indices suggested three additional parameters which, if included in model

specification, could improve model fit: a) no water and no electricity, b) disadvantage and legitimacy, and c) mobility and legitimacy. Parameters were added using a covariance for a) and direct effects for b) and c), as illustrated by the dotted lines in figure 14 below.

Figure 14
Model 4: RESPECIFIED USING MODIFICATION INDICES



Based on modification indices generated through model 3; only magnitudes of significant covariances and direct effects are illustrated
*** p<0.0001, ** p<0.001, * p<0.05

Coefficients and goodness of fit measures for model 4 are presented in table 22. As expected, model fit improved dramatically. At the same time, results are interpreted with caution since these measures, acceptable, do not adequately represent a well fitting model, and are, as mentioned before, based on modification indices.[65]

[65] Also see appendix 3 for standard deviations for model variables.

Table 22

PARAMETER ESTIMATES & GOODNESS-OF-FIT FOR RESPECIFIED MODEL 4

			Model 4		
	Endogenous / latent variable	Exogenous variable	Unstandardized estimate	Standard error	Standardized estimate
	Offending				
1		Disadvantage	.099*	.033	.157
2		Heterogeneity	.769***	.068	.475
3		Mobility	1.891	1.375	.071
4		Legitimacy	.080*	.037	.108
	Legitimacy				
5		Disadvantage	-.212***	-.043	-.252
6		Mobility	-13.429***	1.685	-.378
	Disadvantage (latent estimation)				
7		Illiteracy	1		.994
8		No water	1.958***	.208	.554
9		No toilet	3.857***	.060	.343
10		No electricity	.444***	.041	.599
df			14		
χ^2 statistic (p-value)			36.707 (0.0008)		
RMSEA statistic (90% CI)			0.062 (0.038 – 0.086)		
Bentler Comparative Fit Index (CFI)			0.972		
Goodness of fit index (GFI)			0.980		
Adjusted goodness of fit (AGFI)			0.948		

Standardized coefficient estimates show that heterogeneity, concentrated disadvantage, mobility and legitimacy have a direct effect on offending. Specifically, a one SD increase in heterogeneity leads to a 0.48 SD increase in offending (line 2); an increase of one SD in concentrated disadvantage leads to 0.16 SD increase in offending. Similarly, a one SD increase in legitimacy leads to a 0.11 SD increase in offending. The effect of mobility on offending is not significant. Further, a one SD increase in disadvantage leads to a 0.25 SD decrease in legitimacy, while a similar increase in mobility results in a 0.38 decrease in legitimacy. Because of the significance of these two relationships, it is useful to estimate the extent to which these variables

affect offending as a result of their impact on legitimacy, i.e. their indirect effects.

6.3.1.1 *Measuring indirect effects of mobility and disadvantage on offending*

Indirect effects were estimated using the Monte Carlo method (Selig and Preacher, 2008). The indirect effect of mobility on offending was found to be significant at the 95% confidence level (M=-1.05; LL=-2.132, UL = -0.105) (figure 15). On the other hand, the indirect effect of disadvantage on offending was not found to be significant (figure 16).

Figure 15
INDIRECT EFFECT OF MOBILITY ON OFFENDING

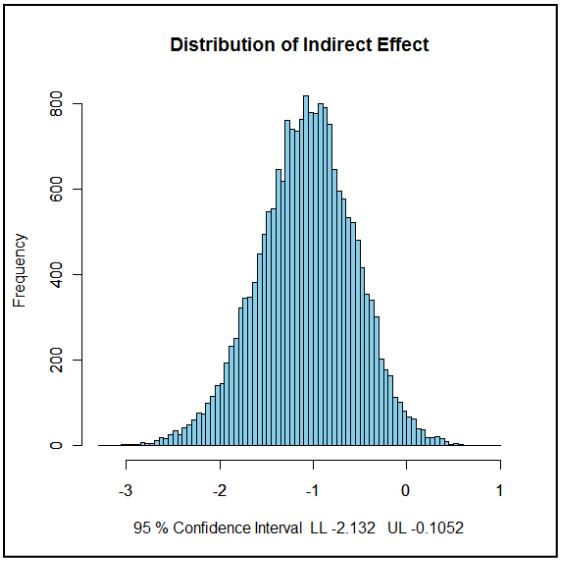
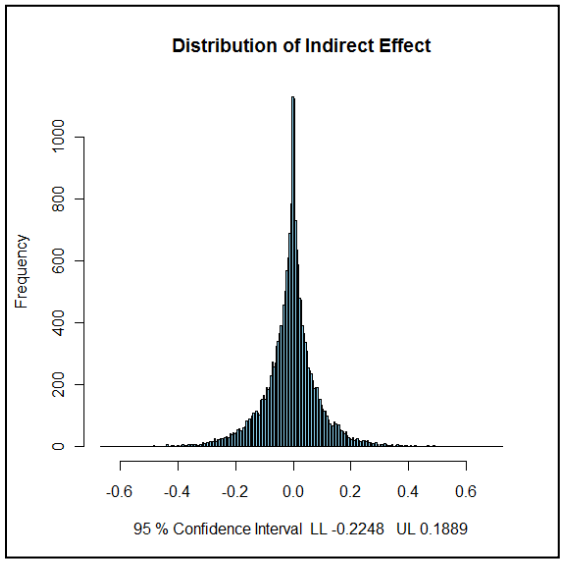


Figure 16
INDIRECT EFFECT OF DISADVANTAGE ON OFFENDING



6.4 Summary of Results

This chapter described results from structural equation modeling of the covariance matrix underlying the data. After considerable data screening, three multi-stage structural regression models were estimated with a view to examine various hypothesized relationships across variables. In the first, legitimacy acted as a partial mediator, so that social disorganization variables (concentrated disadvantage, heterogeneity and mobility) had both a direct and indirect

impact on offending. In the second, legitimacy was a full mediator, and all direct relationships were between social disorganization and offending were fixed to zero. As an extreme alternative, the third model treated legitimacy as an exogenous variable in the estimation of offending, and all relationships between social disorganization and legitimacy were fixed to zero. The model estimated the latent variable, concentrated disadvantage based on four factors: proportion illiterate population, proportion houses without water, proportion houses without electricity and proportion houses without bathrooms.

Although several proposed relationships attained significance, none of the proposed models adequately fit the data, and modification indices for model 3 suggested the addition of three paths to improve overall fit. Results from the respecified model, model 4, included these paths and were predisposed to fit the data well. As expected, model 4 offered significant improvement over the previous three models. Results from model 4 suggested that heterogeneity, disadvantage and legitimacy each had a significant effect on offending. At the same time, mobility and disadvantage significantly impact legitimacy. Mobility also has a significant indirect effect on offending. The next chapter discusses study hypotheses in light of these findings.

CHAPTER 7

DISCUSSION

7.1 The Importance of Neighborhoods

This study is of offending in Karachi's neighborhoods. It is grounded in the ecological framework, which posits that neighborhoods present inherent, structural characteristics which influence the actions of their residents. Shaw and McKay (1942) found that several such traits mirrored offending patterns across urban areas to a greater degree than the racial or ethnic composition, or wealth of residents. Several extensions to traditional social disorganization theory helped flesh out the processes that cause specific neighborhood structures to lead to delinquency. Social control theory argues that short-term residents were less inclined to invest in neighborhood-based institutions of informal control, since they generally did not live in a neighborhood long enough to enjoy the collective benefits from doing so. Highly diverse communities experienced cultural and linguistic gaps, making it more difficult to for residents to work together to ensure the security of their community (Kornhauser, 1978; Berry and Kasarda, 1977; Merry 1981; Reiss, 1951; Bursik, 1988:520). A simultaneous set of processes occurs when neighborhoods house predominantly poorer residents. Lower wage earners are more likely to be preoccupied with their personal security, ensuring they have enough financial stability to cover basic necessities like rent, bills and food. For such community members, their personal security is of greater priority than peace in their community, and they are therefore not willing to invest in the larger goal, even though they may recognize its importance (Taylor 2001). Such processes cause neighborhood structures to translate into social delinquency.

7.2 Defining Neighborhood Structures: the Systemic Model

The processes and causal mechanisms in social disorganization theory have been elucidated through the work of several empirical and theoretical works. One of the most important contributions in this regard is the systemic model of social disorganization. Although early research on the systemic model examined the impact of rapid changes within neighborhoods, its application to social disorganization posits that neighborhood stability fosters strong networks, whereas unstable characteristics such as the concentration of relative poverty (concentrated disadvantage), residential mobility and ethnic heterogeneity weaken local networks amongst friends, family, and members of community organizations, and thereby hinder the social control of delinquent behavior in the community. The enforcement of social control takes place at the micro-level and macro-level. Micro-level processes include the density of individual bonds necessary to maintain informal surveillance over a neighbors' property (Bellaire, 2000). Macro-social processes on the other hand refer to characteristics such as neighborhood stability – the proportion of neighborhood residents who live within15 minutes of their place of birth. Collective efficacy, defined as the linkage between mutual trust and the willingness to intervene, has also been highlighted as an important causal mechanism, but one that largely transcends the macro-micro social boundary (Sampson, 1997). With the rapid rise in the use of social media services such as Facebook and Twitter, definitions of micro- and macro- social processes, and how they apply to social disorganization may soon change.

7.3 Explaining Persistent Delinquency, Despite Strong Networks

A growing body of literature takes issue with the traditional processes outlined in the systemic approach to social disorganization, noting several urban neighborhoods where delinquency

persists despite strong networks. Broadly, there are three sets of arguments which take this approach. First, Wilson (1996) found that the effect of networks on crime control are conditional on whether those networks transcend neighborhood boundaries. Networks that may be deep and broad within the neighborhood don't succeed in enforcing social control because of the lack of opportunities for positive engagement outside the community. In the same vein, Patillo (1998) found that as the systemic model would predict, residential stability fostered dense social ties, but it also made it difficult to label someone as purely good or evil, since relationships frequently spanned generations, and individuals often had multiple associations with an individual. A known drug dealer, for example, could also be the doting god-father of one's nephew. A delinquent youth may not be reported to the authorities simply because the witness has known his mother since they were children. In communities with strong networks and high crime, gangs and other organized criminal groups may enforce positive social behavioral norms within the neighborhood, while facilitating networks among offenders. Youth may be pressurized to be join gangs, while gang members may be condemned for harassing girls in the neighborhood (Browning et al, 2004). The cultural transmission model takes this argument a step further and describes the role of gangs and other criminal elements in developing and enforcing a delinquent code of behavior, which is facilitated by strong networks (Anderson, 1990; Browning, 2004). Strong networks, therefore, may not always enable the unconditional reinforcement of positive behavior.

Another perspective on high crime amidst strong networks draws on behavioral literature on the rule of law. Notions of procedural justice – belief that criminal justice institutions are fair and unbiased - are as central to law abiding behavior, and in their absence, social norms will not condemn delinquent behavior. In the absence of such belief at the community level, the informal

social control enforced through strong networks will not target delinquency.

Neighborhoods experiencing severe isolation and economic and racial disconnect from wider society display a more extreme version of this. Anderson's perspective on high crime despite strong networks builds upon evidence that severe disengagement of the community from the mainstream diminishes the willingness of the community to subscribe to prevailing notions of right and wrong. Isolation leads to lack of interaction, which in turn, leads to suspicion. Although there may be a social condemnation of violence, individuals in such isolated neighborhoods may experience suspicion of criminal justice agencies and, for that reason, be more tolerant of delinquent behavior. This is particularly the case where poverty has persisted through time, or where it is currently on the rise (Anderson, 1990; Sampson and Bartusch, 1998). The "code of the street", as articulated by Anderson (1999) describes the street culture phenomena of violence and aggression as a means for youth to ensure "respect", as the collective response to a severe lack of trust in the criminal justice system, including the police, courts and incarceration institutions. Adults may condone this culture partly because they – willingly or unwillingly – subscribe to it, or because they feel it may protect the neighborhood from external threats – e.g. neighboring gangs.

The lack of faith in criminal justice institutions in particular, and government more generally is similar to the concepts of state legitimacy (Putzel 1997) and institutional legitimacy (Tyler 2006a, b). Legitimacy is defined as an institutional trait, as a result of which people believe that they must defer to the institution's authority, and is a product of, and reflection of, whether the institution is fulfilling its role in a manner that is perceived to be effective and just. This has been studied extensively internationally (e.g. Putzel, 1997) and within the US (e.g. Tyler 2006a, 2006b, 2009).

However, research on institutional legitimacy has had limited application in the social disorganization literature. As Kubrin and Weitzer (2003b) point out, there is a need for social disorganization to consider political economy and social culture factors more effectively, since responses to such factors have a direct impact on how social disorganization processes play out, as noted by Anderson (1990, 1999) and described above. They note that not only does the theory fall short in examining how formal social control – policing, incarceration, detention policies etc. – impact the informal control of delinquent behavior, but it also fails to systematically consider the urban political economy of neighborhoods. The public order of social control, i.e. the extent to which residents have external networks and can influence decision making with regard to the their community – has direct implications for informal control and is integrally related to political economy – both on the part of the residents, in having faith in state institutions and thus being willing to engage with it, and on the part of the state, in being receptive to resident engagement and participation. Failure to include the state-citizen relationship - expressed in the literature as legitimacy – as an explicit dimension of social disorganization is a significant limitation in the current state of the theory, although recent research in Brazil has begun to address these gaps and has uncovered the profound effect of political economy and resident's attitudes toward state legitimacy on how informal social control impacts delinquency (e.g. Rodrigues 2006, Arias 2004 and 2006, Villareal and Silva, 2006).

7.4 Security and State Legitimacy in Pakistan

As narrated by Buddhani et la (2010), Karachi has faced several waves of social violence since the early 1970s. The source of this violence can be traced to the armed cadres of political parties, the widespread use of firearms, (alleged) links between criminal gangs, political party workers, and feudal patrons, and religious violence, manifested through sectarian confrontations. The

peak of the violence was seen between 1989 and 1996 during which time the state conducted multiple crackdowns on civilians in an attempt to control the violence. The violence eventually subsided, but the damage to Karachi's social structures was immense. Widespread targeting of the *muhajir* community by state forces resulted in a high death toll across ethnic lines. Karachi suffered intense social rifts, internal displacement, and out-migration of its residents to other parts of the country, and abroad. Such rifts continue to rupture at the slightest excuse.

Ethnic and political violence are not isolated from crime. Budhanni et al (2010) describe a complex set of relationships that build upon the culture of informality in the face of inadequate provision of basic goods and services by the state. Although state provision of basic necessities such as access to water, public transport, and the enforcement of land rights is severely lacking, Karachi is characterized by strong informal provision of these services. As reflected in the data, residents in Karachi's *katchi basti*s (shanty towns) are largely able to access water and electricity, but this is largely as a result of private – often informal, and sometimes illegal - provision. Wealthier neighborhoods also contract with private tanker companies to supplement their water supply, and purchase oil-fueled generators to compensate for frequent and unpredictable power outages.

The emergence of the informal sector occurred simply in response to state failure. Its success – as measured by pervasive demand and unsaturated supply – could not have occurred without two complex, co-occurring social processes. First, it was imperative that non-state, actors be able to enforce contracts. This applied to the buying and selling of water, as well as to the enforcement of tenancy and ownership contracts against land grabbers. In the absence of inherent institutional legitimacy, private and informal entities had to resort to violence for ensuring smooth business operation. It became necessary, therefore, for violent enforcement to

become acceptable for buyers and sellers in the informal market.

The second factor that was necessary for the effective emergence of the informal sector was the strengthening of social networks within Karachi. Despite the violent nature of the city, it has remained an economic hub and attracted migrants from around the country. Several ethnic groups gained numeric strength and networks within and across ethnicity based neighborhoods strengthened. With the advent of cellular technology, this became even more pervasive, and allowed residents who had originated from the same village but settled in different parts of the massive city, to maintain regular contact and learn about informal services from each other, thereby strengthening the demand for such services. A strong network of social relationships was imperative to the success of the informal sector in Karachi.

However, in this dissertation I argue that the presence of these two factors – strong social networks and the increased acceptance of violent means to enforce social contracts – had another, less desirable consequence, i.e. the failure of informal social control to deter or prevent crime. In chapter two I argued that despite the existence of strong networks, as noted by Buddhani et al, crime in Karachi has risen dramatically over several years, the reason for which I attributed to the increasing social acceptance of violence. In the absence of state legitimacy – characterized by widely perceived state failure and measured by participation in voting- I argued that residents of Karachi had no choice but to accept violent means for contract enforcement, in order for the informal sector to succeed. Informal networks failed to desist or prevent residents from engaging in crime, since the distinction between acceptable violence and unacceptable criminal behavior had become obscure.

In summary, I argue that traditional indicators of social disorganization – ethnic heterogeneity, residential mobility and concentrated disadvantage - would not deter crime in

ways suggested by the systemic model and instead hypothesized that neighborhood variation in crime would be more closely related to variation in legitimacy, so that less legitimacy (i.e. lower voting rates) would occur in areas with lower crime. The hypotheses identified for this study were selected in view of the fact that I had access to severely limited data: not only was longitudinal data unavailable, in fact even concurrent cross-sectional data proved impossible to obtain. Data limitations are part and parcel of the results obtained from these analyses.

7.5 Revisiting Research Questions and Study Hypotheses

In this section, I present an assessment of each study hypothesis with respect to the results described in previous chapters, including descriptive analyses in chapter 4, multivariate regressions in chapter 5, and SEM in chapter 6. For the regressions, results from the negative binomial models are considered most reliable, given the robustness of those models to key assumptions.

7.5.1 Research question # 1: Does the ecological framework apply to Karachi?

Considerable neighborhood level variation was observed across all observed variables, including offending, disadvantage, heterogeneity, mobility and legitimacy. As illustrated in figures 2A through 2D, neighborhoods were fairly well dispersed across all levels of violent offending, although some clustering was observed at the lower level of the axis, i.e. more neighborhoods housed low numbers of violent offenders, compared to those housing high numbers of violent offenders. Neighborhood level variation suggests that the ecological framework would be well suited to understanding offending in Karachi.

H1. *Offending is concentrated in certain neighborhoods i.e. most offenders reside in a few key neighborhoods*:

Data matching for the offense database suggests 30% offenses were housed in 45% of census

tracts suggesting fairly well-dispersed offending patterns, as shown in section 4.2.1. However, the study was limited in the extent to which offender addresses could be matched to Karachi's circles. As noted in table 6 (chapter 4), only about 30% of offenses were matched with a unique circle and were included in the analysis, and it is not clear whether unmatched offenses fall within the same, or different tracts as those that were matched. Therefore, although considerable dispersion is suggested, results are not completely reliable.

H2. *Poverty is concentrated in certain neighborhoods, i.e. few neighborhoods have very high rates of poverty, thus housing large proportions of the city's poor population:*

Some neighborhoods contain many disadvantaged people, while others contain very few. As indicated by the positive skewness in figure 5, certain circles measure much higher on the disadvantage factor than others. For a simple additive disadvantage scale, which simply adds the proportions of residents affected by each of the four components of disadvantage (illiteracy, lack of water, power and latrines), the highest level of disadvantage is up 300 times higher than the lowest level. The poorest 5% have levels of disadvantage higher than 2.00, while the richest 5% neighborhoods have levels below 0.36. At the same time, poorer neighborhoods are likely to house as many people as richer ones: as displayed in section 4.4.2.1, 50% poorest neighborhoods housed roughly 48% of the total population, while the 20% least poor and 20% poorest neighborhoods also contained similar proportions of the population.[66]

H3. *Neighborhoods are clearly divided along ethnic lines:*

The extent of diversity within a varied considerably across Karachi's neighborhoods. Only 20%

[66] This finding makes intuitive sense as this project approximates neighborhoods to circles, which are, by definition, of a consistent number of households (close to about 200); therefore this finding simply states that a given proportion of circles house similar proportions of the population – in fact this finding speaks more closely to the similarity in household size across different levels of disadvantage.

circles had fairly homogeneous populations, while the remaining 80% were mixed. Of the 20% single ethnicity neighborhoods, majority appeared to be Urdu, Punjabi or Pasthto speaking, consistent with what is known about the ethnic composition of the city. However, these are based on the number of languages spoken by offenders from a specific circle, and are based on a very small sample per circle. Therefore these findings must be generalized with caution. Disaggregated census data on ethnicity (or language), more suited to such an examination, were not available.

H4. *Average length of residence is significantly different across neighborhoods, with some consisting of largely longer stay residents, while others consist of short-stay residents:*

The proportion of males across neighborhoods was used as a measure of population mobility. In the literature on social disorganization, the mobility variable has traditionally represented residents' length of stay. However in the context of Karachi's prevailing migration patterns, where laborers from across the country travel to the city for work, entrenchment and social ties with neighborhoods may be more adequately represented by the extent to which residents maintain their ties with their native villages, i.e. closer ties with one's native village may be indicative of weaker ties with neighborhood of residence. As such, the presence of females is a key indicator of whether the family of the worker has migrated to Karachi as well, or, if they remain in the village. It would follow that a laborer who lives in the city solely for earning to support his family who live in the native village would also be more residentially mobile (in the length of stay sense) than one who lives with his family: the former would require less space, fewer amenities, and therefore be more willing to move homes or neighborhoods for better opportunities or savings. The average proportion of women across all circles was as low as 46%, with no circle containing more than 50% and some containing as few as 14% women. As

illustrated in figure 6C, considerable variation in mobility was observed across circles.

7.5.2 Research question # 2: Are structural attributes of neighborhoods associated with variation in residents' criminal involvement?

There was considerable evidence suggesting that, when controlling for other variables, concentrated disadvantage and ethnic heterogeneity had significant and fairly strong, positive associations with higher levels of offending, i.e. higher levels of concentrated disadvantage and heterogeneity contributed to higher offending. Results for the mobility were generally not significant.

H5. *Higher concentrations of disadvantage are associated with higher levels of offending:*

There was strong evidence in support of this hypothesis. All regression and SEM models (models 1 through 18 in chapter 5 and models 1 through 4 in chapter 6) indicated a highly statistically significant, positive impact of concentrated disadvantage on total, violent and robbery offending.

H6. *Higher residential mobility is not associated with higher offending rates:*

I argued that social control dynamics in Karachi, unlike the West, are not affected by residential mobility. Results generally supported this hypothesis. The mobility variable was not significant in any of the negative binomial models (7 through 13) or the SEM analysis. However, a small, positive effect of mobility was observed in the estimation of total offending using logged-dependent OLS.

H7. *Higher ethnic heterogeneity is not associated with higher offending rates*:

I also argued that heterogeneity did not affect social control dynamics in Karachi, and that therefore this variable would not impact offending. In fact, results strongly and consistently supported the positive influence of heterogeneity on offending – higher offending was seen to

occur in circles with higher levels of heterogeneity. This was observed in the results from negative binomial regressions as well as SEM.

7.5.3 Research question # 3: Do residents' attitudes toward state legitimacy influence criminal involvement across neighborhoods?

There was significant evidence to suggest that legitimacy, as measured by voter participation across circles, was a significant predictor of offending. However, the direction of effect was contrary to what was expected: a significant, positive effect was observed.

H8. *State legitimacy and offending rates are inversely related. This is particularly true for violent crimes*:

I argued that people's attitudes toward the state are a function of state delivery: in neighborhoods where the state is perceived to be more effective, residents are more likely to vote, and to be invested in the security of their community. In more isolated neighborhoods, I argued, disillusionment with the state, coupled with an increasing social acceptance of violence, would cause social networks to fail in the informal social control of delinquent behavior. Therefore, I argued that social control in such neighborhoods would function as a more effective deterrent, and offending would be lower. In my approach, the lack of legitimacy represented disillusionment with the state.

In fact, results from this study suggest that while legitimacy is a consistently significant predictor of total and violent offending, and robbery (despite results in model 12), the effect is consistently positive. Areas with higher legitimacy are seen to have higher levels of offending. The direction of this effect is surprising, and contrary to study hypotheses. Two possible explanations are discussed here

I originally argued that higher voter participation reflects greater investment in the

political apparatus. However, this may in fact not be the case. In Karachi's highly corruptible election and governance structure, for example, politicians may promise favors or offer payoffs to local leaders to ensure residents from their communities vote for them. In such situations, local leaders and their cronies may perceive themselves to be exempt from the rule of law and impervious to criminal justice enforcement. Residents perceive that their vote has 'bought' them the right to commit crime, and therefore they offend to a higher degree, in the (perhaps misplaced) belief that they will not be taken to task. This belief may be misguided because, as shown by the data, incarceration rates (as a proportion of total population) in these neighborhoods is higher than in areas with lower voter participation. One explanation of the positive coefficient of legitimacy, therefore, is that voting rates are not an adequate representation of residents' trust in the state, rather, they reflect the extent of resident's belief in the corruptibility of the system.

The second explanation for the observed positive relationship between legitimacy and offending draws on the flawed nature of the election data. It is possible that voting rates have been falsely inflated in some circles through formal or informal pressure on election officials by local political leaders. It would be logical that such pressure would be more likely in neighborhoods where local leaders were already more involved in criminal activity. Such a relationship would cause voter participation to appear higher than it is, in the presence of high rates of offending.

The underlying cause for the positive relationship between legitimacy and offending remains unclear. However, its significance with respect to the prediction of offending is an important empirical and theoretical finding. More inquiry into the reasons why people vote is needed before this effect can be truly understood. The accuracy of election data must also be

controlled for, particularly in areas where polling data may be flawed.

7.5.4 Research question # 4: In the extended model, is the relationship between structural factors and criminal involvement mediated through legitimacy?

I hypothesized that given the extent of neighborhood isolation and state failure across Karachi's neighborhoods, state legitimacy (which I argued was an indicator of state disillusionment) would override any impact that concentrated disadvantage, heterogeneity or mobility had on offending. While results support legitimacy as an important predictor of offending, there is no evidence to suggest that this variable mediates the relationship between traditional social disorganization variables and offending.

H9. *State legitimacy absorbs a significant proportion of the direct effect of concentrated disadvantage on offending, particularly for violent offending:*

Results do not support the mediation effect of the legitimacy variable. In fact, the coefficient for disadvantage is seen to slightly increase when legitimacy is included.[67] In fact, despite a significant effect of disadvantage on legitimacy, and legitimacy on offending, SEM analyses found a non-significant indirect effect of disadvantage on offending when mediated through legitimacy. This stands in stark contradiction to the hypothesized role of legitimacy in the systemic approach to offending.

H10. *State legitimacy absorbs a significant proportion of the direct effect of residential mobility on offending, particularly for violent offending:*

As discussed in H6 above, results did not support the impact of mobility on offending. Mobility was a significant predictor of legitimacy, however, and legitimacy was seen to have a significant impact on offending. As a result, mobility was seen to have a small, negative, indirect impact on

[67] For negative binomial regressions, compare models 14 with 13, 16 with 15 and 18 with 17 to see this effect in the estimation of total offending, violent offending and robbery, respectively.

offending. This suggests that as mobility (proportion male) increases, there is a corresponding decrease in offending, largely as a result of the negative impact of mobility on legitimacy. However, given that no direct relationship between mobility and offending is observed, this relationship does not indicate the mediating effect of legitimacy; rather it likely refers to an interaction effect occurring between mobility and legitimacy. The presence of an interaction effect is also supported by the increase in the magnitude of the coefficient of mobility when legitimacy is introduced in the negative binomial series of regressions (compare model 14 with 13, 16 with 15 and 18 with 17). The mediation hypothesis is not supported.

H11. *State legitimacy absorbs a significant proportion of the direct effect of ethnic heterogeneity on offending, particularly for violent offending:*

Again, results did not support the mediating effect of legitimacy on the relationship between heterogeneity and offending. Heterogeneity had a significant, direct effect on offending, and this relationship was consistent even in the presence of legitimacy as a variable in the model. Had the impact been absorbed by legitimacy, the coefficient of heterogeneity would have diminished when comparing models 14 with 13, 16 with 15 or 18 with 17, for total, violent and robber offending, respectively. This was not the case. Further, SEM also did not suggest the presence of an indirect relationship between mobility and offending.

Table 23

EVALUATING STUDY HYPOTHESES

	Study hypothesis	Outcome
H1	Offending is concentrated in certain neighborhoods, i.e. most offenders reside in a few key neighborhoods.	Supported
H2	Poverty is concentrated in certain neighborhoods, i.e. few neighborhoods have very high rates of poverty, thus housing large proportions of the city's poor population.	Supported
H3	Neighborhoods are clearly divided along ethnic lines.	Supported
H4	Average length of residence is significantly different across neighborhoods, with some consisting of largely longer stay residents, while others consist of short-stay residents.	Supported
H5	Higher concentrations of disadvantage are associated with higher levels offending of all types.	Supported
H6	Higher residential mobility is not associated with higher offending rates.	Supported
H7	Higher ethnic heterogeneity is not associated with higher offending rates.	Not supported
H8	State legitimacy and offending rates are inversely related. This is particularly true for violent crimes.	Not supported
H9	State legitimacy absorbs a significant proportion of the direct effect of concentrated disadvantage on offending, particularly for violent offending.	Not supported
H10	State legitimacy absorbs a significant proportion of the direct effect of residential mobility on offending, particularly for violent offending.	Not supported
H11	State legitimacy absorbs a significant proportion of the direct effect of ethnic heterogeneity on offending, particularly for violent offending.	Not supported

7.6 Comparing Analytical Methods

This study adopted the use of two complementary analytical approaches in the assessment of offending. The first was the more commonly used multiple regression approach.

7.6.1 Comparing WLS, logged-dependent OLS and negative binomial models

This technique has been frequently used in the prediction of offending and delinquency using social disorganization variables. Results obtained from WLS techniques articulated by Sampson and Groves (1988) found concentrated disadvantage, heterogeneity and legitimacy to be

significantly predictive of total offending, violent offending and robbery. However, the distribution of the error terms obtained from this analysis did not meet requirements of homoscedasticity.

In order to obtain results which met requirements and were therefore more reliable, a second set of regressions was estimated, this time using OLS with logged-dependent variables. An assessment of residuals from this analysis revealed that assumptions of homoscedasticity were being met. While results generally supported WLS findings, they drew on a smaller sample size for violent offending and robbery (since the log of a zero variable is undertmined).

To control for sample size without encountering violations of underlying assumptions, I estimated a third series of regressions which are well-catered to distributions such as those of the dependent variables in this study, which contain large numbers of zero- and small values. Following precedents set by Osgood (2000), Adamcyzk (forthcoming) and Rengifo (2007), results from these analyses supported those obtained through WLS and OLS, but were more robust as residuals from these models displayed a relationship with the expected value of the mean response, as required by the underlying assumptions for this technique.

This fairly rigorous approach to multivariate regressions is not often adopted in the literature.[68] In order to assess the difference in results across the three types of models, I have presented effect sizes from each of the models estimated through the three series in table 24 below.

[68] A notable exception is Osgood (2000) which presents an excellent comparative review of results from OLS, logged dependent OLS, negative binomial and Poisson approaches.

Table 24

EFFECT SIZES FOR MULTIVARIATE REGRESSIONS

	Constant	Disadvantage	Heterogeneity	Mobility	Legitimacy
Weighted least-squares (WLS)					
Model 1	-10.74	.157***	.318***	.012	
Model 2	-66.01	.188***	.326***	.064	.161**
Model 3	10.73	.178***	.307***	-.029	
Model 4	-17.27	.207***	.315***	.019	.147**
Model 5	3.38	.160**	.296***	-.026	
Model 6	-6.44	.190***	.304***	.024	.153**
Logged-dependent, ordinary least squares (OLS)					
Model7	.05	1.32**	2.97***	1.14***	
Model 8	-.47	1.38***	3.03***	1.25*	1.31**
Model 9	.63	1.55***	2.41***	.95	
Model 10	.04	1.64***	2.46***	1.07	1.37**
Model 11	.72	1.66***	1.87***	.86	
Model 12	.40	1.72***	1.91***	.92	1.22
Negative binomials					
Model 13	.833	1.45***	6.17**	1.06	
Model 14	.313	1.55***	6.27**	1.16	1.32*
Model 15	1.35	1.62***	5.90***	.92	
Model 16	.46	1.74***	5.99***	1.02	1.32*
Model 17	.33	1.49***	5.05***	.97	
Model 18	.11	1.58***	5.12***	1.07	1.36*

Effect sizes illustrated in table 24 should be interpreted as follows. For models 1 through 12, a one standard deviation increase in the independent variables leads to a change in the rate of offending per 10,000, by the amount displayed in the table. Therefore, for model 1,we would expect a 1 SD increase in disadvantage to result in a .178 increase in the total offending rate. For model 1, on the other hand, we would expect a 1 SD increase in disadvantage to result in a 1.32 SD increase in the total offending rate. For negative binomials (models 13 to 18), the interpretation of effect size is somewhat different: an x unit increase in the independent variable will multiply the offending rate by a factor of exp(bx). The table displays the change in rate that would be expected for an increase of 1 SD for each independent variable, where B represents the

(unexponentiated) B coefficient obtained from appendix 2 and x is the magnitude of the SD for each independent variable, also obtained from appendix 2.

A comparison of effect sizes suggests that results obtained from negative binomial models are far larger than those from the other two techniques. This has been seen in other comparisons between OLS and negative binomial regressions also (Osgood 2000) and has been attributed to the role of population in Poisson based analysis (ibid: 22). Poisson distributions place differential weighting on smaller cases (based on population) whereas OLS techniques weight all cases equally. The relative importance of predictors across the three types of models places heterogeneity in first place, concentrated disadvantage in second, and legitimacy in third place. Significance levels for predictors in each of the three types of models is around the same. Most importantly, the comparison of residual plots in chapter 5 suggest that unlike the first two types of models, negative binomial regressions adhere most closely to underlying assumptions regarding the distribution of errors, making this the most robust estimating technique. This finding is consistent with results from Osgood (2000).

7.6.2 Comparing regression and SEM

The second analytical approach adopted in this study was the use of structural equation modelling to predict complex models of offending. Findings from this analysis supported the results obtained through regression, and added the dimension of contextualizing the role of legitimacy in the larger model. The fact that SEM supports results obtained through traditional regression techniques also contributes to the discussion of the relative merits of these two techniques in the methodology literature. In addition, the respecified model in SEM (model 4, chapter 6), which was suggested by the software as having the best possible fit for the covariance matrix generated by the sample was particularly useful in suggesting theoretical relationships across variables that

had not been previously articulated. Specifically, the finding that legitimacy is negatively affected by concentrated disadvantage and mobility suggests an interaction effect and helps explain the slight increase the size of the coefficients for these two variables when legitimacy is included in regression models.[69] These respecified relationships must be tested on independent datasets before they can be generalized, but this finding suggests potential avenues for future work which could lead to a necessary understanding of how legitimacy may be most usefully incorporated into the systemic model.

7.7 Theoretical Implications of the Study: Next Steps

As discussed in sections 7.5 and 7.6, this study has been particularly successful in three aspects. First, it provides evidence in support of the ecological framework. This study finds that neighborhoods display distinct structural traits and that these traits vary systematically across neighborhoods. This evidence suggests that neighborhoods may possess the capacity to approach economic and political challenges in ways that city or state policy, or individual residents of the neighborhood, cannot. These results set the stage for addressing sociological and development studies questions through the use of innovative approaches, couched in the capacity of neighborhoods.

Second, the study supports the application of social disorganization factors in explaining offending behavior in Pakistan. In support of the theory, concentrated disadvantage and ethnic heterogeneity were found to be significant predictors of offending. This evidence is similar to that obtained by Shaw and McKay (1942) in their early work on delinquency patterns in Chicago. It is also one of the first large-scale quantitative applications of the theory outside of the US and Europe.

[69] Interaction effects in regression models were estimated but were not found to be statistically significant.

In addition, this study responds directly to the critique that social disorganization theory must be contextualized within broader cultural and political economy forces operating in society (Kubrin and Weitzer 2003b). The significance of the relationship between voting behaviors and offending on the one hand, and social disorganization and voting behaviors on the other, suggests that political factors, as indicated in this case by voting, supplement traditional social disorganization explanations of offending. This evidence also offers quantitative support to ethnographic evidence that political context is imperative in understanding offending, particularly in states where communities may experience severe deficiencies in governance (Arias and Rodrigues 2006, Caldeira and Holston 1999, Villareal and Silva 2006).

Finally, this analysis is useful in articulating the limitations of traditional analytical methods in explaining offending. Crime and offending data are frequently characterized by having large numbers of zeros or small values in a dataset and as seen in this research, the use of standard OLS or WLS regression techniques may lead to results which are unreliable because they violate the underlying assumptions of the model. Heterogeneity, in particular, was seen to be a problem in this analysis. Results from negative binomial regressions were robust to such violations, and it is suggested that Poisson based models which control for non-normality in the distribution of the dependent variable are useful in obtaining reliable results when estimating offending (Osgood 2000). Further, the use of structural equation modeling in conjunction with standard regression allows for a multifaceted explanation of complex phenomena and in this case add particular value by suggesting that while it does not mediate the effects of traditional social disorganization variables on offending, it is affected by these variables and does, in turn, affect the outcome.

However, the results from this project are also limited in some important respects. In par-

ticular, results fail to address the causal mechanisms for why the social disorganization indicators of concentrated disadvantage and ethnic heterogeneity affect offending. Theoretically, the social control perspective suggests that the causal mechanism for this relationship is that of the willingness of residents to intervene and articulate shared goals. In disorganized communities, where people often reside for shorter durations, and neighbors may speak experience linguistic and cultural barriers to communication, incentives for social control are weaker, and as a result, offending is higher (Berry and Kasarda 1977, Merry 1981, Bursik 1988). Taylor (1986 and 2001) and Suttles (1972) suggest that residents of disorganized communities face challenges to their economic and personal security and therefore are not invested in the informal control of others' behavior. The systemic model builds on this perspective and through the incorporation of three levels of informal control – public, parochial and private – articulates specific mechanisms for how social disorganization translates into offending (Bursick and Grasmick 2002). This relationship is presented in figure 1.

However, this study fails to incorporate evidence on the causal mechanisms for the relationship between social disorganization and offending: by not analyzing social control, the implications of the study for the systemic model in particular are largely speculative. Albeit for legitimacy reasons related to severe constraints in data availability, by failing to adequately distinguish social disorganization from its causal mechanisms, the study falls prey to critiques articulated by Taylor (2002) and speak to the need to design research which speaks to the need for causal and temporal relationships between indicators of social disorganization and the micro-social processes that are thought to transmit their effects onto offending. While Buddhani et al (2010) argue that the success of informal markets in Karachi has been possible only as a result of the strength of social networks coupled with (an implicit) acceptance of the use of (private, non-

state) violence to enforce contracts, not enough is known about the nature of or neighborhood variation in these networks for these processes to offer support for systemic explanations of social disorganization in the context of Karachi. In particular, there are outstanding questions with respect to the extent to which social networks and legitimization of violence vary with respect to social disorganization, and informal social control.

Findings are also limited in the extent to which they offer support for extending the systemic model to incorporate legitimacy. While results suggest that voting behavior is an important predictor of offending, not enough is known about the factors which cause this behavior. As shown in figure 2, the extended social disorganization model incorporates attitudes toward violence and state or institutional legitimacy based on external networks and dual identities of offenders (Wilson 1996, Patillo1998, Patillo-McCoy 1999); procedural justice (Tyler, 1990); and legal cynicism (Sampson and Bartusch 1998) and adoption of the code of the street (Anderson 1999). In figure 3, I argue that voting behaviors proxy these processes in the context of Karachi. Again, this argument was made largely as a result of severe data limitations. However, not enough is known about the reasons why people vote to be able to make this linkage. In particular, there are unresolved questions about the extent to which voting patterns reflect attitudes toward state legitimacy. As a result, the study fails to address, in essence, whether offending behaviors are influenced by attitudes toward the state. The study originally built on the argument that attitudes toward the state were determined as a result of governance failure in providing basic goods and services (section 2.7) and that these attitudes would be reflected in voting behavior. Implicit relationships between the social disorganization, the strength of networks and social control must also be recast in light of this original argument, which this study does not adequately address.

CHAPTER 8

CONCLUSION

This project examined the ecological basis of offending patterns around Karachi, and the ways in which structural characteristics of neighborhoods, and resident behaviors indicating their attitudes toward state legitimacy, contribute toward these patterns. The research had three goals – each addressing within an identified gap in prevailing criminal justice theory. In the first instance, the project assessed the clustering of offending and other neighborhood characteristics including poverty, ethnic composition and residential mobility across Karachi's census tracts. This allowed for an examination of the fundamental utility of the ecological approach in the context of understanding offending in Karachi. The second goal was an analysis of traditional social disorganization theory in the context of Karachi. This allowed for an evaluation of the direct effects of concentrated disadvantage, ethnic heterogeneity and population mobility on offending rates. Finally the study examined the role of the public order on the theorized operation of private and parochial controls. Specifically, it examined how state legitimacy influenced offending patterns, and how its inclusion in models of offending influenced the direct effects of neighborhood structures.

This research contributes to the literature in several ways. This dissertation records, for the first time, evidence in favor of the use of ecological theories in understanding social phenomenon in Karachi. By examining the systemic model in Karachi, with a sample of nearly 500 census tracts, it presents a unique, empirical examination of the model in a context where there is considerable variation in the extent of isolation across neighborhoods.

Further, support for two key social disorganization indicators in the prediction of

offending – concentrated disadvantage and heterogeneity – provides valuable evidence for the application of the theory in non-Western contexts. Specific observations with regard to Karachi's social structures provide the opportunity for future ecological work to understand these phenomenon. For example, findings regarding the extent of variability in the concentrated disadvantage scale provides the opportunity for comparisons across economic and sociological indicators of well-being. Knowledge about the variation across proportions of males in Karachi's neighborhoods also suggest important avenues for future research. In short, findings from this study open doors to several in-depth, community oriented analyses with significant policy implications.

Third, the examination of the relationship between voting rates and offending was one of the few explicit quantitative assessments of the influence of political behavior on offending. Results support the importance of this variable and at the same time highlight the need to better examine state-citizen relations and understand the processes underlying voting behavior. Finally, the study speaks to the importance of careful selection of analytical methods, keeping in mind the nature of the distribution of offending data, and the benefits of using multiple analytical techniques such as multivariate regression and structural equation modeling for an in-depth understanding of complex social phenomenon.

The study was, however, severely impacted by limitations in the nature and quality of available data. Most importantly, there is a need for more reliable data on offending and state-citizen relations, as well as disaggregated data on heterogeneity and length of stay. Longitudinal datasets will allow for closer examination of the phenomenon addressed in this dissertation, but at a minimum, models should be tested on concurrent data. The quality of voting data is of serious concern. First, the offending data precede election data, limiting the claims that can be

made with regard to causality. Moreover the accuracy of the voting data have not been verified. Concerns about corruptibility of polling agents, fraudulent counting and coerced ballots have been raised in almost every election in Pakistan, and a systematic assessment of the impact of such factors on the data are needed to make the data more reliable.

In addition, the study raises questions about the ability of the adopted indicators to measure the phenomena that are being addressed. In particular, the ability of the voting variable to adequately represent attitudes toward the state or the quality of the provision of security and other basic goods and services, is unclear. More research is needed to understand the reasons why people choose to vote and how this interacts with attitudes toward the state, before this determination can be made.

Further, there is a need to explicitly address the ways in which social disorganization variables affect offending. Specifically, there is a need to better understand the nature of the micro-social processes underlying this relationship. It has been argued that the presence of social networks and the legitimization of violence allow for the effective, informal provision of services particularly in areas where the public delivery is weak. However not enough is known about the nature of these networks to determine the extent to which they facilitate the social disorganization effects observed in this analysis. Moreover, given the project's implicit reliance on processes of informal social control – allowing it to build on systemic approaches to social disorganization theory – such processes must be examined in greater depth. The project addresses important questions about neighborhood based approaches to understanding offending in Karachi, and is the first step in a more in-depth examination of the processes underlying these explanations.

APPENDIX 1

DEMOGRAPHIC CHARACTERISTICS FOR STUDY SAMPLE

	N	Mean (SD)	Min-Max
Population			
Total population (persons)	453	7815 (2890)	1939 – 21,059
Female proportion	453	46.5% (0.03)	0.14 - 0.50
Under 18	453	43.5% (0.05)	0.20 - 0.57
Household size (persons)	453	6.7 (0.73)	4.90 - 9.70
Religious minority	453	3.0% (0.08)	0.00 - 0.92
Education			
Illiteracy	453	29.8% (0.17)	0.04 - 0.84
Male high school or above achievement	453	27.4% (0.16)	0.02 - 0.64
Female high school or above achievement	453	22.4% (0.15)	0.00 - 0.57
Gender gap in achievement (% points)	453	4.9 (0.03)	-0.10 - 0.18
Infrastructure			
Semi-pakka houses	453	2.7% (0.04)	0.00 - 0.37
Katcha houses	453	0.6% (0.02)	0.00 - 0.23
No electricity	453	5.7% (0.23)	0.00 - 1.00
No potable water	453	23.4% (0.25)	0.00 - 1.00
No toilet	453	44.3% (0.19)	0.02 - 0.94

APPENDIX 2

DESCRIPTIVE STATISTICS FOR WLS REGRESSIONS ESTIMATING RATES OF OFFENSE PER 10,000 (MODELS 1 – 6)

	N	Mean (SD)	Min-Max
Dependent variables			
Total offending	453	20.42 (29.32)	0.60 – 238.24
Violent offending	453	10.70 (16.24)	0 .00 – 135.80
Robbery	453	3.55 (5.70)	0.00 – 46.44
Independent variables			
Disadvantage	453	.000 (1.000)	-1.57 (4.25)
Heterogeneity	453	.587 (.324)	.00 – 1.00
Mobility	453	.535 (.032)	.50 - .86
Legitimacy	453	.332 (.148)	.02 – 1.00

DESCRIPTIVE STATISTICS FOR OLS REGRESSIONS ESTIMATING LOGGED DEPENDENT VARIABLES (MODELS 7 – 12)

	N	Mean (SD)	Min-Max
Dependent variables			
Logged total offending	453	1.002 (.538)	-.22 – 2.38
Logged violent offending	400	.824 (.470)	-.12 – 2.14
Logged robbery	299	.532 (.400)	-.17 – 1.67
Independent variables			
Disadvantage	453	.000 (1.000)	-1.57 (4.25)
Heterogeneity	453	.587 (.324)	.00 – 1.00
Mobility	453	.535 (.032)	.50 - .86
Legitimacy	453	.332 (.148)	.02 – 1.00

B COEFFICIENTS FOR NEGATIVE-BINOMIAL REGRESSIONS (MODELS 12 – 18)

	Total_count		Violent_count		Robbery_count	
	(13)	(14)	(15)	(16)	(17)	(18)
Disadvantage	.16***	.19***	.21***	.24***	.174**	.20**
Heterogeneity	2.44**	2.46**	2.38***	2.40***	2.17***	2.19***
Mobility	.83	2.06	-1.20	.24	-.47	.96
Legitimacy		.82*		.82*		.90*
Population	.00	.00	.00	.00	.00	.00
Constant	-.18	-1.16	.30	-.79	-1.10	-2.22

APPENDIX 3

A. MEAN, SD AND COVARIANCE MATRIX FOR SEM SAMPLE (N=428)

	1	2	3	4	5	6	7	8
MEAN	0.59	-0.27	2.22	-1.72	-4.70	1.47	1.66	0.99
SD	0.32	0.02	0.94	0.62	2.94	0.84	0.70	0.52
1. HET	0.11	0.00	-0.02	0.02	0.12	0.00	-0.03	0.08
2. MOB3	0.00	0.00	0.00	0.00	0.02	0.01	-0.01	0.00
3. NOLAT	-0.02	0.00	0.88	0.13	0.48	0.27	-0.09	0.03
4. NOPWR3	0.02	0.00	0.13	0.38	0.91	0.31	-0.09	0.05
5. NOWATER	0.12	0.02	0.48	0.91	8.67	1.36	-0.60	0.19
6. ILLIT	0.00	0.01	0.27	0.31	1.36	0.70	-0.25	0.06
7. LEG	-0.03	-0.01	-0.09	-0.09	-0.60	-0.25	0.49	-0.02
8. OFF	0.08	0.00	0.03	0.05	0.19	0.06	-0.02	0.27

B. R CODE FOR ESTIMATING SEM MODELS 1, 2, 3 AND 4, CALCULATING MEAN AND SD, AND USING MONTE CARLO METHOD TO CALCULATE INDIRECT EFFECTS

```
#################################################################
#MODEL 1

WV14.5 <- specify.model()
ILLIT <-> ILLIT, VarIllit, NA
NOPWR3 <-> NOPWR3, VarNopwr, NA
NOWATER <-> NOWATER, VarNowater, NA
NOLAT <-> NOLAT, VarNOLAT, NA
CD -> ILLIT, NA, 1
CD -> NOPWR3, BCDNopwr, NA
CD -> NOWATER, BCDNowater, NA
CD -> NOLAT, BCdNolat, NA
CD <-> CD, ResCD, NA
HET <-> HET, VarHET, NA
MOB3 <-> MOB3, VarMOB3, NA
LEG <-> LEG, ResLEG, NA
OFF <-> OFF, ResOFF, NA
HET <-> MOB3, CovHM, NA
HET -> LEG, BHETLEG, NA
MOB3 -> LEG, BMOB3LEG, NA
CD -> LEG, BF1LEG, NA
```

```
HET -> OFF, BHetOff, NA
MOB3 -> OFF, BMobOff, NA
CD -> OFF, BCdOff, NA
LEG -> OFF, BLEGOFF, NA
HET <-> CD, CovHETCD, NA
MOB3 <-> CD, CovMOB3CD, NA

WV14.5
WV14.SEM5 <- sem(WV14.5, cov(WV14.short), length(HET))
summary(WV14.SEM5)

#####################################################################
# MODEL 2

WV14.6 <- specify.model()
ILLIT <-> ILLIT, VarIllit, NA
NOPWR3 <-> NOPWR3, VarNopwr, NA
NOWATER <-> NOWATER, VarNowater, NA
NOLAT <-> NOLAT, VarNOLAT, NA
CD -> ILLIT, NA, 1
CD -> NOPWR3, BCDNopwr, NA
CD -> NOWATER, BCDNowater, NA
CD -> NOLAT, BCdNolat, NA
CD <-> CD, ResCD, NA
HET <-> HET, VarHET, NA
MOB3 <-> MOB3, VarMOB3, NA
HET <-> MOB3, CovHM, NA
LEG <-> LEG, ResLEG, NA
OFF <-> OFF, ResOFF, NA
HET -> LEG, BHETLEG, NA
MOB3 -> LEG, BMOB3LEG, NA
CD -> LEG, BF1LEG, NA
HET -> OFF, NA, 0
MOB3 -> OFF, NA, 0
CD -> OFF, NA, 0
LEG -> OFF, BLEGOFF, NA
HET <-> CD, CovHETCD, NA
MOB3 <-> CD, CovMOB3CD, NA

WV14.6
WV146.SEM <- sem(WV14.6, cov(WV14.short), length(HET))
summary(WV146.SEM)
```

```
#################################################################
#MODEL 3

WV14.7a <- specify.model()
ILLIT <-> ILLIT, VarIllit, NA
NOPWR3 <-> NOPWR3, VarNopwr, NA
NOWATER <-> NOWATER, VarNowater, NA
NOLAT <-> NOLAT, VarNOLAT, NA
CD -> ILLIT, NA, 1
CD -> NOPWR3, BCDNopwr, NA
CD -> NOWATER, BCDNowater, NA
CD -> NOLAT, BCdNolat, NA
CD <-> CD, ResCD, NA
HET <-> HET, VarHET, NA
MOB3 <-> MOB3, VarMOB3, NA
HET <-> MOB3, CovHM, NA
LEG <-> LEG, ResLEG, NA
OFF <-> OFF, ResOFF, NA
HET -> LEG, NA, 0
MOB3 -> LEG, NA, 0
CD -> LEG, NA, 0
HET -> OFF, Bhetoff, NA
MOB3 -> OFF, BmoboffNA, NA
CD -> OFF, Bcdoff, NA
LEG -> OFF, BLEGOFF, NA
HET <-> CD, CovHETCD, NA
MOB3 <-> CD, CovMOB3CD, NA

WV14.7a
WV147a.SEM <- sem(WV14.7a, cov(WV14.short), length(HET))
summary(WV147a.SEM)

SEM.MIa <- mod.indices(WV147a.SEM)
print(SEM.MIa)
summary(SEM.MIa)

#################################################################

#MODEL 4

WV14.7b <- specify.model()
ILLIT <-> ILLIT, VarIllit, NA
NOPWR3 <-> NOPWR3, VarNopwr, NA
NOWATER <-> NOWATER, VarNowater, NA
NOLAT <-> NOLAT, VarNOLAT, NA
CD -> ILLIT, NA, 1
```

```
CD -> NOPWR3, BCDNopwr, NA
CD -> NOWATER, BCDNowater, NA
CD -> NOLAT, BCdNolat, NA
CD <-> CD, ResCD, NA
HET <-> HET, VarHET, NA
MOB3 <-> MOB3, VarMOB3, NA
HET <-> MOB3, CovHM, NA
LEG <-> LEG, ResLEG, NA
OFF <-> OFF, ResOFF, NA
HET -> LEG, NA, 0
MOB3 -> LEG, Bmobleg, NA
CD -> LEG, Bcdleg, NA
HET -> OFF, Bhetoff, NA
MOB3 -> OFF, BMoboff, NA
CD -> OFF, Bcdoff, NA
LEG -> OFF, BLEGOFF, NA
HET <-> CD, CovHETCD, NA
MOB3 <-> CD, CovMOB3CD, NA
NOWATER <-> NOPWR3, CovWATPWR, NA

WV14.7b
WV147b.SEM <- sem(WV14.7b, cov(WV14.short), length(HET))
summary(WV147b.SEM)

standardized.coefficients(WV147b.SEM, digits = 5, oneheaded=TRUE, twoheaded=TRUE)

#####################################################################

#CALCULATING MEANS AND STANDARD DEVIATIONS

mean(WV14.short); sd(WV14.short)
sd(WV14.short)^2
cov(WV14.short)
 print(round(sd(WV14.short)^2, 2), quote=FALSE)
 round(cov(WV14.short), 2)

mean(wv14testhalf.df); sd(wv14testhalf.df)
sd(wv14testhalf.df)^2
cov(wv14testhalf.df)
 print(round(sd(wv14testhalf.df)^2, 2), quote=FALSE)
 round(cov(wv14testhalf.df), 2)
```

```
###################################################################
#MONTE CARLO CALCULATOR FOR INDIRECT EFFECTS

a=-0.391
b=0.072
astd=0.047
bstd=0.037
rep=20000
conf=95
avec=rnorm(rep)*astd+a
bvec=rnorm(rep)*bstd+b
ab=avec*bvec
low=(1-conf/100)/2
upp=((1-conf/100)/2)+(conf/100)
LL=quantile(ab,low)
UL=quantile(ab,upp)
LL4=format(LL,digits=4)
UL4=format(UL,digits=4)
################################################
# The number of columns in the histogram can   #
# be changed by replacing 'FD' below with      #
# an integer value.                            #
################################################
hist(ab,breaks='FD',col='skyblue',xlab=paste(conf,'% Confidence Interval ','LL',LL4,'  UL',UL4),
main=`CI of Indirect Effect of Concentrated Disadvantage')



###################################################################
```

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