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THE CONTEXTUAL IMPACT OF INCOME INEQUALITY
ON SOCIAL CAPITAL AND ADVERSE SOCIAL OUTCOMES

by

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A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
in the Department of Public Affairs
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at the University of Central Florida
Orlando, Florida

Summer Term
2010

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ABSTRACT

An interdisciplinary approach to policy and governance recognizes that many social welfare problems are interrelated, and policy-makers have long recognized a need to address the root causes of these problems. There is much evidence that income inequality is one of these root causes but research suggesting the effect of income inequality is mediated by social capital has complicated the relationship, as have theories of causality that take different approaches.

This study takes an ecological approach to these issues to test the relationship between income inequality, social capital and selected adverse outcomes proposed by the relative income hypothesis. The relative income hypothesis posits that the impact of income inequality on adverse outcomes is mediated by social capital. The study used a retrospective cross-sectional design to analyze county-level data for the year 2000 with a structural equation model composed of three constructs: income inequality, modeled by four common measures; a social capital construct based on a model developed by Rupasingha, Goetz and Freshwater (2006); and an adverse outcomes construct designed as a parsimonious measure of social outcomes in four public affairs disciplinary areas.

The test of the path presumed by the relative income hypothesis revealed both a direct effect of income inequality and indirect effect of inequality through social capital. However, the direct effect of income inequality on outcomes was significantly larger than the indirect effect, indicating the relationship is moderated, rather than mediated, by social capital. Since the impact of social capital on the selected adverse outcomes was relatively small, and the final model failed to achieve statistical significance, the relative income hypothesis that income inequality exerts its primary effect on outcomes through social capital was rejected.

ACKNOWLEDGMENTS

I am indebted to the Public Affairs faculty for their patience and guidance, especially with regard to helping me master the statistical concepts necessary for evidence-based analysis. I would also like to express my appreciation to Margaret Mlachak and Michelle Pozdoff for keeping me on-track with the administrative details that could easily have derailed my progress; to my fellow students for their help and advice, and to my good friend David Wilson for keeping my house from falling down around my ears while I was preoccupied with this project. Last but certainly not least, I greatly appreciate the efforts of my dissertation chair, Dr. Thomas Wan, who always made time to discuss my problems and progress, and the other members of my committee, Dr. Lawrence Martin; Dr. Naim Kapucu and Dr. Barbara Kinsey, without whom this project would never have been envisioned, much less completed.

TABLE OF CONTENTS

INTRODUCTION	1
Background and Significance	2
Scope of the Study	6
THEORETICAL FRAMEWORK	12
Social Capital Theory	14
The Relative Income Hypothesis	19
Social Capital Theory and the Relative Income Hypothesis as Complimentary Frameworks ..	22
LITERATURE REVIEW	28
The Problem of Income Inequality	28
The Problem of Declining Social Capital	34
Inequality and Social Capital	45
Income Inequality, Social Capital and Adverse Outcomes	50
Study Objectives and Hypotheses	71
Conceptual Model	74
METHODOLOGY	76
Study Design	76
Data Sources and Sample	78
Procedures	79
Measurement of Study Variables	81
Analytical Model	83
Analysis	84

Summary	91
RESULTS	93
Measurement Models.....	93
Path Analysis	105
Summary and Discussion.....	120
CONCLUSION.....	135
Study Limitations.....	138
Conclusions.....	142
APPENDIX A: DESCRIPTION AND MEASUREMENT OF STUDY VARIABLES.....	145
APPENDIX B: COPYRIGHT PERMISSION	148
REFERENCES	150

LIST OF FIGURES

Figure 1: Conceptualized Path	27
Figure 2: Conceptual Model	75
Figure 3: Proposed SEM Model, Income Inequality, Social Capital and Adverse Outcomes	84
Figure 4: Income Inequality Construct	97
Figure 5: Social Capital Construct.....	100
Figure 6: Adverse Outcomes Index	104
Figure 7: Model 1: Inequality, Social Capital and Adverse Outcomes	105
Figure 8: Final SEM Model	119

LIST OF TABLES

Table 1: Descriptive Statistics, Income Inequality Construct.....	93
Table 2: Factor Loadings for Inequality Construct.....	94
Table 3: Goodness-of-Fit, Inequality Construct	96
Table 4: Squared Multiple Correlations, Inequality Index	97
Table 5: Descriptive Statistics, Social Capital Construct	98
Table 6: Factor Loadings, Social Capital Construct	98
Table 7: Goodness-of-fit Statistics, Social Capital Construct	99
Table 8: Squared Multiple Correlations, Social Capital Construct.....	100
Table 9: Descriptive Statistics, Adverse Outcomes Construct	102
Table 10: Factor Loadings, Adverse Outcomes Construct Model 1.....	103
Table 11: Factor Loadings, Adverse Outcomes Construct Model 2.....	104
Table 12: Regression Estimates, Model 1.....	106
Table 13: Descriptive Statistics, Control Variables.....	109
Table 14: Regression Estimates, Control Variables	110
Table 15: Regression Estimates, Model 2.....	115
Table 16: Goodness-of-fit, Model 2.....	116
Table 17: Regression Estimates, Final Model	117
Table 18: Goodness-of-fit, Final Model	117
Table 19: Results of Hypothesis Tests.....	120
Table 20: Description of Study Variables.....	146
Table 21: Measurement of Study Variables.....	147

INTRODUCTION

Despite a long period of economic growth, with low unemployment and increasing productivity, researchers have noted an increasing gap in economic equality in the United States and worldwide. The increasing income inequality within the U. S. and in other western countries has received more intense scholarly interest in the past decade, and for good reasons. In addition to compounding poverty, inequality in itself generates socially undesirable outcomes (Yates, 2004). Income inequality is truly an interdisciplinary problem; researchers have documented the links between inequality and undesirable outcomes in the healthcare, social work, criminal justice and public administration arenas.

Theorists have also hypothesized that the growing gap between the rich and the poor has led to declining levels of social cohesion and trust, which has been characterized as disinvestment in social capital (Kawachi, Kennedy, Lochner and Prothrow-Stith, 1997). Social capital can be described as the value created through the human relationships or networks that enable a society to function effectively. It has been labeled the ‘glue’ that holds the fabric of a society together, and depends on the degree of trust and cooperation among individuals. Much empirical research has found that inequality is a significant factor in the degree of trust and social capital in society (Putnam, 2000; Halpern, 2005; Kawachi, Kennedy and Wilkinson; 1996; Kennedy, Kawachi, Glass and Prothrow-Stith, 1998a; Kennedy, Kawachi, Prothrow-Stith, Lochner and Gupta, 1998b, Kawachi, 2000a; Kawachi and Kennedy, 1997, among others).

Although relationships between income inequality, social capital and adverse social outcomes have been clearly established, the nature of those relationships remains a matter of considerable debate over the direction of causality and relative magnitude of the effects. Some

theorists concentrate on the micro level and argue that income distribution is the result of individual deficiencies in human and social capital. This perspective reflects the view of economic researchers who espouse the income distribution theory and take a ‘bottom up’ or compositional view of the causal path, focusing on the influence of individual attributes on health, criminal activity or other outcomes (Atkinson and Bourguignon, 2000; Bronfenbrenner, 2007). Others argue that income inequality represents a ‘top down’ structural condition that contributes to or causes the social and human capital deficiencies (Jen, Jones and Johnston, 2009). Some social capital theorists find empirical support for the latter proposition, but others caution that the relationship is reciprocal and the causal arrow could run in either direction. Some researchers have even argued that this reciprocal nature makes the relationship too complicated for any causal relationship to be established (Halpern, 2005).

This complex relationship has made it difficult to formulate policy advice to address these root causes of social problems. A review of the literature raises some important questions about the links between these variables. First, is income inequality solely the result of micro-level human capital deficiencies, or is there a there an aggregate macro-level contextual force at work? Second, if a contextual effect exists, how might it exert its influence? And third, can a contextual causal path in the relationship between income inequality, social capital and adverse social welfare outcomes be validated to illuminate which aspects of this relationship should receive policy attention?

Background and Significance

Theorists have long recognized that the profound effects of inequality and social capital on social welfare issues demand policies that address these broader, macro-social forces

(Kennedy, et al., 1998b). A number of empirical studies have tackled the relationship from different perspectives, directions and disciplines, focusing on the relationship between inequality and outcomes; inequality and social capital, and social capital and outcomes. The effect of economic inequality on health and life expectancy has been documented extensively in several studies (Kawachi and Kennedy, 1997; Kawachi et al., 1997; Kawachi, 2000a, Singh and Yu, 1996; Sells and Blum, 1996; Wilkinson, 1992; 1996; 1999 and 2005; and Waldman, 1992, among others). In the criminal justice arena, researchers have compiled evidence that it is income inequality, rather than poverty, which appears to increase crime (Field, 2003; Arthur, 1991; Blau and Blau, 1982; Western, Kleykamp and Rosenfeld, 2004a and 2004b, among others). These social welfare problems exacerbate the impact of income inequality on public policy dilemmas, but they are not the only effects inequality has on governance. Gallego (2007) contends that the relationship between income inequality and public participation is “one of the most consistent findings of empirical research” (p. 1).

In the public administration arena, a number of authors have focused on the impact of income inequality on educational attainment (Campbell, Haverman, Sandefer and Wolfe, 2005; Pickett and Wilkinson, 2007; and Kaplan, Pamuk, Lynch; Cohen, and Balfour, 1996). Bernstein, McNichol, Mishel and Zahradnik (2000) found that U.S. states with greater inequality also had higher rates of unemployment, incarceration and violent crime as well as lower rates of health insurance and more citizens who needed government economic assistance.

While this research has focused on the direct impact of economic inequality, others have concentrated on the impact of inequality on social capital, and some contend that inequality exerts its influence through its impact on social cohesion. Uslaner (2005a) documents this link in

a study of inequality and corruption, arguing that the path from inequality to corruption is indirect, and runs through generalized trust (p. 2). There is much empirical evidence that inequality is a significant factor in the degree of trust and social capital in society (Putnam, 2000; Halpern, 2005; Kawachi et al.; 1997; Kennedy, et al. 1998b, Uslaner, 2002 and 2005 among others). Uslaner's (2005) findings are consistent with other researchers who have hypothesized that growing inequality in the U.S. has produced a decline in social capital in the U.S. Many of these studies have also linked the decline in social capital to the same adverse outcomes associated with rising income inequality. But attempts to illuminate the nature of this relationship have engendered much debate over the direction of causality.

The scholars cited above take an ecological approach and look at income inequality as a structural feature of society that impacts individual opportunities and choices. In contrast, the income distribution theory, a branch of economic theory, considers individual human capital deficits a cause of income inequality. Some social capital theorists also hypothesize that income inequality may be the result, rather than the cause, of problems such as poor health or a life of crime. Others point out the evidence at both contextual and compositional levels suggest both forces are at work, and propose a circular reciprocal pathway. This debate has made it difficult to determine how policy should be directed to alleviate these adverse outcomes.

The complexities of these relationships have perplexed policy makers, who have called for simpler measures to inform their decisions about these issues. Such simpler measures demand both a sound theoretical framework and rigorous methodologies to tease out the root causes of social problems. Research indicates that the problems of crime, corruption, poverty, poor health and low educational attainment are interrelated, thus there may be underlying causal factors that

could be addressed to alleviate these problems across disciplines. There is much evidence that income inequality may be one of these underlying causes; the problem for evidence-based research is to determine which aspects of this relationship should receive policy attention.

An ecological approach to income inequality can provide such a framework because it can help identify the conduits through which contextual conditions such as income inequality affect life choices at the micro level, and explain how these choices impact societal well-being at the macro level (Cullen and Agnew, 2006). Understanding the channels through which these contextual factors contribute to social problems can provide useful information to inform policy, particularly if analysis can distinguish the relative impact of proposed causative factors. Investigating the structure of these relationships should be a first step toward determining which aspects should receive policy attention.

Although there is much evidence to suggest that a reciprocal relationship exists, such a relationship poses problems from a policy analysis perspective. When no temporal precedence can be identified, reciprocal relationships produce poorly-specified models that are impossible to test. For analytical purposes, isolating a primary pathway in a relationship provides a testable model that can be validated or refuted to provide more useful information. If the model can be validated, the appropriate model variables can then be used to inform policy decisions to obtain the best outcomes. To this end, this study proposes a test of the contextual relationship posited by the relative income hypothesis.

Richard Wilkinson (1992; 1996; 1999 and 2005) argues that the effects of relative income differences—inequalities—exert a greater influence on social outcomes than the level of individual absolute income. He also asserts that the primary effect of income inequality results

from its impact on social capital, hypothesizing that the psychosocial effects of relative differences in income are the forces that drive the observed impact of income inequality on adverse social outcomes (Wilkinson, 1996). Wilkinson's insight is categorized as a hypothesis because, although there is evidence to support the causal chain he proposes, the evidence is considered insufficient to support raising the hypothesis to the level of theory. This hypothesis is worth testing given review of the literature and relevant theory that provides a sound basis to consider the effect of a potential causal pathway from income inequality through social capital to adverse social outcomes.

Despite the evidence suggesting that contextual income inequality exerts its influence through social capital, Fischer and Thorger (2007) contend that there has been little empirical research into the impact of relative income position on social capital. A review of the literature suggests a need for a broader, more interdisciplinary approach to test the theoretical proposition that social welfare problems share common roots, to identify those roots and ascertain how they influence social welfare. The questions raised by this issue lend themselves to comparative analysis, and an investigation of differences in income inequality, social capital and social welfare outcomes in the U.S. could illuminate these relationships.

Scope of the Study

This study addresses these issues by introducing a new model to illuminate the structure and effects of these macro-social forces across disciplinary lines in public administration, social work, health care and criminal justice in U.S. counties. To accomplish this end, this study used structural equation models to build and validate measurement models of the income inequality, social capital and outcome concepts. These measurement models were then used to build a

confirmatory structural equation model (SEM) of the posited relationship. SEM is a good choice for such an investigation because it offers a hypothesis-testing approach to analysis of the theoretical structure underlying complex relationships (Byrne, 2001).

The choice of U.S. counties as the level of analysis for this study was driven by theoretical considerations. Although some scholars have noted that the relationship effect in the U.S. is more pronounced at the state level, others contend that the relationship is essentially local because that is the level where individuals make the most meaningful relative comparisons (Subramanian and Kawasaki, 2004). Rupasingha et al. (2006) argue that studies at the county level are better suited to capture the effect of relative income inequality because individuals are more likely to compare their position to that of their neighbors rather than to residents of other states.

Also, from a statistical perspective, SEM is a large sample technique, and sample size requirements increase with the complexity of the model. While parsimony is one objective of the model proposed for this study, the model is still complex enough to require a relatively large minimum sample size of over 250 cases to increase statistical power (Kline, 2005). Since there are only 50 states in the U.S., sample size can be increased by using the approximately 3,000 counties in the U.S.

The study uses a retrospective cross-sectional design to examine the structure of the relationships between income inequality, social capital and selected adverse outcomes for the year 2000 to determine whether the path proposed by the relative income hypothesis could be validated. It should be noted that cross-sectional designs cannot establish causality. Nonetheless, they can provide good information about the structure of relationships, and such information can

provide evidence to inform theories of causality. This study focuses on the structural elements of the relative income hypothesis, which contends that the indirect path from income inequality to adverse outcomes is mediated by social capital (Wilkinson, 1996). A mediating effect implies that the indirect path represents the causal direction, thus removal of the mediating variable (social capital) would negate the influence of the predictor variable (income inequality).

A test of this hypothesis implies several basic premises. First and foremost, that the measurement indicators provide an accurate depiction of the elements under study, and that these indicators share sufficient commonality to define the concepts of income inequality, social capital and adverse social outcomes. Four other premises were also integral to the study: that there is an association between income inequality and adverse social outcomes; between social capital and adverse outcomes; between income inequality and social capital; and finally, that some evidence exists to suggest that the impact of income inequality on adverse outcomes occurs as a result of its impact on social capital. The literature offers much evidence to support these contentions, which form the framework for an SEM path analysis to investigate three research questions: Does income inequality, as a contextual variable, exert any influence on adverse social outcomes? Is an association between income inequality and adverse outcomes mediated by social capital? And finally, can a structural path from income inequality to adverse outcomes through social capital be validated?

The following study objectives were designed to illuminate these issues.

Objective 1: To determine whether there is sufficient commonality among income inequality indicators to form a valid index measure of income inequality.

Objective 2: To test the social capital measurement model developed by Rupasingha, Freshwater and Goetz (2006) (the RGF model) for the census year 2000 to determine whether this model produces a valid measure of the concept.

Objective 3: To determine whether there is sufficient commonality among specific indicators to form a valid index measure of adverse social outcomes in four disciplinary areas.

Objective 4: To determine whether there is a relationship between income inequality and social capital such that an increase in income inequality is associated with a decrease in social capital.

Objective 5: To determine whether there is a relationship between income inequality and selected adverse social outcomes such that an increase in income inequality is associated with an increase in these selected adverse outcomes.

Objective 6: To determine whether there is a relationship between social capital and adverse outcomes such that a decrease in social capital is associated with an increase in adverse outcomes.

Objective 7: To determine whether social capital mediates the relationship between income inequality and adverse outcomes.

Objective 8: To determine whether social capital mediates the relationship between income inequality and adverse outcomes when controlling for specific demographic factors.

Objective 9: To determine whether a causal path from income inequality to adverse outcomes through social capital can be validated.

This study contributes to the existing literature by illuminating the channel through which structural features such as inequality may impact social welfare outcomes. This investigation of these hypothesized conduits to assess their relative contributions adds a new model to the

literature to help explain the structural factors in the relationship. In addition, while most previous research has concentrated the effects of these issues in a single disciplinary area, this model tests the relationship across an interdisciplinary spectrum of outcomes including healthcare, criminal justice, governance and social welfare. Last but not least, speculation over the relative impact of income inequality remains a hypothesis because insufficient evidence has been accumulated to raise the supposition to the level of theory. Fischer and Thorngler's (2007) complaint about the gaps in the empirical research into these relationships is germane here. This study takes the broader, more interdisciplinary approach called for to test the theoretical proposition that social welfare problems share common roots, to identify those roots and ascertain how they influence adverse social outcomes.

To set the stage for this analysis, the next chapter of the study discusses the theoretical framework that informs the research questions. Next, the study summarizes the literature on the relationships between: income inequality and adverse outcomes; inequality and social capital, and social capital and adverse outcomes, as well as the evidence that supports and refutes the relative income hypothesis that social capital mediates the relationship between these ecological variables. A description of the study methodology and measurement of the study variables forms the fourth chapter, which is followed by a discussion of results of the analysis. The concluding chapter summarizes these results and their implications for theory and further research.

This study has implications for both theory and practice. At a minimum, it informs the theoretical debate over the contextual consequences of income inequality. Conducting the analysis across four disciplinary areas also broadens the scope of Wilkinson's (1992) relative income hypothesis to provide information about the significance of structural pathways that may

be root causes of social ills. The overriding purpose of good public policy is to improve societal well-being. At best, social problems such as high rates of crime and poverty, along with poor education and health outcomes, put increased pressure on government budgets. At worst, these problems can contribute to economic and social deterioration and provoke political instability. Theorists and policy makers have long recognized that these problems share common elements and may have common causes; the results of this study could inform policy by illuminating which aspects of the problem could be addressed to improve these outcomes.

THEORETICAL FRAMEWORK

The theoretical framework selected for this study provides a foundation for understanding how economic inequality and social cohesion affect social outcomes. Researchers have demonstrated consistent links between income inequality and undesirable outcomes in the healthcare, criminal justice, governance, and social welfare arenas. Evidence also suggests that rising inequality in the U.S. has contributed to the decline of social capital, which has been characterized as the level of trust and social cohesion that determines how well a society functions (Kawachi et al., 1997).

A number of empirical studies in several disciplinary areas have tackled the issue of the relationships between economic inequality and social capital; inequality and specific adverse social outcomes; and social capital and selected outcomes. Theorists caution that the relationships are complex and causal arrows could run in any direction, thus theories of causality take different approaches. The economic theoretical stream, represented by income distribution theory, argues that the association between inequality and adverse social outcomes is compositional, and views macro-level income inequality as an outcome of micro-level deficiencies in human capital such as a lack of education, poor health or a criminal record. An alternate view considers these problems outcomes of the ecological context of structural inequality at the macro level which prevents individuals from attaining human capital. Recent research suggesting the effect of income inequality is mediated by social capital has further complicated the relationship.

This study takes an ecological approach to these issues for several reasons. First, the human capital argument fails to recognize that each new individual enters a world where

structural elements that undermine efforts to achieve human capital already exist. Since these structural features of society are pre-existing, the compositional argument ignores the causal requirement for time-precedence. Second, there is extensive empirical evidence that increases in human capital over the last 60 years have failed to decrease income inequality in the U.S. In fact, the opposite has occurred; increases in economic inequality have grown even as Americans were increasing their human capital by investing in higher education, working longer hours and increasing productivity gains (Levy and Temin, 2007). The failure of these compositional improvements to produce the greater income equality predicted by economic theory provides good justification to consider the contextual argument.

Third, although there is also evidence to support the impact of human capital deficiencies on income inequality and adverse outcomes, no one suggests that compositional elements such as race actually matter in human capital terms; rather, it is the social meaning attached to race--the structural issue of class prejudice—that produces variation in compositional variables such as individual income (Wilkinson and Pickett, 2006).

Finally, the contextual pathway from inequality to outcomes has not received as much study as the compositional path, despite findings that the contextual path exerts a relatively strong influence. There is much evidence to suggest the ecological causal pathway from contextual income inequality to adverse social outcomes may have greater significance than individual-level deficiencies in terms of the overall economic and social well-being of developed societies. This evidence provides a firm theoretical foundation for an approach that tests an ecological-level pathway in an attempt to simplify the relationship. The use of an ecological approach raises the issue of potential susceptibility to the ‘ecological fallacy’—that is, the

assumption the conclusions based on aggregate data can be extrapolated to the individual level. In this case, this fallacy is not an issue because both the predictor and outcome variables are measured at a purely ecological level and thus do not provide the information necessary to make predictions about individual behavior (Kennedy et al., 1998b).

Numerous studies at the U.S. state level have found that inequality is a significant factor in the degree of trust in society (Putnam, 2000; Halpern, 2005; Kawachi et al.; 1997; Kennedy, et al. 1998b, and Uslaner, 2002 and 2005 among others). A growing body of research has tested the hypothesis that increasing income inequality in the U.S. has undermined social cohesion and trust and led to ‘disinvestment’ in social capital (Kawachi et al., 1997). Many of these studies have also linked the decline in social capital to the same adverse outcomes associated with rising income inequality, but the relationships between these variables are the subject of much debate over the direction of causality and relative magnitude of the effects.

The complex relationship has made it difficult to formulate policy advice to address these root causes of social problems. The theoretical framework chosen for this study combines two related theoretical concepts-- social capital theory and the relative income hypothesis--that attempt to explain the effect of inequality on social outcomes by tracing a causal path from income inequality to adverse outcomes through social capital.

Social Capital Theory

Social capital theory has roots in classical philosophical concepts of the good society and the nature and role of citizens in promoting social welfare. Modern social capital theory extends this debate by recognizing that social welfare is dependent upon the quality of social relationships in the society (Adler and Kwon, 2002). Robert Putnam (2000) is credited with

reviving interest in social capital research as a result of his investigation into the impact of declining social engagement in the United States. Putnam (2000) contends that social capital is a major determinant of social outcomes. Comparing U.S. states, he argues that states with low social capital exhibit more adverse outcomes-- poorer health, higher crime rates, greater poverty and poorer educational outcomes—than states with higher levels of social capital. In his popular book *Bowling Alone* Putnam (2000) maintains that a decline in social capital in the United States is likely to have negative consequences for the nation's future well-being.

Putnam (2000) defines social capital as the norms, networks and trust that allow a society to function. The use of the term 'capital' in current conceptualizations of the good society is an explicit reflection of the theoretical proposition that these social elements function like other forms of capital, with a similar normative basis. Designating social integration as 'capital' emphasizes that returns are expected from investment in social relations; social capital is thus an asset in terms of access to social networks and the benefit of their resources (Lin, 2001, p. 19).

James Coleman (1988) is credited with developing the social capital concept as a way to integrate social theory with economic theory. Coleman considered social capital a resource because of the expectation of reciprocal returns on an individual's investment in social relations (Field, 2003). From an economic perspective, appropriate reciprocity is required to establish trust, and trust is necessary to grease the wheels of commerce. This dimension of social capital goes beyond the individual to incorporate wider networks among groups who have built a high degree of trust (Field, 2003, p. 20). Thus, social capital is a resource that can influence societal well-being at the communal level through networks of relationships that "bind people together as

a community via certain norms and psychological capacities, notably trust, which are essential for civil society and productive of future collection action or goods” (Farr, 2004, p. 9).

Social capital theory explains the association between social engagement and adverse outcomes by asserting that social cohesion is necessary to inhibit socially undesirable actions. The theory explains how this occurs by distinguishing between associational ties within homogenous groups and those between diverse groups. Granovetter (1983) introduced the idea that the weak ties between acquaintances are essential to an individual’s integration in society. He maintains that individuals with few weak ties will suffer from information asymmetries which can insulate them from new ideas and disadvantage them in the labor market. Granovetter (1983) extends this impact to society at large, noting that “social systems lacking in weak ties will be fragmented and incoherent. New ideas will spread slowly, scientific endeavors will be handicapped, and subgroups separated by race, ethnicity, geography or other characteristics will have difficulty reaching a *modus vivendi*” (p. 202).

Granovetter’s (1983) insights were also explored by Putnam (2000), who makes a distinction between bridging and bonding social capital. Putnam considers these two concepts the most important dimensions of social capital (p. 22). He defines bonding social capital as the inward-looking ties that bind homogenous groups together to enforce an exclusive identity. Bridging social capital is analogous to Granovetter’s (1983) weak ties; it occurs not within but between groups of individuals, and forges the acquaintanceships that allow the kind of linkage necessary for the diffusion of information and opportunities across society.

Fukuyama (2001) further explains how the mix of bonding and bridging social capital impacts society. He points out that it is not just the internal cohesiveness of groups that affects a

society's social capital; the way these groups relate to outsiders is also an important factor.

Fukuyama (2001) argues that strong moral bonds within a group can work to decrease the amount of trust the group has in outsiders; each individual and group has a 'radius of trust' that establishes this boundary. A narrow radius of trust will produce negative externalities because "in-group solidarity reduces the ability of groups to co-operate with outsiders" (p. 9).

This narrow radius makes it difficult to trust others and encourages the perception that strangers fall into a different social category where a lower standard of moral behavior can be applied. In such cases, strong bonding social capital produces negative externalities, as when kinship group loyalty results in nepotism or corruption in government and business. In contrast, Fukuyama (2001) theorizes that cases where the radius of trust is large—groups that trust outsiders as well as group members—produce positive externalities such as wider networks and lower transaction costs that encourage economic growth and development. In fact, Fukuyama (2001) concludes that the radius of trust defines the probabilities for positive and negative externalities: the wider the radius, the greater the probability of positive externalities; the narrower the radius, the greater the probability of negative effects on society.

Since groups with a wider trust radius are more likely to have more bridging links, the radius of trust establishes the potential for the 'weak ties' that Granovetter (1983) contends are essential to an individual's integration in society, and to a society's well-being in terms of innovation, internal integration and economic success. On the other hand, strong bonding social capital may have negative consequences. The dark side of social capital has been recognized by most social capital theorists. Considering the use of social capital in inner-city gangs, Putnam

(2000) recognized that problems can occur when group solidarity is maintained by isolation from, and hostility toward, out-group members.

The two key concepts of association and generalized trust form the basis for the social capital construct. A wider trust radius produces the generalized trust that promotes association; diverse association produces the weak ties and bridging social capital necessary for social cohesion. In contrast, a narrow trust radius encourages homogenous bonding that discourages diverse association. At best, this bonding inhibits the free flow of ideas and increases transaction costs; at worst, it promotes social disintegration by encouraging suspicion of out-group members and endorsing the application of different—and usually lower—moral standards in dealings beyond the group in society at large. These tenets of social capital theory attempt to explain the empirical association between social capital and adverse social outcomes, and the theory has been persuasive enough to cause much concern over research demonstrating a decline in social capital in the U.S.

These findings have focused much research on the reasons for this decline, and well-researched studies have suggested underlying causes include changes in demographics; shifts in employment patterns; evolving alternate entertainment technologies; the introduction of women into the workforce; and racial and ethnic diversity (Halpern, 2005; Field, 2003; and Putnam, 2000 and 2007). Studies have also suggested that economic inequality is a significant factor in the decline of social capital, (Putnam, 2000; Halpern, 2005; Kawachi et al.; 1996; Kennedy, 1998b, among others) but theorists disagree over the magnitude and direction of its effect. This study builds on the ecological tradition in social capital theory, and uses Richard Wilkinson's

(1992) relative income hypothesis to examine the possibility that social capital exerts a mediating influence in the relationship between inequality and selected adverse outcomes.

The Relative Income Hypothesis

Richard Wilkinson's (1992) relative income hypothesis takes an ecological approach which contends that, in developed societies, the structural effect of income inequality has a greater impact on social outcomes than individual-level income. Wilkinson formulated this hypothesis as a result of his investigation into the impact of income inequality on health status, which demonstrated that health outcomes appear to be adversely related to the level of inequality in developed societies. He notes a paradox in the differences in health status in developed societies where modern medicine has advanced to the point that infectious diseases are no longer the main causes of death and the necessities of life are readily available. In these societies, degenerative diseases influenced by affluent lifestyles have become the main causes of premature deaths (Wilkinson, 1996, p. 3). Wilkinson (1996) contends that once a country has passed this threshold, the direct effects of higher individual income and a higher standard of living are less important for health outcomes than the effects of relative differences in social position (Wilkinson, 1996, p. 3).

Wilkinson's (1992, 1996, 1999 and 2005) studies on income inequality and health status led him to hypothesize that the impact of a sense of relative deprivation and disadvantage "probably extends far beyond the conventional boundaries of poverty" (Mancinko, Shi, Starfield and Wulu, 2000, p. 413). His hypothesis is based on the posited psychosocial impact of income inequality at the macro level. He argues that the direct effects of absolute income matter less than the ecological effect of income inequality, and that these ecological effects contribute to

outcomes through their impact on social stratification within the wider society. The relative income hypothesis raises compositional psychosocial explanations of the effect of income inequality on health at the macro-level, hypothesizing that income inequality produces status and power differentials that create psychosocial stresses. In turn, these stresses create a climate of distrust that reduces the level of social cohesion in the society (Wagstaff and van Doorslaer, 2000). His hypothesis attempts to explain how inequality creates a sense of relative deprivation in developed societies that results in social disintegration and produces social problems such as poor educational attainment and high rates of crime, mortality, and poverty.

Wilkinson's (1999) research applied an interdisciplinary approach, using information obtained from behavioral science to argue that sensitivity to inequality may be programmed into the human psyche. To bolster this assertion, he cites carefully controlled experimental studies of primate behavior that demonstrate an association between poor health and subordinate status. Newer evidence that suggests an aversion to inequality may be hard-wired even further down the evolutionary chain was recently obtained by researchers working with dogs. In a controlled experiment, dogs not given treats for 'shaking hands' became agitated when they observed that other dogs were rewarded for the task, and eventually went 'on strike' and refused to cooperate. The control group, where none of the dogs were given treats for 'shaking,' did not exhibit the same behavior and cooperated for longer periods. Dogs are the first animals outside the primate community that have been shown to have a sense of reciprocity in terms of 'fair pay' for 'work', and the author notes that: "Biologists have theorized that an aversion to inequality is a critical factor for cooperative behavior" (Millus, 2009, p. 13).

Back in the human arena, empirical studies that demonstrated the impact of income inequality holds for outcomes other than mortality and at smaller levels of analysis (i.e., within as well as between countries) lent additional support to the relative income hypothesis. Even more support was obtained from studies indicating the effect of inequality has been demonstrated in other disciplinary areas such as the criminal justice and education arenas mentioned above.

Based on such findings, Wilkinson (1992, 1996, 1995 and 2005) posited that relative income inequality provokes conflict with an innate sense of fairness and violates principles of reciprocity that form the basis of trust in society. Inequality also affects association by creating hierarchical social stratification and establishing social distances that inhibit the formation of the weak ties and bridging social capital Granovetter (1983), Putnam (2000) and Fukuyama (2001) consider so necessary for social cohesiveness. In promoting social exclusion, social stratification breeds resentment and distrust between the stratified groups. It also stigmatizes the deprived and affects their opportunities to obtain the human capital necessary to improve their lives. These effects impact aggregate social capital as resource/demand conflicts increase social tensions, decrease tolerance and depress generalized association. In lieu of bridging social capital, bonding social capital encourages the formation of an 'us versus them' mentality that promotes advancement of group values over societal values. Lower levels of trust undermine the legitimacy of social institutions and incite disregard for social values. Decreased tolerance promotes anti-social attitudes and social stress which manifests in increased aggression, poorer health, blocked opportunities and increased poverty and criminal activity.

Thus, Wilkinson (1992, 1996, 1999 and 2005) contends it is not the direct effect of income inequality that produces social problems, but its indirect impact on the quality of the

society's social fabric. In essence, he hypothesizes that social capital mediates the relationship between income inequality and adverse social outcomes. Wilkinson (1996) asserts that the quality of social life is a powerful determinant of a society's wellbeing, and he argues that differences in the quality of social life are closely related to differences in economic inequality (p. 5). His hypothesis--that inequality creates a sense of relative deprivation which undermines social cohesion and leads to social disintegration--attempts to explain the mechanism through which inequality exerts its influence, and establishes a testable causal path from inequality to social outcomes through the effect of relative deprivation on the social fabric.

Social Capital Theory and the Relative Income Hypothesis as Complimentary Frameworks

Social capital theory and the relative income hypothesis are related in that each posits some or all of the adverse social effects of economic inequality result from its association with social capital. The application of an ecological approach to this relationship provides a framework which can describe the conduit—social capital—through which structural conditions such as inequality affect life choices at the micro level, and explain how these choices impact societal well-being at the macro level (Cullen and Agnew 2006).

The association between economic inequality and social capital has extensive theoretical roots. James Coleman (1988) developed the social capital concept as a way to integrate social theory with economic theory; the evolution of the concept parallels development of the idea of human capital in the 1960's and further widens the interdisciplinary aspect of economics by adding another social dimension to classical economic theory (Field, 2003). Field (2003) suggests that “interest in social capital represents an attempt to modify the traditional focus of economists on individual behaviour, by stressing the social basis of peoples' decisions” (p. 9).

Bourdieu (1984) illuminates the relationship between these two concepts in his view of capital as the product of accumulated labor and his contention that both social capital and cultural capital should be treated as assets that represent the product of this accumulated labor (Field, 2003).

Coleman brings this view of social relationships as ‘capital’ to the contextual level in his observation that social capital represents a resource because it goes beyond individuals to involve wider networks that form relationships governed by trust and shared values (Field, 2003, p. 20). At the macro level, social capital theory stresses that the relationship between social cohesion and trust is important to a society’s economic success. The economic theory of transaction costs is invoked to explain how social capital affects the economic arena. Key components of the social capital concept include reciprocity, trust and civic cooperation, and proponents of social capital theory hold that “economic activities that require some agents to rely on the future activities of others are accomplished at lower cost in higher trust environments” (Knack and Keefer, 1997).

Coleman emphasizes that trust in the economic arena is based on the concept of a fair trade, thus social capital is a resource in the economic sense because it involves the expectation of reciprocity (Field, 2003). The concept of reciprocity explains how inequality impacts social capital when trust is undermined by the absence of appropriate reciprocity. Uslaner and Brown (2005) touch on this dynamic when they suggest that “trust in others rests on a foundation of economic equality. When resources are distributed inequitably, people at the top and bottom will not see each other as facing a shared fate and will thus have less reason to trust people of different backgrounds” (p. 869). A large body of literature has extended this insight to suggest that inequality affects social capital by constraining individual access to the type of social capital

that impacts economic success (Lin, 2007; La Ferrara, 2000; Halpern, 2005; Field, 2003; Fischer and Thorngler, 2007, among others).

Numerous studies have demonstrated an inverse relationship between income inequality and positive social capital in the U.S. over the last 30 years, and have suggested the rise in inequality is a factor in the decline of social capital. In fact, the concept of social capital was initially part of a critique of class inequalities in capitalist society (Hadiz, 2004). Putnam (2000) reported a significant correlation ($r=-0.81$) between inequality and civic engagement; he and other researchers have extensively documented statistically significant correlations between the differences in social capital levels and the differences in social well-being within U.S. states (Kawachi et al., 1997). Other scholars have also found consistent correlations between state levels of social capital and many of the same undesirable outcomes associated with inequality, including poorer health, higher crime rates, lower educational attainment, less efficient government and lower levels of trust in government (Kawachi et al., 1997; Field, 2003; Halpern, 2005). A large body of research has contributed to attempts to illuminate the nature of the relationship between inequality, social capital and adverse social outcomes associated with both constructs (Putnam 2000; Field 2003; Halpern 2005; Uslaner 2002).

While some of this literature suggests that income inequality may be a causal factor generating adverse outcomes through its effect on social capital, many researchers caution that the causal arrow could run in either direction. This debate echoes the context versus compositional arguments about the effect of inequality on adverse outcomes: it questions whether contextual income inequality causes low social capital, or whether the compositional effects of low social capital cause income inequality. On the compositional side, Bourdieu

(1984), one of the earliest social capital theorists, held that social capital functions to increase income inequality because individuals earn an unequal return on essentially equal economic capital due to their different abilities to mobilize social capital (Field, 2003).

Although much social capital research has validated Bourdieu's (1984) insight, ecological level research also offers insight into a potential structural path, and many social capital researchers contend that the causal pathway that runs from income inequality to social capital may have greater significance in terms of social well-being. For example, Kennedy et al. (1998b) investigated the relationship between income inequality, social capital and violent crime. Their path analysis indicated that inequality exerted a large indirect effect on firearm violence through social capital ($r = .59$). Cullen and Agnew (2003) argue that contextual inequality that constrains individual abilities and opportunities also affects life choices those individuals make--such as whether to obey the law or commit crimes--that aggregate to impact societal well-being.

The fact that there is evidence to support both a compositional and a contextual pathway has prompted some researchers to propose a reciprocal model. Halpern (2005), who proposed a reciprocal model to explain the relationship between income inequality, social capital and aggregate population health, suggests the relationships are simply too complicated to establish causality. Halpern's (2005) conclusion reflects the problems with specification of a reciprocal conceptual model, which assumes an equal effect for all causal factors and does not allow for the possibility that some reciprocal effects may represent weaker feed-back loops. Perhaps more importantly, the model fails to identify any temporal sequence necessary to establish a causal chain of events. While there is evidence to support a reciprocal depiction, such a model is not scientifically interesting because it cannot be empirically tested.

In the end, a review of the social capital literature both illuminates and muddies the issue of causality with respect to income inequality and adverse outcomes. The introduction of the social capital concept has helped explain how income inequality affects outcomes, but the reciprocal pathway posited by social capital theorists makes it difficult to test causality to determine where policy interventions might be directed for best effect.

However, a testable model can be generated from research and theory that supports a logical causal link from income inequality through social capital to adverse outcomes. The relative income hypothesis reflects a logical temporal sequence in positing that contextual inequality produces a sense of relative deprivation which undermines trust, inhibits association, and aggregates to the macro level to impact social capital and produce adverse social outcomes. Wilkinson (1996) asserts that the quality of social life is a key factor in social wellbeing; he argues that differences in economic inequality are closely associated with differences in the quality of social life in developed nations (p. 5). His hypothesis attempts to explain the mechanism through which inequality exerts its influence by postulating that inequality is a primary cause of a sense of relative deprivation which undermines social cohesion and leads to social disintegration

Wilkinson (1996) posits a mediating role for social capital, where the indirect effect of inequality through social capital is the main cause of social problems associated with both income inequality and social capital. Understanding the conduits through which these factors contribute to social problems can provide particularly useful information to inform policy when the relationships are complex. The relative income hypothesis, informed by social capital theory,

establishes a testable structural pathway from inequality to social outcomes through the effect of relative deprivation on the social fabric of developed nations.

Figure 1 illustrates the way the combination of social capital theory and the relative income hypothesis work together to clarify the causal pathways and mechanisms that explain the relationships between income inequality, social capital and the adverse social outcomes associated with both potential sources of undesirable social outcomes. This conceptualization forms the foundation for the theoretical framework that informs the model tested in this study.

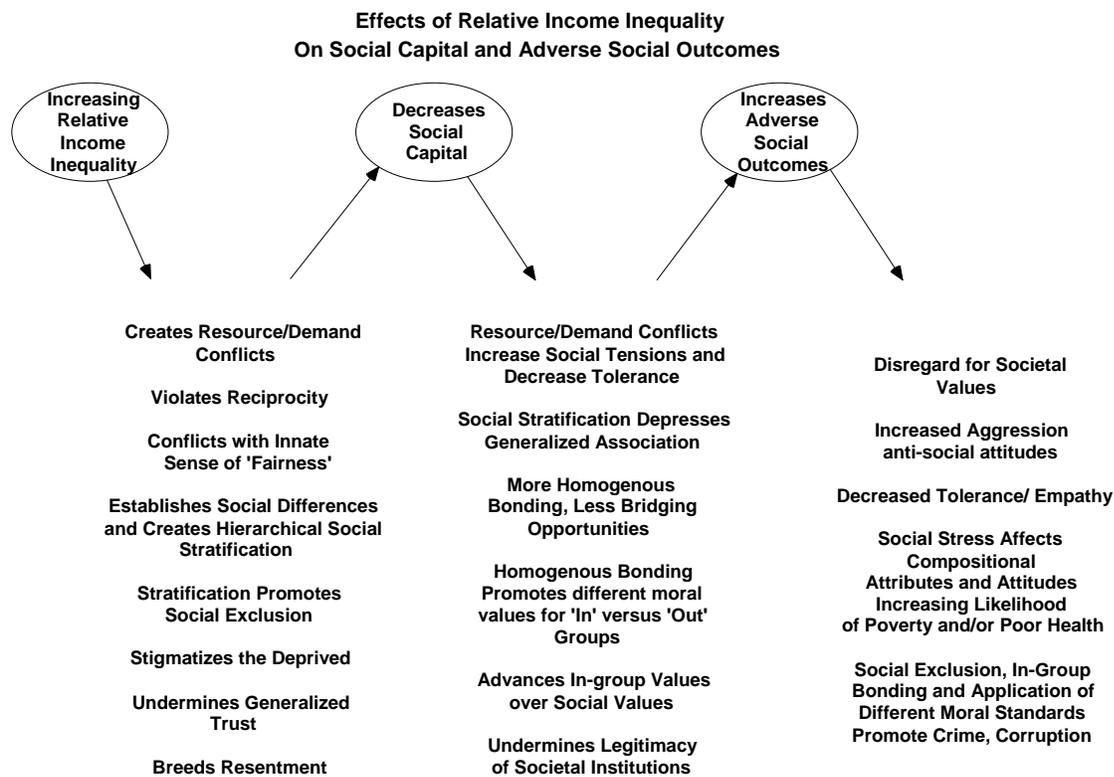


Figure 1: Conceptualized Path

LITERATURE REVIEW

A test of the relative income hypothesis requires validation of four basic premises. First, that there is an association between income inequality and adverse social outcomes; second, that an association exists between social capital and adverse outcomes; third, that such an association also exists between income inequality and social capital; and finally, that some evidence exists to suggest that the impact of income inequality on adverse outcomes occurs as a result of its impact on social capital. However, since inequality, social capital and adverse outcomes are broad concepts, tests of these potential effects depend on construction of adequate measurement models. This literature review discusses these measurement issues as well as the evidence with regard to the impact of income inequality and social capital on adverse social outcomes individually and in concert.

The Problem of Income Inequality

The emphasis on the impact of structural and institutional features on the income distribution goes at least as far back as Karl Marx, and more recent theorists such as Harold Lyndall have added considerations of social status and hierarchy to the human capital variables of education and talents (Bjerke, 1970). Theorists from the sociological school have a long history of illuminating the structural and institutional features that impact social wellbeing. This school of thought argues that the shape of the income distribution is the result of a historical process that has created structures and institutions that impact individual potential for income equality (Bjerke, 1970). Moreover, this sociological theoretical stream argues that the shape of the distribution can change as these underlying institutional factors change (Bjerke, 1970). These

structural theories use an ecological approach to study the systems of relationships that form individual environments and then investigate the impact of these structural systems on individuals. From a statistical perspective, ecological analysis uses aggregate data in an attempt to identify contextual features that impact individual actions and behaviors. Many theorists contend that income inequality is a contextual feature that impacts outcomes in a variety of areas.

Richard Wilkinson's (1992, 1996, 1999, and 2005) extensive work in this arena takes such an ecological approach; he argues that the ecological context of relative income inequities is more important than an individual's absolute income (Wagstaff and van Doorslaer, 2000). Much of his work in this area has focused on the impact of income inequality on health, where research has demonstrated that health outcomes appear to be adversely related to the level of income inequality in a society. In review of the literature on inequality and health, Wilkinson and Pickett (2006) reviewed 168 analyses in 155 papers, and found that 70% reported poorer health in less equal societies. The effect of inequality on health outcomes and life expectancy has been documented extensively by numerous studies (Kennedy, Kawachi and Prothrow-Stith, 1996; Sells and Blum, 1996; Singh and Yu, 1996; Lynch and Kaplan, 1997; Kawachi, et al., 1997; Kennedy et al., 1998a; Wolfson, et al., 1999; Wilkinson, 1992, 1996, 1999 and 2005; Wilkinson and Pickett, 2006; Pickett and Wilkinson, 2007 and Waldman, 1992, among others).

In addition, some studies that have examined differences between U.S. states have found that income inequality is a better predictor of health status than absolute poverty. For example, the Lynch et al. (1998) study of income inequality and mortality in metropolitan areas of the U.S. found that areas with high income inequality and low average income had an excess mortality rate of 139.8 deaths per 100,000 when compared with areas with lower inequality and higher

average income (p. 1079). The authors noted that “the magnitude of this mortality difference is comparable to the combined loss of life from lung cancer, diabetes, motor vehicle crashes, HIV infection, suicide and homicide in 1995” (Lynch et al., 1998, p. 1079). They concluded that the health effects of income inequality make initiatives to reduce inequality a high policy priority.

In addition to health effects, a 1996 study by essentially the same group of researchers (Kaplan et al., 1996) found higher inequality significantly associated with higher rates of work disability and unemployment; medical, police and welfare expenditures, and homicide, violent crime, and imprisonment rates. In the criminal justice arena, researchers have consistently found that it is inequality, rather than poverty, that appears to increase crime (Field, 2003). Kennedy et al. (1998b) found that income inequality was highly correlated with violent crimes using firearms ($r=0.76$). Western, et al. (2004a and 2004b) found economic inequality the largest factor in the rise in U.S. imprisonment rates from 96 per 100,000 in 1970 to 470 per 100,000 in 2001 (p. 2). Halpern (2005) adds that the relationship between economic inequality and violent crime is supported by cross-national studies that find nations with higher inequality have significantly greater rates of violent crime (p. 133).

The above problems exacerbate the impact of inequality on governance and social welfare, but they are not the only effects inequality has on government. Eric Uslaner (2005) finds a link between inequality and the quality of government in his study of corruption. He argues that “the path from inequality to corruption may be indirect—through generalized trust—but the connection is key to understanding why some societies are more corrupt than others” (p. 2).

Public administration outcomes have also been linked to differences in income inequality. Campbell et al. (2005) examined the effect of increases in economic inequality on three

educational outcomes: the number of years of schooling completed; the probability of graduating from high school; and the probability of attending college (p. 11). These authors found that the increase in economic inequality was associated with greater dispersion of educational attainment, and particularly affected the number of years of schooling completed. Pickett and Wilkinson (2007) examined the effect of income inequality on a number of variables associated with child well-being, including educational attainment. These authors found that income inequality at the U.S. state level was significantly associated with worse educational scores and a higher high school dropout rate. Kaplan et al. (1996) focused on health issues, but also found wealth inequality significantly linked to educational performance using indicators such as proficiency scores, education spending, and the high school dropout rate.

Bernstein et al. (2000) focused on inequality in a comparative study of its impact in U.S. states, and found that states with greater inequality also had higher rates of unemployment, incarceration and violent crime as well as lower rates of health insurance and more citizens who needed government economic assistance. The authors also noted that that income inequality, rather than poverty per se or average income, was the best predictor for these outcomes (Bernstein et al., 2000).

Such results suggest that income inequality is truly an interdisciplinary problem, with documented repercussions for health status, criminal justice, governance and social welfare. However, this is not to suggest that there are no negative results. Subramanian and Kawachi's (2004) literature review of multilevel studies of the impact of inequality on health examined 15 such studies and reported that just over half (8 studies) supported the association. Moreover, they note that studies conducted outside the U.S. have failed to support the association between

inequality and health. They attribute some of these results to the fact that the nations tested are more egalitarian societies than the U.S. Also cognizant of such results, Halpern (2005) and Wilkinson and Pickett (2006), among others, have suggested there may be a threshold for the effect. Methodological issues and the widespread nature of the impact on different outcome measure variables were also cited as potential reasons for negative findings.

Subramanian and Kawasaki (2004) suggest that scale is an issue, with analysis of states supporting an association, but less evidence at the level of counties and cities (p. 81). They also critique some null-results studies for small sample sizes which could undermine statistical power and fail to detect the effects (p. 82). Mancinko et al. (2003) echoes complaints that studies in this area often use samples that are too small to be generalizable, and further argue that such studies often fail to control for potential confounding variables (Mancinko et al., 2003).

Other scholars have voiced similar concerns about the positive findings based on the difficulty of accurately measuring income and income inequality and the fact that results tend to be very sensitive to the types of inequality measures used. Although there is some controversy over its measurement, income inequality is a generally considered measurable indicator rather than a construct that must be measured by proxy. Nonetheless, there are differences of opinion about how best to measure it. A number of techniques are available for calculating income inequality and each has its advantages and disadvantages. Some researchers split the population into income percentiles and compare the difference in the average for the top and bottom for each percentile. The size of the difference represents the absolute inequality between the top and bottom deciles (Brady, 2003). However, this method relies on the units of measurement, which can limit the range of results. To deal with this problem, economists often use the natural

logarithms of the average incomes before calculating the differences. This method provides a relative, rather than absolute measure and there is some consensus that such a relative measure is the most useful concept for most purposes (Brady, 2003).

Nonetheless, the most common indicator of income inequality is the Gini co-efficient. This measure ranks the cumulative share of total income earned from bottom to top, and plots this curve against a 45⁰ line which represents complete equality. The Gini coefficient is the ratio of the area between the curve and the 45⁰ line to the entire area below the line, and ranges from a score of 0 for perfect equality to a score of 100 for complete inequality (Hisnanick and Rogers, n.d.). Two drawbacks to the use of the Gini coefficient are its sensitivity to extreme values on either end of the distribution, and the inability to decompose the index into subgroups.

Other potential indexes include the Robin Hood Index, the Theil Index and the Atkinson Index. The Robin Hood Index is also based on the Lorenz curve and approximates the share of total income that would need to be transferred from households above the mean to those below it to achieve an equal distribution. The Theil Index is useful in analyses where the researcher wishes to identify a subgroup's contribution to overall equality. The Atkinson Index is based on a normative judgment about society's aversion to intolerance. It includes a parameter for this aversion such that as the societal aversion to inequality rises, the measure becomes more sensitive to transfers from the lower end of the distribution and less sensitive to transfers at the top. Thus, this measure is more sensitive to poverty than the other measures (Kawachi, 2000a). Each of these methods has advantages and disadvantages, and researchers recommend tailoring the approach to the specific analysis. Factoring and structural equation modeling can also be

used to create indexes which can test the combined effects and tease out the contribution each indicator makes to the overall concept of economic inequality.

Studies controlling for various individual income and demographic variables have also produced mixed results, but Mancinko et al. (2003) note that more sophisticated designs have substantiated the association between income inequality and health, and although such designs have also produced some negative findings, many of the compositional-level studies also suffer from methodological problems and measurement issues. These mixed results, together with the long-debated argument over whether the association between income inequality and adverse social outcomes is structural or compositional, provide good reasons for further investigation into the nature of these relationships. Thus, the first research question for this study is: Does income inequality (as a contextual variable) exert any influence on adverse social outcomes?

The Problem of Declining Social Capital

Unlike the income inequality variables, social capital is a concept that cannot be measured directly, thus studies that indicate a decline in the level of social capital may be vulnerable to criticism on the issue of construct validity. Field (2003) reports that policy-makers world-wide are “virtually unanimous in agreeing that social capital measurement is a central challenge” (p. 123). This challenge stems from the inability to directly measure the construct, which impacts the number and type of indicators chosen. Robert Putnam (2000) based much of his research on association, and he used 14 indicators to measure social capital in America, including: political participation; civic participation; religious participation; work associations; informal association; altruism; honesty; reciprocity and trust. Since his study, other researchers have used as many as 19 indicators (Field, 2003). But some researchers point out that large

numbers of indicators may measure different dimensions of social capital while others suggest some indicators should be considered outcomes, and still others divide the construct into attributes and behaviors (Field, 2003).

Nieminen et al. (2008) contend that the fact that there is no real accepted definition of the construct has led researchers to define a number of different dimensions. Fischer and Thorger (2007) assessed the impact of inequality on individual attitudes using 14 indicators to reflect 4 dimensions of social capital: generalized trust; confidence in institutions; civic cooperation and civic engagement. Nieminen et al. (2008) note that the World Bank has introduced an empirical measurement tool with six dimensions (including groups and networks; trust and solidarity; collective action and cooperation; information and communication, and social cohesion and inclusion and empowerment), while the UK Office of National Statistics uses five dimensions to measure the construct (participation; social engagement and commitment; self-efficacy; perception of community; social interaction, networks and support; and trust, reciprocity and social cohesion (p. 408).

Nieminen et al. (2008) also consider a measurement tool developed by Bullen and Onyx (1998), which identified 8 elements these authors contend define social capital. Their concept measures individual perceptions of community participation; neighborhood connections; family and friend connections; work associations; social pro-activity; trust and safety; tolerance; and the value of life. The Bullen and Onyx (1998) tool considers the first four elements the ‘building blocks’ of social capital, while the last four are measures of participation (p. 408).

While the debate over the definition of the construct and the utility of its potential indicators continues, there is growing consensus that personal attributes such as honesty,

altruism, association membership and civic engagement can provide insights into the level of social capital (Putnam, 2000; Halpern, 2005; Field, 2003 and Lin, 2001). The consensus on these concepts, together with calls for simplification for policy purposes, has led some researchers to try to produce more parsimonious models. After reviewing the options, Nieminen et al. (2008) settled on three dimensions of social capital for their own study, including social support; social participation and networks; and trust and reciprocity. Knack and Keefer (1997) also produced a simpler model to assess the impact of social capital on economic performance using only measures of trust, civic cooperation and memberships in informal groups.

A review of this literature suggests that models of social capital offer a rich variety of dimensions that could be used to build a testable model of the social capital concept. Although there is still much debate, research has continued to narrow and define the essential parameters of the concept. Models constructed and tested using principal components analysis (PCA) and structural equation modeling (SEM) are of particular interest to this study because of the ability of these techniques to reduce several explanatory variables that could simply be part of the same phenomenon into one or a few variables to build a more parsimonious model (Bjørnskov and Svendsen, 2003, p. 22). For example, in a cross-country analysis, Bjørnskov and Svendsen (2003) used PCA to test four widely used measures to determine whether social capital could be reduced to a unitary concept. These authors found that social capital could include two dimensions, representing a psychological aspect (trust) and a behavioral aspect (participation). Their trust component measured both trust in individuals and trust in institutions. The civic participation variable was based on Putnam's Instrument, a measure of the density of volunteer organizations in a country (Bjørnskov and Svendsen, 2003, p. 18).

Although the authors suggest the construct could have two dimensions, they concluded that: “Overall, it makes sense to treat social capital as a one-dimensional concept” (Bjørnskov and Svendsen, 2003, p. 29). The authors found that all four of their variables loaded powerfully on a single underlying factor, producing effect sizes between 67% and 75% depending on different combinations of their four social capital proxies.

Pamela Paxton (1999) also constructed a model using principal and confirmatory factor analysis that used 12 indicators and three latent variables tested over a twenty-year period to determine whether social capital is actually declining in the U.S. She found that the two dimensions of generalized trust (individual and institutional), coupled with a measure of associations (survey data on four types of associations), provided an excellent model fit. Paxton’s (1999) model differs from Bjørnskov and Svendsen’s (2003) in the use of ‘association’ rather than ‘participation’. Paxton (1999) considers political participation and volunteering individual outcomes of social capital. However, there is some similarity to Putnam’s Instrument in Paxton’s (1999) participatory variable “group membership”, which measures self-reported total memberships in voluntary organizations.

In yet another factor analysis, Rosenfeld, Messner and Baumer, (2001) considered Paxton’s (1999) model for their analysis of the effect of social capital on homicide rates, but found it their own model superior for their analysis (p. 291). Rosenfeld et al. (2001) constructed a structural equation model with the latent construct social capital measured by the two dimensions of social trust and civic engagement. Both Paxton (1999) and Rosenfeld et al. (2001) used data from the General Social Survey (GSS) to construct their ‘trust’ indicator, but Rosenfeld et al. (2001) replaced Paxton’s (1999) association measure with their own ‘civic engagement’ indicator

consisting of voting and organizational membership in one organization, the Fraternal Order of Elks. The validity of this last indicator was untested; in a test of the model with and without the Elks indicator, the authors found a good model fit unaffected by removing the Elks indicator. The effect of social capital on homicide was smaller, but remained statistically significant. The authors concluded that the magnitude of the increase in parameter estimates when the Elks variable was included lent validity to this indicator, but they also noted that their results did not depend on this specific measure of organizational membership (Rosenfeld et al., 2001, p. 299). The Rosenfeld et al. (2001) model differs from the Paxton (1999) and Bjørnskov and Svendsen's (2003) models in deleting their measure of institutional trust as well as replacing association variables based on surveys or Putnam's measures of association, often referred to as 'Putnam's Instrument' (Paxton, 1999; and Bjørnskov and Svendsen, 2003 respectively).

The models discussed above provide a good mix of indicators with little disagreement that some form of social or generalized trust is a key component, and some consensus that a measure of association should be included. However, most of these studies have been done between nations or between U.S. states. There is much reason to suspect that the creation of social capital occurs at the local level, but since the surveys used to measure social capital at the national level are not always available at lower levels of analysis, the availability of good data has been a problem for researchers. Moreover, survey data is subject to criticism because responses can vary due to phrasing and context, and responses can be influenced by external events. Nonetheless, a number of models using different proxies have provided similar results, suggesting there are different ways to measure the concept that may be able to widen research potential and alleviate problems with data availability.

A recent study by Rupasingha et al. (2006) demonstrates that it is possible to find data at the county level that can model the social capital construct. Rupasingha et al. (2006) used a measure similar to the widely-used Putnam's Instrument. Relying on census data and data on business and charitable organizations, their unitary model of social capital production at the county level was based on an index measure of associations along with the number of non-profit organizations, voter turnout rates and mail response rates for the decennial Census Population and Housing Survey.

The authors consider association their primary measure, but broaden the model with inclusion of specific civic engagement and altruism measures. Their altruism measure is similar to Putnam's (2000) in measuring the density of non-profit organizations within counties. The civic engagement aspect of their model includes both voter turnout and response to the decennial census. Both variables are intended to provide a measure of civic responsibility that is not based on self-reported behavior. Use of the census response rate was well-justified in Stephen Knack's (2002) study of social capital and the quality of state governments. Knack (2002) points out that analysis of census cooperation rates in individual-level studies have considered response rates a good indicator of civic engagement, thus the rates are a reasonable proxy for social cooperation.

Rupasingha et al. (2006) point out that the concept of social capital demands a broad measurement strategy due to its multiple components. (p. 84). These authors also contend that one of the major obstacles in developing the concept of social capital is lack of good data. Their analysis demonstrates that it is possible to construct a good measure using proxies available at the county level. The authors represent their study as: "the first attempt to calculate a consistent set of variables to measure levels of social capital at the U.S. county level" (Rupasingha et al.

2006, p. 100). This noteworthy accomplishment suggests additional tests of their model could further the goal of developing a simple measure of social capital at a level of analysis consistent with theories of social capital production. Testing this four-factor model using principal component analysis in 1990, Rupasingha et al. (2006) reported the first principal component explained about 46% of the variation among U.S. counties.

Although review of the literature suggests the concept of social capital suffers from definitional and measurement problems, these problems have not stymied empirical research on social capital in general or the relationship between social capital and economic inequality in particular. However, most social capital research has focused on the positive aspects of the concept. The emphasis has been on the connection between high levels of association and civic engagement, which theorists have interpreted as proxies for high levels of social trust, and high levels of socially desirable outcomes. In correlating these attributes, however, research has demonstrated that the opposite is also true—lower levels of association and civic engagement are associated with less positive outcomes. A smaller body of research has investigated the ‘dark side’ of social capital, where social capital can foster adverse social outcomes when networks such as gangs and hate groups share socially undesirable values. Thus, the concern over research that demonstrates a decline in social capital is based on the fear that lower levels of positive social capital produce less positive, and perhaps even more negative, outcomes for society.

In an extensive comparison of the levels of association within U.S. states, Robert Putnam (2000) demonstrated that communities with lower social capital exhibit more adverse outcomes--including poorer health, higher crime rates, greater poverty and poorer educational outcomes—than states with higher levels of civic engagement. Putnam (2000) contends that social capital is

a major determinant of social outcomes. Three prominent social capital theorists (Putnam, 2000; Field, 2003 and Halpern, 2005) devote chapters of their books on social capital to the subject of the association between social capital and health status. Robert Putnam (2000) contends that, of all of the consequences of social capital, none is so well established as the link between social connectedness and health (p. 326). His research demonstrated convincing correlations between social capital, measured by his social capital index of association and civic engagement, and a range of health indicators, including cancer; AIDs; low birth rates; infant mortality; suicide and all-cause mortality (p.328).

The first research to link the quality of social ties with a health-related outcome occurred in the 1930's, when Emile Durkheim's research demonstrated a link between social integration and suicide rates. Durkheim's study was statistically sophisticated for its time, and he is credited for his recognition of the effects of social structure at the ecological level (Field, 2003, p. 57). Although much research has demonstrated the link between social relationships and health at the individual level, Kawachi (2000b) suggests his 1997 study (Kawachi et al., 1997) was among the first to conduct a purely ecological level analysis (p. 61). This study used responses to the GSS survey aggregated to the state level; and found that state-level social capital indicators were highly correlated with state mortality rates. Regression estimates indicated variation in the degree of trust across U.S. states explained 58% of the variation in mortality rates (Kawachi, 2000b, p. 61). Kawachi and his colleagues followed this study with a multilevel analysis to analyze the relationship between social capital and self-rated health in U.S. states (Kawachi, Kennedy, and Glass, 1999a). As a mixed-level analysis, this study was able to consider potentially confounding individual-level variables such as insurance coverage and lifestyle

choices as well as demographic variables. The results validated the impact of these factors on health, but also revealed a strong association with social capital at the state level. According to Kawachi, the odds ratio for poor health where social capital was lowest was about 1.41 (Kawachi et al. 1998a, p. 1187).

In addition to the health arena, Kawachi and his colleagues joined with Wilkinson to look at crime and violence in addition to mortality. In a 1998 article Wilkinson, Kawachi and Kennedy (1998) reported that levels of all three adverse social outcomes were significantly related to social cohesion. Measures of social trust explained 58% of the variation in mortality in U.S. states, and explained about 49% of the variation in homicide rates (p. 584).

The above authors noted a large body of literature has correlated a variety of social capital indicators with violent crime rates, delinquency, robbery rates, neighborhood violence and homicide rates. Of particular interest to this study, Rosenfeld et al. (2001) used structural equation modeling to evaluate the relationship between social capital and crime rates. Like the present study, these authors modeled social capital as a latent construct. Their study sampled 99 geographical units in the 1990 U.S. GSS Primary Sampling Units (PSUs) (p. 289). After controlling for other potential explanatory variables such as population structure; age composition; divorce; deprivation; unemployment and region, their social capital construct exhibited a significant direct effect on homicide rates and explained 63% of the variance within these geographical units.

The relationship between social cohesion and crime is so well-recognized that several criminal justice theories have been advanced to explain it. In keeping with the economic roots of social relationships as capital, the criminal justice choice theory assumes that individuals make

rational decisions about whether to commit crimes (Savage and Kanazawa, 2002). The potential cost of losing social ties, as well as the potential for discovery, is thus weighed against the expected benefit. Where the value of social bonds is high, so is the cost of undermining those bonds, thus high social capital provides a deterrent to crime.

Another perspective on social capital and crime uses the social disorganization theory framework, which suggests that disorganization weakens informal social controls that are necessary to prevent crime (Rosenfeld et al., 2001). This social disorganization is essentially the opposite of the social cohesion implied by social capital theory. In a third perspective, the ‘dark side’ of social capital is represented by theories of sub-cultural deviance that explain how and why strong bonding social capital can lead to the formation of groups whose value system is outside the mainstream, and could include deviant behavior (Savage and Kanazawa, 2002). The wealth of literature on the relationship between social capital and crime provides a sound theoretical basis to conclude that levels of social capital are strongly associated with this adverse social outcome.

Education is yet another area where social capital is associated with the quality of a social outcome. In this arena, Putnam (2000) points out that although there has been some research on the positive aspects of social capital on education and child welfare, most research has focused on the negative aspects of low social connectedness. He notes a “remarkable convergence” in his social capital index comparisons of U.S. states and the Annie E. Casey Kids Count index of child welfare (p. 296). Putnam’s (2000) analysis demonstrates that states with low social capital also tend to have a higher percentage of children who do not attend school and higher high school dropout rates. While he recognizes that other variables, such as socio-economic status, also

influence these results, he argues that controlling for these variables still demonstrates a significant effect for social capital; poverty was the only variable to demonstrate a greater effect on child welfare than social capital. Putnam (2000) also contends that states with high social capital have better educational outcomes such as consistently higher scores on standardized tests and a lower drop out rate than students in states that have lower scores on his social capital index (p. 299).

The association between social capital and educational attainment was a key aspect of Coleman's research as well. His study of the impact of social capital on human capital, which looked at educational attainment among African-American school children, produced the surprising result that social capital could overcome the impact of socio-economic factors. The results of Coleman's study have been replicated by a large body of research; more recent investigations have generally confirmed the relationship between social capital and educational outcomes (Field, 2003, p. 46.) Field (2003) cites a literature review by Dika and Singh (2002) that examined the history of research on social capital and education from 1990 to 2001, and found much evidence to support the link between social capital and educational outcomes, even with different conceptualizations and measurements of social capital. The authors reviewed 14 studies of the impact of social capital on educational achievement; 13 studies of the relationship between social capital and educational attainment; and nine studies of social capital and psychosocial factors related to education (Ditka and Singh, 2002, pp. 41-43). The majority of these studies found statistically significant relationships between their measures of social capital and educational achievement measured by achievement scores; grades and grade-point averages; years of schooling; high school dropout rates; college enrollment and educational aspirations.

Although they do note that some studies suffer from methodological issues, these authors conclude that the evidence supports the theoretical expectation that a number of different social capital measures demonstrate a statistically significant impact on education.

The literature reviewed in this section provides good evidence that social capital significantly influences social outcomes in both positive and negative ways. However, most researchers note that these associations can be confounded by issues of social disadvantage, such as poverty. Putnam (2000) recognized this problem and argued that for some outcomes, the impact of social disadvantage variables such as race, poverty and educational attainment are indirect; he concluded that social capital is the driving force behind these outcomes (p. 300). However, research that has also found consistent correlations between state levels of social capital and many of the same undesirable outcomes associated with inequality--including poorer health, higher crime rates, less efficient government and lower levels of trust in government--has led some scholars (notably Wilkinson, Kawachi, Kennedy and their associates) to suggest the relationship between social capital and outcomes may itself be an indirect effect of the impact of economic inequality on social capital.

Inequality and Social Capital

Review of the literature indicates there is much evidence to support the first two premises of this study; that is, that high levels of income inequality and low levels of social capital both produce adverse outcomes. A third premise, that inequality impacts social capital, must also be addressed to provide a foundation for a test of the relative income hypothesis that income inequality exerts its influence through social capital. As noted in the theoretical framework for this study, concept of social capital was initially part of a critique of class inequalities in

capitalist society (Hadiz, 2004), thus it is no surprise that the two concepts have long been closely linked. Renewed interest in social capital research has also generated growing interest in income inequality due to evidence that there may be a relationship between the rise in economic inequality and the decline of social capital in western developed nations over the past three decades. Also as indicated earlier, Robert Putnam (2000), found a significant correlation between inequality and civic engagement and a growing number of studies have demonstrated an inverse relationship between the increase in economic inequality and a decline in various aspects of social capital in the U.S.

A large body of research supports the contention that income inequality is a significant factor in the degree of trust and social capital in society. Kawachi et al. (1997) studied the relationship between social capital, income inequality and mortality in a cross-sectional analysis of U.S. States in 1990. These authors considered the relationship between income inequality and social capital a major finding of their study, which indicated that “the size of the gap between the rich and the poor is powerfully and negatively related to level of investment in social capital” (p. 1495). Uslaner (2002) has also produced a reputable body of work on the relationship between inequality and trust, a basic component of social capital.

In his book *The Moral Foundations of Trust*, Uslaner (2002) aggregated state-level data from a variety of survey data sources designed to gauge trust and civic engagement attitudes over the period 1960 to 1996. His regression equation predicted a 14% decline in trust due to inequality over the period, and he notes that the Gini index of income inequality alone drove almost two-thirds of the effect (Uslaner, 2002, p.186). In Chapter 8 of his book, the author finds persuasive evidence that the relationship holds cross-nationally as well. Continuing this research,

Uslaner and Brown (2005) examined the relationship between inequality, trust and civic engagement. Looking at aggregated data from U.S. states for 1970, 1980 and 1990, the authors found income inequality was the strongest determinant of trust in three of the four models they tested (p. 889).

Alesina and La Ferrara (2000b) also considered the relationship between inequality, trust and association. Two articles published in 2000 considered determinants of trust and participation in communities that exhibit racial, ethnic and economic fragmentation. In Alesina and La Ferrara (2000a) the authors use individual-level data from the GSS and U.S. census Current Population Survey (CPS) data to compare U.S. Metropolitan Statistical Areas (MSAs) and Primary Metropolitan Statistical Areas (PMSAs) over the twenty-year period from 1974-1994. The authors accept the proposition that a predisposition to associate with others is influenced by both individual and community characteristics, but contend that ecological factors such as economic, racial and ethnic diversity also impact this inclination (p. 891). Their results indicate that both racial fragmentation and income inequality have a strong negative impact on participation in groups. In a follow-on study (Alesina and La Ferrara, 2000b) these authors focused on the trust dimension of social capital, and reported similar results. Income inequality was second only to race in its impact on the formation of trust in U.S. communities.

Costa and Kahn (2003) consider this issue in a review of the literature on community attributes and social capital. Like Alesina and La Ferrara (2000a and 2000b), Costa and Kahn (2003) consider income inequality a measure of community diversity. They report that 15 different economic papers published from 1998 to 2003 have found lower levels of trust and association in heterogeneous communities than in homogeneous arenas. Using a variety of

indicators from the GSS, CPS, DDB Needham Lifestyle Survey, and the American National Election Surveys (ANES), the authors examine data from the mid 1970's through the 1990's to assess the impact of diversity variables--including income inequality measured by the Gini coefficient--on volunteering, membership and trust. The results indicate these social capital attributes are lower in communities where wage inequality is high. Consistent with the Alesina and Ferrara (2000a and 2000b) results, this study also found the impact of racial fragmentation appears to have greater impact, but Costa and Kahn (2003) found the Gini coefficient a particularly important predictor of membership in voluntary organizations such as youth, sports and church groups, although the Gini was not a significant contributor to membership in professional groups (p. 106).

In another comparison of U.S. states, Knack and Keefer (1997) provided evidence of the link between income inequality and social capital cross-nationally as well as in the U.S. These researchers used indicators from the World Values Survey (WVS) on 29 nations to measure the impact of trust and civic cooperation on economic growth, and found that nations with high inequality demonstrated lower levels of trust and civic cooperation than nations with a more equitable distribution of wealth. In a later study, Zak and Knack (2001) broadened their analysis to 41 nations with market economies and included three waves of WVS data for 1981, 1990-91 and 1995-96. While their primary focus is on growth, the authors conclude that "inequality reduces growth through a novel mechanism—variations in trust" (p. 306). In yet another follow-up study, Knack (2002) also found the Gini coefficient significantly and negatively associated with social trust, the census mail response rate, and an index of measures of informal socializing such as visiting friends and attending dinner parties.

Review of this literature demonstrates that inequality has been closely and negatively associated with social capital over time and cross-nationally as well as within the United States, although there have been some negative findings in specific years and units of analysis. For example, in their study of factors related to the production of social capital in U.S. counties, Rupasingha et al. (2006) found inequality a statistically insignificant factor for the 1980-1990 time period, and only weakly significant for 1990-1997 (p. 95). The authors attribute these results to an increase in inequality in the 1990-1997 timeframe, which suggests such results could be due to the same potential threshold mechanism noted in the association between inequality and adverse outcomes; a 'tipping point' could also affect the relationship between inequality and social capital. Despite some negative findings, the preponderance of evidence supports the premise that inequality affects social capital in some way, and the association is accepted by most social capital researchers (Putnam, 2000; Halpern, 2005; Field, 2003, among others), but Halpern (2005) and others also suggest that the mechanisms that drive this association are complex and direction of causality remains difficult to establish (p. 271).

At the aggregate level, Uslaner (2002) contends that inequality affects social capital by lowering optimism; Oxendine (2006) suggests the impact of inequality on bridging versus bonding social capital is at fault; and a number of researchers have opined that inequality stretches the social fabric in some way that increases the social distance between individuals (Wilkinson, 1996; Halpern, 2005). Wilkinson (1992, 1996, 1999 and 2005) hypothesizes that the pathway from income inequality to adverse outcomes through social capital describes the causal mechanism at work in the relationship. This debate sets the stage for the second research question posed by this study; that is, does social capital mediate the relationship between income

inequality and adverse social outcomes? The next section considers this topic in a review of the literature pertaining to adverse social outcomes and the relative income hypothesis.

Income Inequality, Social Capital and Adverse Outcomes

Most of the studies cited earlier consider the impact of inequality on adverse outcomes; social capital on adverse outcomes and inequality on social capital; there is much less research on the complicated nature of the structure of the relationships. The relative income hypothesis raises compositional psychosocial explanations of the effect of income inequality on health to the macro-level by theorizing that income inequality produces status and power differentials that create psychosocial stresses which in turn create a climate of distrust and reduce the level of social cohesion in society (Wagstaff and van Doorslaer, 2000). A growing body of evidence supports the hypothesis that the effect of income inequality on health is at least moderated, and perhaps even mediated, by social capital and research in other disciplines has noted a similar effect on other social welfare outcomes.

The Kawachi et al. (1997) study of the relationship between social capital, income inequality and mortality in U.S states, which considered the relationship between income inequality and social capital a major finding of their study, also concluded that the impact of inequality on disinvestment in social capital was one of the pathways through which income inequality affects aggregate-level mortality (p. 1495). A follow up article by this same group of researchers (Kennedy et al., 1998b) further investigated this relationship in a study that hypothesized the effect of inequality on homicide and violent crime is mediated by social capital. These researchers averaged responses from 1986-1990 General Social Surveys (GSS) to measure the trust and association components of social capital, and the Robin Hood Index, which

measures the amount of income that would have to be redistributed from the rich to the poor to achieve income equality, as a measure of inequality. Their path analysis revealed that state-level inequality was significantly associated with social trust and group membership, and the fact that their model indicated that income inequality exerted a large indirect effect (with a path coefficient of .59) on firearm violence through social capital led these researchers to conclude that social capital mediates the relationship (p. 14).

A third study by Kawachi and associates (Kawachi, et al. 1999b) specifically references the relative income hypothesis within the U.S. In this study, Kawachi et al. (1999b) analyzed five years of GSS data for 39 states from 1986 through 1990 to examine the influence of relative deprivation (modeled as income inequality) and social capital on violent crime and property crime. The authors found that all measures of violent crime and the burglary measure of property crime were strongly associated with relative deprivation and low social capital. These researchers consider the compositional reciprocal effects of crime on social capital, and attribute some of these effects to a surge in inequality between 1970 and 1990, which they contend affected the spatial distribution of poverty by concentrating more of the poor into specific neighborhoods, thus reducing economic diversity. The conceptual framework for the Kawachi et al. (1999b) study is similar to the pathway tested in this dissertation in that it posits both a direct effect for income inequality and an indirect effect through social capital. However, in the Kawachi, et al. 1999b study, the authors' methodology is based on the construction and use of a correlation matrix to examine the relationships; they do not attempt a path analysis and do not report direct and indirect effects (p. 724).

In another attempt to evaluate the impact of relative income differentials, Fischer and Thorngler (2007) used survey data from 26 countries to model social capital and test the hypothesis that the negative distance between an individual's income and the national median income impacts the creation of social capital. The authors hypothesized that relative deprivation produces a negative effect on social capital by undermining generalized trust and the individual propensity to associate and contribute to social capital formation. By comparison, the study also draws some conclusions about the potential benefits of a relatively advantageous position for those whose incomes are above the median. The authors found support for the contention that relative deprivation impacts individual happiness, generalized trust and trust in institutions such as government and business (but not religious institutions). Results for their measures of compliance with social norms and associational activities are mixed, however. The authors report that relative income position is not significantly related to compliance issues such as tax evasion but may be more so with respect to issues such as lying to obtain government benefits.

Mixed results were also obtained for their measures of association and civic engagement, with relative income differences affecting charitable, religious and other organizations, but with no observable effect on political engagement. These effects are consistent with other research that has demonstrated higher levels of volunteering among those whose relative position is more advantageous. In the end, the authors conclude that the negative effect of relative income differences are apparent in about two-thirds of the facets of social capital they investigated, while the positive effect was observed in only a few instances (p. 38).

Fischer and Thorngler, (2007) contend that empirical research on the relative income hypothesis is "sorely lacking" (p. 1), and they note Putnam's (2000) comment that social capital

is a relatively new concept that suffers from a lack of good data that has hampered both time series and cross-sectional analysis. This body of research is growing, however, with some evidence focusing more on the mechanisms that may explain the associations.

Some of this research has drilled down to the meso and micro levels in attempts to derive psychological and sociological theories that explain the relationship. Empirical studies of the contextual relationship at the micro level have suggested that inequality depresses group membership and/or causes groups to become more homogeneous and skewed to affluent segments of society (Oxendine, 2006). A study conducted in Tanzania supports the argument with the finding that higher inequality makes individuals less likely to join groups. The author notes that the more inequality in a community, the less access community members have to the benefits of social capital (Oxendine, 2006).

Follow-on research also found that inequality affects the rich and poor differently: as inequality increases, the more affluent are the first to disengage, leaving the less-affluent fewer opportunities to form ‘bridging’ ties to those who have access to information necessary for upward mobility (La Ferrara, 2000; Oxendine, 2006). The concepts of bridging and bonding social capital help explain the impact of contextual inequality on social capital at the micro level. The possibility that structural inequality affects social capital by inhibiting bridging social capital is intriguing given Granovetter’s (1983) arguments that weak ties are fundamental to bridging social capital. The literature cited above demonstrates that there is sufficient evidence that an inverse association exists between income inequality and social capital. This evidence has led many researchers to suspect that the impact of income inequality on adverse outcomes is a result of its impact on social capital, and the relative income hypothesis postulates just such an effect.

The relative income hypothesis receives support from the empirical studies that have demonstrated the association with income inequality holds for outcomes other than mortality and at smaller levels of analysis (i.e., within as well as between countries) Other studies indicating the relationship holds for adverse outcomes in other disciplinary areas, such as the criminal justice and governance arenas mentioned above, provide further support. But negative findings have also been reported, and the relative income hypothesis is not without its critics, some of whom complain the contextual approach commits the ecological fallacy of assuming inferences from aggregate data can reveal causal factors at the individual level (Wilkinson, 1999).

Wilkinson (1999) counters this argument by pointing out that the individual fallacy-- attempting to use individual-level data to infer societal processes—is just as problematic. He suggests the relationship between absolute income and health status at the individual level is confounded by the impact of relative income position, and contends that, if the causal effect is actually socio-economic status rather than absolute financial position, it may be wrong to assume that improvements in individual income will improve health status as much as suggested by studies showing associations between health and absolute income. The comments by Levy and Temin (2007) that improvements in education and increases in work productivity have failed to improve economic inequality tend to support Wilkinson's (1999) supposition.

Wilkinson (1992) also supports his argument by noting that mortality rates for poor citizens in the U.S. were comparable to third-world countries such as Bangladesh, despite the much higher absolute income and material wealth in the U.S. Finding that wealthy individuals in highly unequal countries had higher mortality rates than poorer individuals in more equitable societies, Wilkinson concluded this variation in mortality rates must reflect the contextual

influence of relative income and social status rather than the compositional influence of individual income level (Wagstaff and van Doorslaer, 2000).

But some critics of the relative income hypothesis contend the findings reported by Wilkinson and others are the result of a statistical artifact, thus his conclusions are invalid. Gravelle (1998a and 1998b) was among the first to raise this issue; he suggested that because a more equal distribution implies more individuals in the middle of the distributional curve and fewer outliers at each end, the average poor person can appear to be better off in a more equal society because there are more individuals in a middle class with a higher level of income (Mancinko et al., 2003). Moreover, he argued that the relationship between mortality and individual income is not linear but is subject to diminishing marginal returns—beyond a certain point, additional income does not necessarily improve individual mortality rates. Thus, high incomes will not influence the relationship between inequality and mortality but, due to this statistical artifact, the relationship will show a higher association at lower income levels (Mancinko et al., 2003).

Gravelle, Wildman and Sutton (2001) tested this hypothesis with an analysis of 56 countries between 1980-1982 and 1988-1990, controlling for GDP as well as several transformations of average national income. Their study found these controls rendered the effect of income inequality insignificant. In effect, these authors argue that the apparent contextual effect of income inequality is a statistical artifact of the compositional effect of more individuals with a higher absolute income in a more equal society, and they conclude that the relationship between income inequality and health is purely compositional.

Gravelle's (1998a) hypothesis has not been tested as extensively as the relative income hypothesis but has received some support. A recent multilevel analysis by Jen et al. (2009) used a simulated data set to demonstrate that the functional relationship posited by Gravelle (1998a) could exist (i.e., a statistical artifact can produce a spurious relationship between income inequality and health). But noting that the fact that such an artifact *can* exist doesn't prove that it does, Jen et al. (2009) then tested Gravelle's (1998a) hypothesis with a cross-sectional multilevel analysis of data for over 15,000 individuals in 12 OECD countries. Finding income inequality an insignificant variable, they concluded that controlling for compositional effects renders the contextual relationship insignificant.

However, although the Jen et al. (2009) study included the U.S. among the countries studied, some evidence suggests these between-country findings may not be generalizable within countries, particularly with respect to the U.S. and other nations that have higher income inequality than many OECD states. To support his position, Gravelle (1998b) cited only one longitudinal study of U.S. states (Fiscella and Franks, 1997) that also found controlling for household income rendered the relationship between income inequality and all-cause mortality insignificant. These results have not been replicated in other research (Kennedy et al., 1998a; Wolfson et al., 1999).

In their study of U.S. states, Kennedy et al. (1998a) found the association between income inequality and adverse outcomes held even after controlling for household income, and concluded there is an independent contextual effect of income inequality on health status at the state level (p. 919). Wolfson et al. (1999) also found an independent effect of income inequality. His analysis was a precursor to the later work of Jen et al. (2009) in constructing a simulation as

if the statistical artifact posited by Gravelle (1998a) was responsible for the total observed effect of income inequality on health. Finding that the simulated mortality rate was lower than the observed rate in the 50 states, they concluded that the observed association could not be entirely accounted for by the statistical artifact, thus contextual forces must also be considered.

In defense of the relative income hypothesis, Wilkinson and Pickett (2006) offered three reasons for the failure of some studies to find a positive association between inequality and health. First, they argue that many studies measured inequality in areas too small to detect the effect of social class in the society. Second, they contend that control variables used by many studies actually reflect the level of social stratification and thus confound the contextual effects. Third, they suggest that the relationship was temporarily lost in between-county comparisons due to demographic shifts in the poverty population, better medical care for the aged, and/or lagged effects of rapid rises in income inequality that have yet to be felt. Finally, they also point out that the relationship has been consistent in the U.S., thus negative findings elsewhere could simply reflect a threshold that was not met in the areas or times that were studied.

Wilkinson and Pickett's (2006) comments follow a hypothesis based on the posited psychosocial impact of income inequality at the macro level. Wilkinson and Pickett (2006) argue that the direct effects of absolute income matter less than the effect of income inequality on social stratification within the wider society. Thus, the effect will only be sensitive when measured at a level where this broader pattern can be observed. In addition, the authors contend that if the association between health and income inequality actually reflects social class stratification, and attributes such as education, income level, and ethnicity reflect this stratification, these attributes may be simply be moderating or mediating variables along the

causal pathway. If this is the case, selection of appropriate control variables depends on defining which variables are part of social class and which are not, and Wilkinson and Pickett (2006) contend that control variables that have a strong contextual effect should be factored out if the relative income hypothesis is to be tested in its most plausible form.

The control variables used in this study were selected based on theoretical and empirical observations that support independent aspects of the theory. Most of the studies reviewed here have noted the possibility that unobserved variables could confound the analysis with other factors—such as individual income—that could influence the results. Researchers have used a wide variety of control variables in studies of inequality and outcomes, but Wilkinson and Pickett (2006) contend that a true test of the relative income hypothesis requires a careful consideration of the appropriateness of control variables in terms of their structural influences. Wilkinson and Pickett (2006) note that many initially supportive associations between inequality and various dependent variables have been rendered insignificant due to the introduction of control variables such as race; education; individual income; ethnicity and employment status. These researchers contend that the impact of social class stratification on these variables makes it difficult to determine whether they are legitimate control variables or simply mediate the relationship; if contextual discrimination affects individual income, for example, they suggest that variable is not a legitimate control. Recognizing Wilkinson and Pickett's (2006) observation as valid imposes some serious restrictions on research intended to tease out the unique effect of income inequality.

In this case, the intent of the analysis is to examine the variation within U.S. counties that could result from structural income inequality. Thus, control variables should include those

attributes that could confound the relationship at this level of analysis, but which are not significantly impacted by contextual discrimination. This is not an easy task since contextual discrimination is so pervasive. For example, Robert Putnam's (2007) study of social capital and diversity concluded that diversity is a major determinant of social capital. Putnam (2007) found that diversity made the largest impact on social capital variation between states when income inequality was controlled. Putnam (2007) used U.S. census categories to measure diversity (e.g.; Hispanic and non-Hispanic White, Black and Asian). Wilkinson and Pickett's (2006) comment on the selection of such variables is germane here; to the extent that income inequality is based on contextual features such as racial and/or ethnically-based discrimination, diversity could simply be another mediating variable in the relationship or even a proxy for inequality. This problem is evident in many situations where contextual discrimination can disqualify individuals before their compositional human capital talents can even be considered. The same logic holds for other individual-level control variables frequently used in studies of social capital and inequality, such as individual income and education level, and an argument could be made that even broader controls, such as age, region, urban/rural composition and the types of industries in states and counties are a result of structural features of the society at large.

While there may be truth in such assertions, it is still important to control for the possibility that some of the observed variation between could be due to differences in economic opportunity due to resource availability, rather than the result of systemic discrimination. For this reason, attempts to tease out the specific effects of income inequality on social capital and outcomes should include controls for demographic differences that may not exhibit strong contextual discrimination effects but which could influence the analysis. For example, the

possibility that the effect of income inequality is mediated by social capital suggests that controls intended to distinguish variation should first take into account variables suspected to affect social capital or outcomes independently. These variables must then be examined to determine whether their primary influence is contextual.

Previous studies have used a wide variety of demographic, geographic and economic controls, including: ethnicity; race; gender; population size; education; individual income; employment status; age, region, urban/rural composition and types of businesses in their units of analysis. Several of the above variables—ethnicity; race; gender; education; individual income; and employment status--were specifically criticized by Wilkinson and Pickett (2006), whose argument for their contextual roots is well-founded. Because these variables have a strong structural discrimination context, they have been rejected as controls for this study in keeping with Wilkinson and Pickett's (2006) argument that selection of control variables depends on defining which variables are part of social class and which are not, as well as the argument that the hypothesis should be tested in its most plausible form.

Factoring out these social class variables provides a shorter list of possible confounding demographic variables that may have some structural content but which may not be the direct result of structural forces at the macro level. These include measures of the urban/rural mix; population size; age distribution and regional differences. A number of studies have noted regional differences in inequality, social capital and adverse outcomes; whether this variable is a legitimate control depends on the extent to which regional patterns reflect structural discrimination and social class differences.

The remaining variables on the ‘most used’ list—population size; urban/rural composition; and age distribution--are also considered appropriate for this analysis. Population size can distinguish economies of scale that could affect variation as employment opportunities may be dependent on the resources available. Differences in the urban/rural composition of counties could also independently influence the social capital score given consistent evidence that rural communities tend to have higher social capital (Halpern 2005; Putnam 2002). The same is true of the population over 65; Putnam (2002) contends the World War II generation is exceptionally civic-minded, and cites other studies indicating individuals become more trusting as they age. The fact that demographic differences could confound the analysis by raising social capital scores for counties with large older populations warrants an exception for age discrimination as a structural condition. Such an exception is also justified in this case because the effects of discrimination change over time and the entire population is susceptible at some point in time. In sum, the control variables selected for this study were intended to account for some of the differences in county demographic profiles that could independently influence the dependent variables, but which are less the result of structural discrimination at the individual level than the opportunities and challenges of resource availability. The purpose of this analysis is to construct a structural equation model to determine whether a particular causal pathway could exist; the method recognizes there may be other pathways that are just as valid. Since the purpose of this analysis is to test the plausibility of the relative income hypothesis, the study follows Wilkinson and Pickett’s (2006) logic in selecting only those control variables that do not suggest social stratification.

The potential for use of social stratification variables essentially as controls also illuminates the possibility that their use as independent variables suggests they have some causal impact. One purpose of this study is to examine the effect that income inequality has on adverse social outcomes, including declining social capital. But in some of the studies cited in the literature review, variables such as income inequality, poverty and educational attainment are essentially used as control variables to tease out the independent effects of social capital (Putnam, 2000; Knack and Keefer, 2000; and Rupasingha et al., 2006). In other studies, potential outcome variables such as poverty and educational attainment have been used to distinguish the separate effect of income inequality. Variables such as civic participation and voter turnout rates are used as predictors of social capital in some studies and as outcome measures in others. The close correlation between these variables further confounds the selection of potential outcomes at an ecological level. The validity of any examination of the relationship between income inequality, social capital and adverse outcomes demands careful selection of adverse outcomes indicators at this level.

In this study, the concept of adverse social outcomes is modeled as a construct that contains the endogenous variables intended to represent socially undesirable outcomes associated with income inequality and social capital across four disciplinary areas. The construct is not intended to measure the entire scope of adverse outcomes, but to select a parsimonious set of outcome variables that are indicative of social problems in the four public affairs domains of criminal justice; health care; governance and social services. In this case, the indicators should represent a spectrum of social problems across the four disciplinary areas that could share a

common source that can be reflected by the selected construct measures, and that aggregate to impact social welfare.

The perception of social welfare is based on the assumption that societies that have greater poverty, poor population health, and higher crime and lower educational attainment are less well-off than societies that do not face problems of the same magnitude. In economic terms, these problems increase transaction costs and detract from the efficiency of the market systems. The four disciplines chosen are all concerned with alleviating specific adverse outcomes for the benefit of society, therefore the challenges they encounter and the indicators used to measure them provide a good basis for an analysis of any shared variation that could illuminate a common source. Review of the literature offers several potential variables for a theoretically and empirically informed construct.

For example, violent crime contributes substantially to the perception of security versus danger in a society. A number of researchers have demonstrated a relationship between inequality and crime. Blau and Blau (1982) used the rate of violent crime to determine whether location, racial inequality or poverty could explain the variation in violent crime (murder, rape, robbery and assault) in U.S. states. The authors reported that once economic inequalities are controlled, poverty and location are no longer associated with the crime rate, and it is economic inequality-- both generally as well as between races--that increases rates of criminal violence.

The homicide rate has been used by several researchers (Krohn, 1976; Messner, 1982; Krahn, Hartnagel and Gartrell, 1986 and Daly, Wilson and Vasdev, 2001) who have found the Gini index to be a good predictor of homicide rates, while others (Rosenfeld et al.; Kennedy et al. 1998) have investigated the link between social capital and homicide. Kennedy et al. (1998)

concentrated on the rates of homicide, robbery and assault using firearms to test their hypothesis that income inequality, mediated through social capital, affected the rate of violent crime. These results suggest that there are several possible indicators that could be used to represent the criminal justice discipline. Although many studies have focused on violent crime, property crime is more prevalent and provides a richer data source at the county level.

Using the property crime rate can also enhance the statistical power of the analysis; in his study of the socio-economic predictors of crime Arthur (1991) noted that the beta co-efficients for property crimes were much higher than those for violent crimes in rural Georgia counties. Arthur's (1991) findings suggest that the effect of socio-economic disparities and deficiencies in social cohesion may be stronger predictors of property crime than violent crime, particularly in rural counties. Since about a third of the census U.S. counties database consists of counties that are more than 75% rural, the property crime rate could do a better job of teasing out the effects of the relationship between inequality and social capital in these rural areas. Although much research has illuminated the effects of these contextual variables on total crime and/or violent crime, little research has focused specifically on property crime.

In the healthcare arena, research has concentrated on the effect of inequality or social capital, or both, on a number of health problems. In their review of the literature on inequality and health, Subramanian and Kawachi (2004) reported that eleven of the 21 studies they examined used self-reported health as the dependent variable, while seven used mortality rates. Empirical results suggest self-reported health does a good job of representing health status, and health survey data are often used in studies where good data on actual mortality rates is not available (Idler and Yael, 1997). However, this is not the case in the U.S., where good data on

mortality rates are compiled by the National Center for Health Statistics (NCHS) and available from the NCHS National Vital Statistics System Center (NCHS). NCHS data on mortality is collected from data on medical and vital records provided by states and calculated as the rate per 100,000 population.

In the social welfare arena, the third discipline to be included in this model is social work, a discipline which works to alleviate social problems at the individual or family level. Several measures included in the U.S. Department of Health and Human Services Annual Report to Congress (U.S. Department of Health and Human Services (HHS), 2007) provide potential adverse social outcome variables, such as measures of welfare recipients and dependency and predictors of future dependency. The predictors and risk factors include 20 indicators divided into the three dimensions of economic security, work status, and non-marital births. Many of these indicators provide good measures of social welfare by expressing the extent of need within states, and an examination of the indicators over time reflects similar longitudinal patterns.

However, welfare outputs may be limited by institutional policies and requirements, and thus may not be a true reflection of the need component of social welfare. Since the poverty rate is often the basis for calculation of means-tested social service benefits, the poverty rate provides a good indicator of the extent of the need for social services. Using the poverty rate as an outcome variable is consistent with the ecological perspective that suggests poverty is a result of contextual factors. The poverty rate may be the highest-level outcome in an ecological sense; and since the model for this study includes only one indicator for each discipline, it makes sense to select the most representative indicator. In addition, selection of outcome variables is conditioned on the quality and availability of good data. Data on the poverty rate, though not

without criticism, is widely available and of good quality because the methods used to calculate it are reasonably consistent across U.S. counties, which allows for a consistent comparison of variation. The U.S. Health and Human Services (HHS, 2007) report on poverty uses a number of measures, including the official poverty rate; the percentage of the population below 50%, 100% and 125% of the official rate; and three experimental rates meant to capture the effects of various transfer payments.

The official poverty rate income includes means-tested cash assistance, pre-tax income and social insurance benefits, but does not include non-cash benefits or federal tax benefits, including the redistributive Earned Income Tax Credit. Using these last measures, the report indicates that official poverty rates would be about 3% lower if all transfers were taken into account. While using this last method would provide more accurate information, the unavailability of data at the county level necessitates use of the official poverty rate calculated by the U.S. census. Since the intent of this analysis is to measure relative differences between U.S. counties, using the official poverty rate measures all units of analysis with the same yardstick and maintains those relative differences.

Modeling the final adverse outcome representing the public administration discipline presents a particular problem in that researchers have noted that there are few good measures of the concept of good governance. Uslaner (2005) notes that because there is no other objective measure of good governance, the level of corruption is the most widely accepted indicator. The number of Federal corruption convictions by state is widely available, and most studies of the subject in the U.S. are done at state level. Unfortunately, the number of Federal prosecutions at

the county level is insufficient to provide variability in the dataset; in fact, there were only 211 prosecutions of local officials in 2000, and 284 in 2007 (U.S. Department of Justice, 2007).

Other standard measures of government success or failure are concerned with economic standards of efficiency; these measures are not useful for this study since they do not necessarily capture the effect of their outcomes on citizens, a major focus of this study. George Frederickson (1990) recognized this problem as early as 1968, when he developed a theory of social equity as a “third pillar” for public administration and defined social equity as the extent to which government is responsive to the needs of its citizens. The presence of any of the adverse social outcomes in this study could signal a failure of government responsiveness, but this analysis sought a variable that could more clearly capture the impact of public policy in a more specific way at the county level. Given the dearth of good measures of the concept of good governance, a wider view of the responsibilities of the discipline could allow for the use of other indicators.

A number of researchers have investigated the relationship between public administration, school funding and performance; in 1978, James G. March focused on educational performance as an outcome of public administration, management and public expenditures. In Frederickson’s (1990) analysis of public administration’s responsibility to promote more equitable outcomes, he uses public school integration to illustrate the role of public administration in ensuring social equity, and argues that the lack of professional public administration can explain public school funding service inequities. In their investigation of public management and educational performance, Meier & O’Toole (2003) studied 500 school districts in the U.S. using standardized test scores to measure the impact of networking on public administration of the school system.

Public school system policies and administration have been widely associated with variation in social outcomes, and investigations such as those mentioned above suggest that educational attainment could offer useful indicators that could proxy adverse outcomes for public administration. Meier & O'Toole (2003) noted that school districts are the most common public organizations in the United States. These districts collect data on educational progress and educational attainment, and much of this data is available at the county level.

The fact that variation in educational performance has also been associated with both inequality and social capital also makes such a measure useful for this analysis. In this regard, educational attainment has often been used as the measure of performance. For example, Campbell et al. (2005) examined the effect of increases in economic inequality on three educational outcomes, and found that an increase in economic inequality impacted the overall dispersion of educational attainment and particularly affected the number of years of schooling completed. Pickett and Wilkinson (2007) examined the effect of income inequality on education in conjunction with a number of measures of child well-being. These authors found that income inequality at the U.S. state level was significantly associated with worse educational scores, a higher high school dropout rate, and lower educational attainment overall.

Kaplan et al. (1996) also found inequality significantly linked to educational performance; their measures included proficiency scores, education spending, and the high school dropout rate, and the authors argue that the rise in economic inequality is a significant factor in the decline in investments in both human and social capital. Several articles in the literature review of social capital and outcomes cited the association between educational attainment and social capital. For example, Coleman (1988) described the role of community

social capital in encouraging high school completion, and Putnam (2000) contends that social capital is especially important in keeping teenagers from dropping out of school. And, while empirical research on the relationship often focuses on how educational attainment influences social capital, Furstenburg and Hughes (1995) investigated the opposite path in their previously discussed 20-year longitudinal study of at-risk youth to examine whether social capital can serve as a buffer these youths. The authors found their social capital measures significantly related to a number of measures of socio-economic success, including the completion of high school or GED equivalent. Such research provides a basis for selection of educational attainment as a public administration outcome subject to the effects of income inequality and social capital.

However, while the high school dropout rate is often used as a proxy to determine the efficacy of the public school system, the drop out rate is not always calculated consistently by states and counties, and some areas have been accused of using novel methods to improve their standing. For example, counties in Florida have been criticized for transferring poor performing students to adult education classes, where they will not be counted in the official drop out rate. Although this tactic is not prohibited by state law, the state Department of Education department notes that some counties use it more aggressively than others (Webber, 2010). Since such tactics could undermine the ability to consistently analyze variation within counties, this study uses the percentage of the 18-24 year-old population without a high school diploma to proxy educational attainment. This rate is calculated from U.S. census figures, which are more consistent across counties in the U.S. and provide a better approximation of the adverse outcomes associated with public school policies. In this study, the variable 'education' proxies a poor outcome; that is, the

percentage of 18-24 year olds who did not complete high school and who have not obtained a General Equivalency Diploma (GED).

Review of the literature substantiates the selection of outcome variables selected for this study, which has attempted to test a parsimonious model of four outcome measures in the disciplines of health care; criminal justice; social welfare and public administration. The specific indicators chosen—mortality; property crime; poverty and education--have all been associated with both income inequality and social capital, and represent outcomes that empirical research suggests may have a common root cause.

Many social capital researchers contend income inequality is such a root cause, and have suggested that impact of income inequality on social capital may have great significance in terms of social well-being. The combination of social capital theory and the relative income hypothesis offers a theoretical framework which allows for the integration of macro and micro by identifying social capital as the conduit through which structural conditions such as inequality affect life choices that individuals make—such as whether to commit crimes, invest in education or volunteer to help others--that aggregate to impact societal well-being at the ecological level.

Although the literature offers much support for a contextual pathway, the potential pathway from inequality to outcomes has not received as much study as the compositional path, despite much evidence to suggest the pathway from contextual income inequality to adverse social outcomes may have greater significance than individual-level deficiencies in terms of the overall economic and social well-being of developed societies. This evidence provides a firm theoretical foundation for an approach that tests an ecological-level pathway in an attempt to simplify the relationship, and to answer three key research questions posed by the literature

review: first, does income inequality (as a contextual variable) exert any influence on adverse social outcomes?; second, is an association between income inequality and adverse outcomes mediated by social capital?; and third, can a causal path from income inequality to adverse outcomes through social capital be validated? The following study objectives and hypotheses were designed to illuminate these issues.

Study Objectives and Hypotheses

This study used data for the year 2000 in a retrospective cross-sectional design. Structural equation modeling (SEM) was used to test the proposition that income inequality exerts an influence on adverse social outcomes through social capital. SEM offers a hypothesis-testing approach to analysis of the theoretical structure of the forces underlying complex relationships (Byrne, 2001). In addition to its ability to model multivariate relationships and unlike other methods which rely on observed measurements only, SEM can utilize both latent and observed variables. This aspect of SEM has made it a popular choice for analysis of latent theoretical constructs that are not directly observable.

The concept of ‘social capital’ is such a latent construct, and, like many such constructs, it presents particular definitional problems. The other two constructs in the model are relative income inequality and adverse social outcomes. These constructs are composed of observable indicators organized into definitions of ‘relative income inequality’ and ‘adverse social outcomes’ for the specific purpose of this study. Since these constructs must be tested to determine whether they exhibit sufficient commonality to indicate they are measuring the same concept, but not so much that they duplicating the same measurement, the study objectives and

hypotheses were designed to test the latent constructs to obtain a valid test of the posited pathway. The objectives and hypotheses for the study are listed below.

Objective 1: To determine whether there is sufficient commonality among income inequality indicators to form a valid index measure of income inequality.

Hypothesis 1: The four measures of income inequality exhibit enough commonality to form a valid index measure of the concept.

Objective 2: To test the social capital measurement model developed by Rupasingha, Freshwater and Goetz (2006) (the RGF model) for the census year 2000 to determine whether this model produces a valid measure of the concept.

Hypothesis 2: The four measures of social capital in the RGF model form a valid measurement instrument for the concept of social capital.

Objective 3: To determine whether there is sufficient commonality among specific indicators to form a valid index measure of social outcomes in four disciplinary areas.

Hypothesis 3: There is sufficient commonality among four selected indicators to form a valid index with the selected social outcomes.

Objective 4: To determine whether there is a relationship between income inequality and social capital such that an increase in income inequality is associated with a decrease in social capital.

Hypothesis 4: The relationship between the income inequality and social capital will be negative and statistically significant at the $p \leq .05$ level.

Objective 5: To determine whether there is a relationship between income inequality and selected social outcomes such that an increase in income inequality is associated with an increase in these selected social welfare outcomes.

Hypothesis 5: The relationship between income inequality and the selected social outcomes will be positive and statistically significant at the $p \leq .05$ level.

Objective 6: To determine whether there is a relationship between social capital and the selected social welfare outcomes such that a decrease in social capital is associated with an increase in adverse social outcomes.

Hypothesis 6: The relationship between social capital and selected social outcomes will be negative and statistically significant at the $p \leq .05$ level.

Objective 7: To determine whether social capital mediates the relationship between income inequality and adverse social welfare outcomes.

Hypothesis 7: Income inequality will exert an indirect effect on the selected social welfare outcomes through social capital.

Objective 8: To determine whether social capital mediates the relationship between income inequality and adverse outcomes when controlling for specific demographic factors.

Hypothesis 8: Income inequality will exert an indirect effect on adverse outcomes through social capital when controlling for specific demographic factors.

Objective 9: To determine whether a causal path from income inequality to social welfare outcomes through social capital can be validated.

Hypothesis 9a: The relationship between income inequality and social welfare outcomes is mediated by social capital.

Hypothesis 9b: The posited model will validate a potential causal pathway from income inequality to social welfare outcomes through social capital.

Conceptual Model

SEM is a confirmatory approach, which expects that the links between the observed variables and their associated construct are known a priori. This requirement can be met by using theory and empirical research to specify the model, which can then be validated by constructing measurement models for each construct and testing the links with an exploratory factor analysis to examine the extent to which the observed variables link to their underlying factors (Byrne, 2001). To do this, the measurement models are over-identified to produce positive degrees of freedom that allow model trimming to produce the best fit. Thus, the final structural equation model cannot be accurately depicted until the measurement models have been validated. The conceptual model depicted in Figure 2 is simply a graphic depiction of the hypothesized relationship based on the theory and research on the topic.

The conceptual model used in this study is similar to the framework used by Kennedy et al. (1998b) in that it posits both a direct effect for income inequality and an indirect effect through social capital. Examination of direct and indirect effects will provide a test of the possible mediational effect of social capital. Although the terms mediation and moderation are often used interchangeably, a more nuanced definition is necessary for this analysis because it deals with potential causal effects. According to Baron and Kenny (1986), a moderating effect increases or decreases the strength of the effect, while a mediating effect indicates that the primary cause of the outcome is the effect of the first predictor (income inequality) on the second (social capital). That implies that removal of the mediating variable would negate the influence of the first predictor variable. Thus, in this analysis a mediating effect presumes that the indirect

path represents the causal direction; to determine whether this is true, both direct and indirect paths must be included. The hypotheses for the study are included to depict the tested pathways.

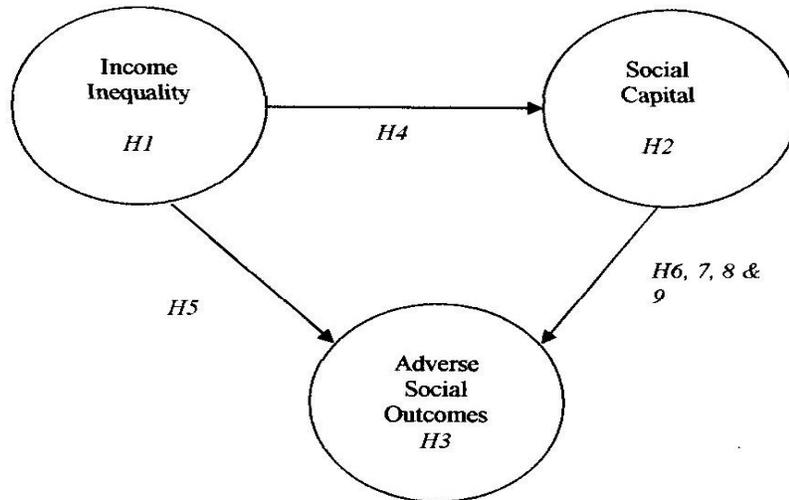


Figure 2: Conceptual Model

METHODOLOGY

This section covers the study design and procedures and discusses the study sample, data sources and statistical procedures used in the analysis. It also includes details about the measurement of study variables and development of measurement models for use in the structural equation model to test the relationships between income inequality, social capital and adverse outcomes.

Study Design

This study used a cross-sectional design to analyze data for the census year 2000 for U.S. counties to investigate the nature of the relationship between income inequality, social capital and adverse social outcomes through structural equation modeling. The study used SPSS and AMOS (version 17) software to validate statistical assumptions and build measurement models of three construct indexes. Confirmatory factor analysis (CFA) was used to validate each measurement model to ensure the indicators adequately captured the commonalities inherent in the construct. Then, the constructs were used in a structural equation model with a direct path to test the relationship between inequality and adverse outcomes, and an indirect path from inequality to adverse outcomes through social capital to test for a mediating effect.

Review of the literature revealed only one study that used structural equation modeling to test the concepts relevant to this analysis. Rosenfeld et al. (2001) constructed a structural equation model to test the relationship between social capital and crime rates, and found their social capital construct exhibited a significant direct effect on crime rates that explained 63% of the variance among U.S. states. Using the same approach, this study goes beyond the Rosenfeld

et al. (2001) analysis to add to the literature with a test of a hypothesized pathway from of income inequality through social capital to adverse social outcomes in four disciplinary areas.

SEM is an appropriate method for this analysis because it offers a hypothesis-testing approach to analysis of the theoretical structure of the forces underlying complex relationships. The technique is based on factor analytic models that emerged from observation of correlation matrices that suggested the correlation between variables might be explained by a single underlying factor (Hjöllund and Svendsen, 2000). The CFA models form the foundation for the structural equation model. In SEM, the null hypothesis is that the researcher's default model fits the data, thus the researcher expects to validate the null hypothesis (Byrne, 2001).

SEM is particularly useful for inference because it requires the relationships between variables to be specified in advance, thus providing a method to test theoretical propositions about causality (Byrne, 2001). SEM can statistically test postulated causal relationships with a series of regression equations that simultaneously analyze a system of variables to determine whether the model is consistent with the data. If the data fit, the model supports the hypothesized relationship. While a good fit for one model does not rule out the possibility that other models may fit equally well, a validated SEM does offer support for a posited causal relationship (Byrne, 2001). In the case of cross-sectional studies, which are not considered useful for determining causality, SEM can still provide useful information about the structure, direction and strength of postulated causal effects. Thus, it can still be used to good effect in studies such as this one, where the primary objective is to investigate the underlying structure of the relationships in the light of competing potential causal connections.

This study uses the county as the level of analysis. Wilkinson and Pickett (2006) have commented that some studies have failed to find a positive association between inequality and health because they measured inequality in areas too small to detect the effect of social class in the society. Subramanian and Kawasaki (2004) noted that the relationship effect in the U.S. was more pronounced at the state level, but other researchers contend that the relationship is essentially local because that is the level where individuals make the most meaningful relative comparisons. Rupasingha, et al. (2006) argue that studies at county level are better suited to capture this effect.

Data Sources and Sample

Descriptions of the data and data sources for the study are included in Appendix A. The U.S. census was the primary source for most of the raw data, much of which was available from the U.S. Census USA Counties on-line database for the year 2000. This source contains over 6500 data items at the national, state and county level. The census SF-1 datafile contains demographic information and other information collected from everyone who replied to the census in 2000. The census SF-3 contains survey data obtained from a sample of about 15% of the population. The North American Industry Classification System (NAICS), which categorizes businesses and organizations, is also included in the USA Counties database. In addition to U.S. census statistics, the database includes statistics from a variety of Federal agencies, including the Bureau of Economic Analysis, the Bureau of Labor Statistics, and the Federal Bureau of Investigation (U.S. Census, USA Counties, n.d.) Although no data source is perfect, census data is widely considered to be a reliable representation of the population, and contains data for both states and counties. Beyond the census, other sources used in the study for the year 2000

included the University of Arizona's Household Income Disparity database (n.d), which is based on census SF-3 data and the National Center for Charitable Statistics (NCCS). In some cases, the data are available as percentage rates; in others, the raw data was used to calculate the appropriate statistic for the analysis. The specifics on the data for each indicator are covered in the discussion of measurement models.

The U.S. census counties database includes Metropolitan Statistical Areas (MSAs), Puerto Rico and the District of Columbia as well as counties and county equivalents. Since U.S. counties were the units of analysis for this study, Puerto Rico, the MSAs and the District were deleted, leaving an initial sample size of 3098 counties (or county equivalents) in all 50 states.

Procedures

Unlike other methods which rely on observed measurements only, SEM can utilize both latent and observed variables, thus SEM is a good choice for analysis of latent theoretical constructs that are not directly observable. The concept of 'social capital' is such a latent construct; the other two constructs in the model are 'relative income inequality' and 'adverse social outcomes'; although the indicators for these two constructs are measurable, depicting them as constructs is useful because it provides a more intuitive portrait of the relationship. The two constructs are composed of observable indicators organized into definitions of 'relative income inequality' and 'adverse social outcomes' for the specific purpose of this study. Organizing these variables into a construct in SEM essentially creates an index from the construct variables.

The inequality construct was composed of four variables. Data for the Gini co-efficient and the Theil statistic for the year 2000 were available from the University of Arizona's Household Income Disparity Database, available from the University's Geoda Center. Data for

the mean to median ratio and the income dispersion ratio were calculated from county and national income statistics extracted from the U.S. Census USA Counties database. The database is based on the U.S. census Summary File 3, which consists of detailed tables of social, economic and housing characteristics compiled from a sample of approximately 19 million housing units (about 1 in 6 households) that received the Census 2000 long-form questionnaire.

Data for the social capital construct was also extracted from U.S. census records; values for two of the variables (association and vote rates) were included in the USA Counties database. The database contains information on the election results by county obtained from the CQ Press, as well as data provided by the census North American Industry Classification System (NAICS), which categorizes businesses and organizations and was used to construct the aggregate index of associations. The CQ Press data is subject to copyright; permission to use this copyrighted data is included in Appendix B. Beyond the USA Counties database, published census data also provided the census mail response rate for the year 2000 (U.S Census, 2004a). Data for the final variable in the construct was obtained from the National Center for Charitable Statistics (NCCS), which maintains the national repository for statistics on non-profit organizations at both the state and county level (NCCS, 2009).

Data for the adverse outcomes construct, including values used to calculate the poverty rate, education (the percentage of the 18-24-year olds without a high school diploma); mortality rate and property crime rate was also extracted from the USA Counties database. Tables 1 and 2 in Appendix A describe the study variables and explain how each was measured. Values for these statistics are based on information collected by or reported to the census by U.S. government agencies, and are considered generally reliable. Most of the information from the

2000 census was based on actual counts, rather than samples; the SF-3 data is an exception in that the values are estimated from surveys. Although there are well-known limitations to using survey and estimated data, census estimates in general represent the best available data.

Measurement of Study Variables

In this study, two exogenous variable constructs were predicted to influence adverse outcomes: income inequality and social capital. Four different indicators of income inequality were used to capture different dimensions of the concept. The most common absolute indicator of income inequality is the Gini co-efficient. This measure is based on the Lorenz curve, which ranks the cumulative share of total income earned from bottom to top, and plots this curve against a 45⁰ line which represents complete equality (Hisnanick and Rogers, n.d.). The Gini coefficient is the ratio of the area between the curve and the 45 line to the entire area below the line, and ranges from a score of 0 for perfect equality to a score of 100 for complete inequality. However, because the Gini is a measure of absolute inequality, three other measures were also used to tease out the effect of relative inequality at different levels.

The ratio of the mean to the median in each county measures the relative difference in income levels within each county, and has been used by social capital researchers who contend it does a better job of capturing the effects of relative inequalities within a particular level of analysis. The income dispersion ratio, in contrast, measures inequality relative to the national median. In addition, noting criticisms outlined by Mancinko et al. (2003, p. 434) the study includes the Theil index, which weights the data to identify those at the bottom of the income distribution. The advantage of using all four measures in a structural equation model is that the

method allows for construction of an index from all four variables, and preserves the requirement for an over-identified model.

However, since these indicators are likely to be highly correlated, this method can present multicollinearity problems. In fact, since this analysis focuses on the mediating effect of social capital, some multicollinearity between the explanatory variables was expected. The problem with multicollinearity is that it can increase the standard errors for the coefficients associated with the independent variables and make it difficult to tease out the individual effects of these variables (Pallant, 2005). Nonetheless, this does not actually reduce the predictive power of the SEM model (Byrne, 2001). In addition, the tendency of multicollinearity to produce large standard errors is reduced as the sample size increases, so the large sample size used for this study was expected to reduce the error in this analysis (Pallant, 2005).

The concept of social capital was measured by the four variables used in the RGF model developed by Rupasingha, et al. (2006). The RGF model produces a social capital index composed of four county-level indicators: the voter turnout rate; the number of not-for-profit organizations; the response rates to the U.S. census and an index measure of association density. The voter turnout rate was calculated from the number of votes cast for president in 2000 provided by CQ Press. The census mail response rates represent the percentage of housing units that returned a census questionnaire by mail, telephone, internet or Be Counted form (U.S. Census, 2004).

The number of tax-exempt non-profit organizations in each county was obtained from the National Center for Charitable Statistics and calculated per 10,000 people. The final variable, association, is an aggregate of 12 types of associations included in the U.S. Census County

Business Patterns database. The 12 associations include: bowling centers; civic and social associations; physical fitness facilities; public golf courses; religious organizations; sports clubs, managers and promoters, membership sports and recreational clubs; political organizations; business organizations; labor organizations; and other membership organizations not included in the above categories (Rupasingha et al., n.d.). Following Rupasingha et al. (n.d.), the variable for the number of associations for each county was calculated as the total number of associations per 10,000 population.

In addition to the predictor and outcome variables, a set of demographic variables was included to determine whether non-structural extraneous factors could affect the relationship. All but one of these variables, or the values required to calculate them, was obtained from the USA counties database. These demographic variables included the county population size; the percentage of the population over 65; the percentage rural, and the census region for the state in which the county was located. The regional variable, which was obtained from the U.S. census geography division, was coded as a dummy variable with 1 representing the south. Finally, an interaction variable was introduced as a control to further investigate the potential mediating effect of social capital. This variable was constructed by multiplying the factor scores for the inequality index by the scores for the social capital index.

Analytical Model

The proposed structural equation model for the study is depicted in Figure 1. Indicators for the exogenous construct ‘income inequality’ are shown at the top left. Indicators for the social capital construct, which is endogenous with respect to inequality and exogenous with respect to adverse outcomes, are depicted on the right. Indicators for the endogenous adverse

outcome construct are also shown to the right of the construct, with demographic controls depicted on the left. Arrows depict the posited causal pathways from income inequality directly to adverse outcomes and from income inequality to adverse outcomes through social capital. The figure displays the conceptual model designed to test the hypothesis that the effect of income inequality on adverse outcomes is mediated by social capital.

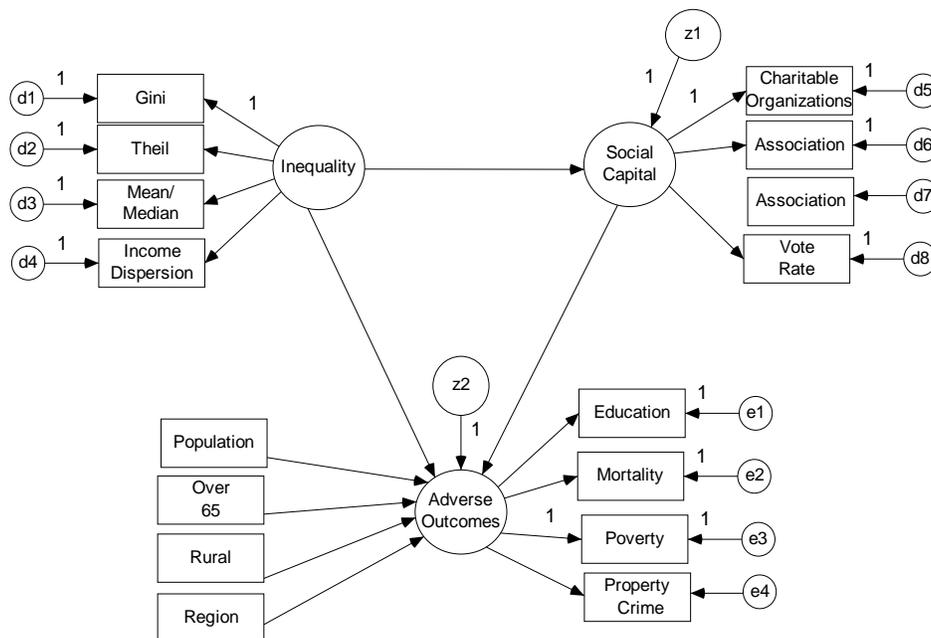


Figure 3: Proposed SEM Model, Income Inequality, Social Capital and Adverse Outcomes

Analysis

Data cleaning. The data obtained from the U.S. census for year 2000 was relatively complete; however, three counties were immediately removed due to missing data on more than two variables. The deleted counties were Kalawao, Hawaii; Loving, Texas; and Broomfield, Colorado. Loving, Texas has the smallest population of any county in the country, with only 67 residents as of 2000. Kalawao, Hawaii, with 147 residents, has the second-smallest population.

Broomfield, Colorado became a consolidated county in 1999, and may not have been able to provide statistics for the year 2000.

The remaining sample contained a significant number of missing values for some variables. A few values missing at random were replaced with the state average, but some missing values were not randomly distributed across the observations but concentrated in specific states. For example, Alaska did not report the number of votes cast for President in 2000, and several states had large numbers of missing variables for property crime rates. Because the data were not missing at random, deletion of the affected cases was not appropriate. Several methods were attempted to replace the missing values.

Missing data for property crime rates in the USA Counties database was a particular problem. However, additional research obtained some values for Illinois, Kentucky, Delaware and Montana from state agencies responsible for collecting and maintaining this data for the Federal Bureau of Investigation's Uniform Crime Report (UCR). For Illinois and Kentucky, State Police Annual Reports provided the missing data; for Missouri, the State Highway Patrol maintains UCR data. For Montana, the Montana Board of Crime Control provided UCR data. For Delaware, the data were provided in a report by the state Office of Management & Budget Statistical Analysis Center. Replacing missing values for counties in these states reduced the number of missing values for property crime to 133.

In addition to the crime rate, the vote rate also presented a missing values problem in that the state of Alaska did not report the number of votes cast for President in 2000 for its 29 borough county equivalents. Replacement of the rate with the state average was not appropriate since this method could undermine the extent of variation in the database. The missing data for

Alaska raised the number of missing values to 162. These remaining missing values for the vote rate and property crime variables were interpolated using statistical methods in SPSS.

The SPSS program provides several methods for dealing with non-random missing variables, including linear interpolation, replacement with the series mean or median, and replacement with the mean or median of nearby values. All of these methods were attempted, with the predicted values compared to actual values. Arthur's (1991) regression model, which used socio-economic indicators (unemployment; population size; poverty; government aid receipt; race; and the percentage of the population aged 15-39) and was able to predict 44-49% of the variance in property crimes in rural Georgia counties, was compared with actual values for property crime, but appeared to underestimate the property crime rate in this analysis. The most accurate method involved sorting the database hierarchically in Excel by three predictor variables and replacing missing values with the mean of nearby values. The property crime variables were sorted by poverty rate; population over 65 and region. Missing values for the Alaska vote rate were sorted by education, population over 65 and percent rural. The 162 replaced missing values represented about 5% of the database, thus the replacement methods used were not expected to significantly skew the outcome.

Statistical analysis. Once the database was cleaned, the data were examined with SPSS and AMOS software (version 17) to test for violations of statistical assumptions of SEM. This method bases the estimation of parameters on the maximum likelihood method which requires a large sample size and continuous variables that are univariate and multivariate normal (Byrne, 2001). The sample size in this analysis is more than sufficient, and all of the variables are continuous except for the dummy variable region, which is scaled as 0-1 and treated as

continuous. Multivariate normality was assessed using SPSS software. Since AMOS does not provide normality scatter plots, linearity and homoskedasticity were examined using SPSS in a multiple regression with the inequality and social capital indicators regressed separately on each endogenous variable. The P-P plots and scatter plots revealed some potential heteroskedasticity in the poverty rate indicator, which could cause the standard errors to be underestimated and inflate the significance of the result. Given the normality tests, the confirmatory factor analysis models were estimated using the maximum likelihood (ML) method, because this method is relatively robust with respect to violations of multivariate normality, such as the potential heteroskedasticity observed in the regression scatter plot for poverty.

Descriptive statistics and correlation matrices were inspected using SPSS for the indicators in each construct and are included in the discussion of study results. Tests for multivariate normality were also conducted; scatter plots inspected for each pairing of independent and dependent indicators revealed linear relationships between all independent and dependent variables, with no significant heteroskedasticity except for the poverty indicator mentioned above. Tolerance and VIF statistics revealed no significant multicollinearity problems. Mahanobis distances were then examined for the presence of outliers.

This analysis revealed a total of seven extreme outliers which were subsequently removed to improve the normality of the distributions. Two cases were extreme outliers in the social capital construct (Edgefield, SC; Nicollete, MN). These same cases, along with five others (New York, NY; Buffalo, SD; Shannon, SD; Grant, NE and Los Angeles County, CA) were identified as extreme outliers in the initial analysis of the final model. Deletion of these cases reduced the sample size to 3088. Once these outliers were deleted, all measurement models were

re-estimated with the new data set. All analyses described below were performed on this data set prior to use in the confirmatory factor analysis (CFA).

Indicators for each individual construct were scaled for positive correlations since SEM expects all the indicators of a construct to move in the same direction. The inequality indicators were constructed so that higher scores reflect greater inequality. The social capital variables were constructed such that higher scores reflected greater positive social capital; the correlation between the two constructs was expected to be negative. Like the inequality construct, the adverse outcomes construct was scaled so that higher scores reflect worse social outcomes. This scaling is intuitive with indicators such as higher poverty, mortality and crime rate; the education indicator was reversed so that the variable for education reflects the poor social outcome indicated by percentage of the 18-24 year-old population without a high school education. In keeping with the study hypotheses, both inequality and adverse outcomes were expected to vary inversely with social capital.

Examination of descriptive statistics and histograms revealed relatively normal distributions for the variables. Skewness and kurtosis statistics were within the guidelines for estimation methods used by SEM programs, which suggest that skewness index values less than 3 and kurtosis index values less than 10 are acceptable (Kline, 2005 p. 50). A correlation matrix indicated all four of the variables that composed the income inequality index were significantly correlated at the $p \leq .05$ level in a one-tailed test. All of the Pearson correlation co-efficients were above the .3 value recommended for factor analysis, but none was above the .8 value expected to produce multicollinearity problems. Since all four variables were significantly correlated, all four were retained for the measurement model analysis.

Descriptive statistics for the social capital construct indicated that all of the variables were reasonably normally distributed. Inspection of the histograms for these variables indicated the presence of some outliers that might be deleted to improve the distribution; however, since the histograms were reasonably normal, all cases were retained for an initial analysis. As indicated earlier, these outliers were subsequently deleted along with four other extreme outliers identified in the final model. The subsequent correlation matrix indicated that all of the social capital variables were significantly correlated, but none of the correlations was above the .8 level that could cause a multicollinearity problem.

Descriptive statistics for the adverse outcomes construct indicated a reasonably normal distribution for all variables. The correlation matrix obtained during the CFA revealed that all of the variables were significantly correlated at the $p \leq .001$ level except for property crime, which was negatively correlated with the other variables in the construct. Since this variable did not contribute to the model, it was removed during the CFA, leaving three indicators to model the adverse outcomes construct.

An SPSS correlation matrix was also analyzed to test the hypothesis of an inverse relationship between income inequality and social capital. The analysis revealed the expected negative correlation between all of the income inequality indicators and all of the social capital indicators. Most of the indicators were significantly correlated at the $p \leq .05$ level; the exceptions were the non-significant correlation between the Theil statistic used in the inequality index and the association variable used in the social capital construct. Since these indicators all correlated significantly with the other variables in the matrix, all were retained for the CFA. None of the correlations was above the .8 value that could produce significant multicollinearity problems,

although the correlation between the Gini index and the Theil index, at .785, did approach that level.

The SPSS correlation analysis for the hypothesis of a positive relationship between income inequality and adverse outcomes indicated that most of the variables were significantly correlated and in the expected positive direction. However, serious exceptions were revealed with respect to the property crime indicator. The correlation between the Theil statistic and the property crime rate, though in the expected direction, was non-significant, as was the correlation between the mean-to-median ratio and property crime. The relationship between property crime and poverty was in the correct direction but non-significant. Three other correlations, between property crime and the income dispersion measure, the mortality rate, and the high school dropout rate, were statistically significant but in the wrong direction, indicating that increases in the values of these variables was associated with a decrease in property crime. This variable was subsequently trimmed from the model.

Finally, since this study tested for the mediating relationship between inequality and adverse outcomes through social capital, normality tests and a correlation matrix were examined for the expected inverse relationship between the social capital and adverse outcomes indicators. The matrix indicated that two of the social capital indicators—the vote rate and the number of charitable institutions—were positively and significantly correlated with the mortality rate. Since these variables were significantly correlated in the expected direction with the other social capital construct indicators, all variables were retained for the CFA.

Summary

This study used a retrospective cross-sectional design to analyze data for the census year 2000 to investigate the nature of the relationship between income inequality, social capital and adverse social outcomes through structural equation modeling. The study used theoretically and empirically informed methods to select four indicators for each of the above constructs, and used CFA to test the validity of the measurement models. The study was conducted at the county level of analysis; the initial sample size for the year 2000 was 3088, and included counties in all 50 U.S. states. Missing values constituted less than 10% of the database, and were replaced by finding other sources for the data; replacement with state averages; or, in the case of property crime rates for some states and vote rates for Alaska, replaced with the mean of nearby values after sorting the data on specific predictors for these variables.

All variables were examined to ensure compliance with statistical assumptions of regression and structural equation modeling. As a result of these tests, 7 extreme outliers were removed for a final sample size of 3088; statistical assumptions were reassessed after the outliers were deleted, and all subsequent analysis was performed on the new data set. Correlation matrices provided good support for the hypothesized relationships with the exception of the relationships between income inequality and property crime; this indicator was subsequently deleted from the final model.

SEM is a confirmatory approach which expects that the links between the observed variables and their associated construct are known a priori (Byrne, 2001). This requirement can be met by using exploratory factor analysis to build measurement models for each construct and testing the links to examine the extent to which the observed variables link to their underlying

factors (Byrne, 2001). The model can be revised by trimming factors that do not significantly contribute to the construct, with the improved models combined to produce the structural equation model for the path analysis. The following chapter provides details of the tests performed above as well as tests of the exploratory and confirmatory structural equation models.

RESULTS

Measurement Models

Hypothesis 1

The four measures of income inequality exhibit enough commonality to form a valid index measure of income inequality.

Descriptive statistics for the inequality construct indicators is shown in Table 1 below for the census year 2000. The skewness and kurtosis statistics are within the guidelines for estimation methods used by SEM programs, which suggest that skewness index values less than 3 and kurtosis index values less than 10 are acceptable (Kline, 2005, p. 50).

Table 1: Descriptive Statistics, Income Inequality Construct

Indicator N=3088	Mean	Std.	Skewness		Kurtosis	
	Statistic	Deviation	Statistic	Std. Error	Statistic	Std. Error
Gini	43.3876	3.74349	.334	.044	.380	.088
Theil	34.5713	8.9034	-.163	.044	4.565	.088
Mean/Median	50.0031	5.3109	.278	.044	1.100	.088
Income Dispersion	115.8152	21.0525	-1.327	.044	2.986	.088

In addition to the initial correlation matrix inspected in SPSS, the AMOS program also constructs a correlation matrix to determine whether the selected indicators display sufficient commonality for factor analysis. In the unstandardized estimate, the AMOS program assigns a constraint of 1 to unobserved variables such as error terms, where the unit of measurement is

unknown and must be specified to identify the model. Since the indexes and constructs rely on a single unobserved but underlying latent concept, one of the construct's indicators must also be constrained. Constraining the indicator with the highest correlation to 1 allows the other indicators to be scaled against it and provides for model identification. The four variables were all significantly correlated at the .001 level; the highest correlation, between the Gini coefficient and the Theil statistic, returned a Pearson statistic of .781; this relatively high value could signal some multicollinearity problems, but was below the .8 level considered to produce serious problems. Table 2 depicts the statistical significance and factor loadings for the four variables.

Table 2: Factor Loadings for Inequality Construct

Indicator (N=3088)	Unstandardized Estimate	Standardized Estimate	S.E.	C.R.	P
Income Dispersion	3.526	.592	.097	36.206	***
Mean/Median Ratio	1.086	.723	.023	47.751	***
Theil	2.091	.830	.036	58.387	***
Gini	1.000	.944			

*** Indicates the variable is statistically significant at $p \leq .001$

Initial estimation of the social capital measurement model produced a χ^2 of 15.77 with 2 degrees of freedom. In SEM, the null hypothesis is that the model fits; the χ^2 is the maximum likelihood ratio test statistic that tests whether the specifications of factor loadings, variances, covariances and error variances for the postulated default model are valid (Byrne, 2001, p. 79). In the initial test of the inequality measurement model, the probability of achieving a χ^2 value as high as 15.77 is not significantly different from zero, indicating the null hypothesis of model fit should be rejected. Since all the indicators were significant contributors to the model, and model

trimming would result in a fully saturated model, allowing the error terms to correlate was the best method available to improve the measurement model.

The AMOS modification index (MI) provides information about error terms that could improve the model if allowed to correlate freely. The MI indicated the highest error term correlation was between the Theil statistic and the mean/median ratio. The Theil statistic is an absolute measure of inequality that weights the bottom of the income distribution more heavily. The mean/median ratio is a relative measure that captures the skew in the income distribution within counties. The correlation between the two suggests there may be some common source of variation unexplained by the model that produces redundancy in the measurement of the two indicators. The redundancy may lie in the measurement of the mean/median ratio which is based on an income distribution that, like the Theil statistic, is also skewed toward the lower end of the income distribution. Allowing these error terms to correlate significantly improved the model.

Table 3 presents results of the fitting estimation for the modified model. This model returned χ^2 of .140 with 1 degree of freedom. The p-value of .709 indicates that the null hypothesis of model fit cannot be rejected. The RMSEA represents the root mean square error of approximation and indicates how well the model would fit the population covariance matrix if optimal parameter values were available (Boyne, 2005). The statistic measures the discrepancy between the optimal condition and the default model, and takes the model complexity into account. RMSEA values less than .05 represent a good fit. In this case, the RMSEA value of .000 indicates no unreasonable errors of approximation (Byrne, 2001, p. 85).

In addition to the χ^2 test, the AMOS software provides several other goodness-of-fit measures based on comparing the default model with a fully saturated model and an

independence model which represents no model at all. The goodness-of-fit (GFI) and adjusted goodness-of-fit (AGFI) are absolute indexes that compare the default model with the independence model; the AGFI addresses the parsimony issue by penalizing the model for including excess parameters (Byrne, 2001, p. 82). The parsimony goodness-of-fit (PGFI) also addresses this issue, and takes into account the complexity of the model.

Table 3: Goodness-of-Fit, Inequality Construct

Model	#Parameters	χ^2	DF	P	χ^2/DF	RMSEA
Default model	9	.140	1	.709	.140	.000
Saturated model	10	.000	0			
Independence model	4	6154.976	6	.000	1025.829	.576

Several other measures compare the model to the independence model, which represents no model at all. The NFI, or normed fit index and the CFI (comparative fit index), along with the relative fit index (RFI) and incremental fit index (IFI) all compare the default model with the independence model; the latter three offer additional information by taking various measures of parsimony or sample size into account. All of these measures range from zero to 1.00, with values above .95 considered to represent a superior fit for the default model (Byrne, 2000, p. 83).

In the modified measurement model, the GFI, AGFI, NFI and CFI all returned values of 1.000, indicating an excellent model fit. The RMSEA value in the new model was also improved at .000, below the .05 level considered a superior fit. The final model indicated that the Gini coefficient contributed the most to the index, while the income dispersion measure contributed the least. The squared multiple correlations for the indicators are presented in Table 4.

Table 4: Squared Multiple Correlations, Inequality Index

Indicator	Estimate
Gini	.851
Theil	.723
Mean/Median Ratio	.552
Income Dispersion	.357

The model fit statistics indicate that the null hypothesis of model fit cannot be rejected, and provide good support for the first study hypothesis that the indicators have sufficient commonality to form an index of income inequality. The final model for the inequality construct is shown in Figure 2.

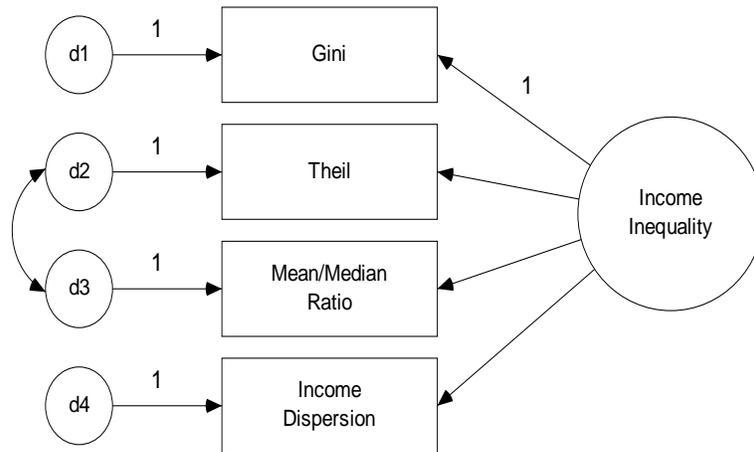


Figure 4: Income Inequality Construct

Hypothesis 2

The four measures of social capital in the RGF model form a valid measurement instrument for the concept of social capital.

Descriptive statistics for the social capital construct are shown in Table 5. The indexes indicate that all of the variables are reasonably normally distributed. Factor loadings for the variables for the social capital construct are depicted in Table 6. The analysis revealed all variables to be significantly correlated at $p \leq .001$ level except for the census mail response rate, which was significant at the .073 level. This result suggests that the response rate could be trimmed from the model. However, since removing this variable would have resulted in a just-identified model, the response rate was retained to allow trimming if necessary in the full confirmatory structural equation model.

Table 5: Descriptive Statistics, Social Capital Construct

Indicator (N=3088)	Mean	Std. Deviation	Skewness	Kurtosis		
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Response	64.13	8.9800	-.672	.044	1.000	.088
Association	14.44	6.6601	1.552	.044	4.769	.088
Charitable	53.87	29.3736	1.484	.044	3.105	.088
Vote	53.38	9.7074	-.328	.044	1.970	.088

Table 6: Factor Loadings, Social Capital Construct

Indicator N=3088	Unstandardized Estimate	Standardized Estimate	S.E.	C.R.	P
Charitable	1.000	.941			
Association	.166	.681	.006	27.859	***
Response	.015	.034	.008	1.794	.073
Vote Rate	.199	.568	.008	25.354	***

*** Indicates the variable is statistically significant at $p \leq .001$

The initial test of the measurement model for the social capital construct returned a χ^2 value of 29.311 with 2 degrees of freedom and a p-value of .000 for the null hypothesis, indicating that the hypothesis of model fit should be rejected. The modification indexes were consulted and revealed correlated errors between the census mail response rate and each of the other indicators which might suggest some redundancy in the measurement. The highest correlation of error terms occurred between the census mail response rate and the number of charitable organizations. Both the census mail response rate and the charitable organizations variable measure trust in institutions; redundancy could occur here if respondents who trust one institution are more likely to trust the other.

Allowing these error terms to correlate significantly improved the model and raised the significance level for the response rate to the $p \leq .001$ level. Goodness-of-fit statistics for the modified model are shown in Table 7. The modifications to the model reduced the χ^2 to .417 with 1 degree of freedom and a p-value of .519, indicating the null hypothesis a fit for this model should not be rejected. As with the inequality measurement model, the goodness-of-fit indexes (GFI; AGFI; PGFI, NFI and CFI) all returned values of 1.00, indicating an excellent model fit, and the RMSEA value of .000 suggests there are no extreme errors of approximation.

Table 7: Goodness-of-fit Statistics, Social Capital Construct

Model	# Parameters	χ^2	DF	P	χ^2/DF	RMSEA
Default model	9	.417	1	.519	.417	.000
Saturated model	10	.000	0			
Independence model	4	2719.330	6	.000	453.222	.383

The final model for the social capital construct is shown in Figure 5. The squared multiple correlations for the indicators are presented in Table 8.

Table 8: Squared Multiple Correlations, Social Capital Construct

Indicator	Estimate
Vote Rate	.320
Response	.012
Association	.459
Charitable	.895

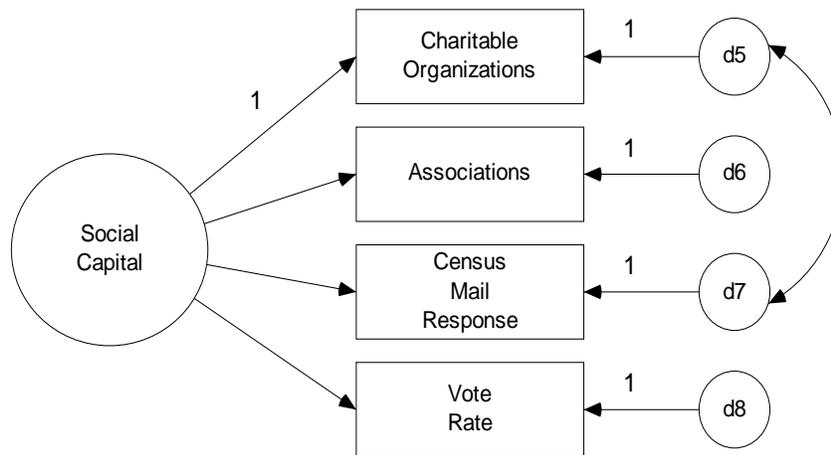


Figure 5: Social Capital Construct

The final model for the social capital construct indicated that the number of charitable organizations made the most significant contribution to the model, followed by the number of associations. The census mail response rate contributed the least to the model; this result is not surprising given that this variable was not correlated with the other variables at the $p \leq .05$ level in the generic model. Since the researchers who developed the RGF model (Rupasingha, et al.,

2006) tested their model with a principal components analysis (PCA), a separate factor analysis was conducted using the PCA function in SPSS to allow for a consistent comparison.

This analysis returned a KMO statistic of .631 with a significant result at the .000 level for the Bartlett's test of sphericity, indicating that the indicators share sufficient commonality for factor analysis. The first principal component explained 51% of the variance, slightly higher than the 46% obtained by Rupasingha et al. (n.d.) in their analysis of 1990 data. These results support the hypothesis that the four measures of social capital in the RGF model share enough commonality to consider that they measure the same underlying concept, although there may be some redundancy in the census mail response variable. Rupasingha et al. (2006) noted that tests of their model demonstrated results consistent with models developed by Putnam (2000) and other researchers for state-level analysis. Their findings, together with the results of this study, support the hypothesis that the four indicators of the RGF model form a valid measurement instrument for the concept of social capital; support is qualified here only because the census mail response rate failed to achieve statistical significance at the $p \leq .05$ level in the generic modes. Results of the maximum likelihood estimation in the SEM measurement model indicate that combining these variables to form a construct for structural equation modeling is appropriate.

Hypothesis 3

There is sufficient commonality among four selected indicators to form a valid index of selected adverse social outcomes.

Descriptive statistics for the adverse social outcomes construct are reported in Table 9. Skewness and kurtosis indices indicated a reasonably normal distribution within the guidelines for SEM analysis.

Table 9: Descriptive Statistics, Adverse Outcomes Construct

Indicators N=3088	Mean	Std. Deviation	Skewness		Kurtosis	
			Statistic	Std. Error	Statistic	Std. Error
Poverty	13.63	6.2140	1.246	.044	2.516	.088
Mortality	10.22	2.7296	.154	.044	.822	.088
Property Crime	22.53	1.4450	1.217	.044	3.342	.088
Education	22.60	8.7395	.633	.044	.084	.088

The factor loadings for the variables in the adverse outcomes construct are depicted in Table 10. All of the variables were significantly correlated at the $p \leq .001$ level except for property crime, which was also negatively correlated with the other variables in the construct. The negative correlation with property crime reveals this indicator did not make a positive contribution to the construct. Examination of the bivariate correlation matrix in SPSS revealed that property crime was positively, but not significantly, associated with the poverty rate, but was negatively and significantly correlated with the mortality and education rates (at the $p \leq .05$ level). This is an interesting finding that may deserve further investigation, but is beyond the scope of this analysis. In this case, since SEM expects all construct variables to be scaled in the same direction, the property crime indicator was trimmed from the model. Trimming the property crime variable resulted in a just-identified model which could not be further tested as a construct; that is, the possibility that the three variables share sufficient commonality to represent

a single concept could not be verified or refuted. However, this does not obviate the use of the variables as an index; the purpose of the measurement model process is to trim the model of extraneous variables, and a just-identified model can still be used as an index since it does have the capability to provide a unique solution for all parameters (Byrne, 2001).

Table 10: Factor Loadings, Adverse Outcomes Construct Model 1

Indicators N=3088	Unstandardized Estimate	Standardized Estimate	S.E.	C.R.	P
Education	1.796	.919	.127	14.132	***
Mortality	.162	.265	.012	13.568	***
Poverty	1.000	.720			
Property Crime	-.145	-.045	.062	-2.326	.020

*** Indicates the variable is statistically significant at $p \leq .001$

The issue of identification is relevant to the measurement model, but since it was not the intent of the study to develop a measurement for all adverse social outcomes but rather to investigate the impact of income inequality on selected outcomes, the use of a just-identified model in the confirmatory factor analysis is not inappropriate. Although the χ^2 , degrees of freedom and probability level could not be computed in SEM for this model, a separate factor analysis in SPSS using the three indicators returned a significance value of .000 for Bartlett's test of sphericity, which indicates factor analysis may be appropriate, but the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) value of .547 fell just below the .6 or above level recommended.

While the statistical results indicate the three variables may not have enough commonality to represent a single idea or construct, the first principal component in the factor analysis explained a respectable 59% of the variation within counties. This result suggests

enough commonality to combine the three values into an index which does not purport to represent a measurement instrument for adverse outcomes in general but which simply represents an index of the outcomes of interest in this analysis. Although SEM cannot calculate χ^2 statistics from a just-identified model, factor loadings can still be obtained and are depicted in Table 11.

Table 11: Factor Loadings, Adverse Outcomes Construct Model 2

Indicators N=3088	Unstandardized Estimate	Standardized Estimate	S.E.	C.R.	P
Education	1.741	.908	.124	14.084	***
Mortality	.161	.268	.012	13.570	***
Poverty	1.000	.724			

*** Indicates the variable is statistically significant at $p \leq .001$

The three variables are significantly correlated, with poverty contributing the most to the index and mortality the least. Although the variables could be modeled as individual indicators, modeling the outcomes as an index will allow demographic variables to be estimated in conjunction with the outcomes as part of the final confirmatory factor analysis in SEM. The final model for the adverse outcomes index is depicted in Figure 6.

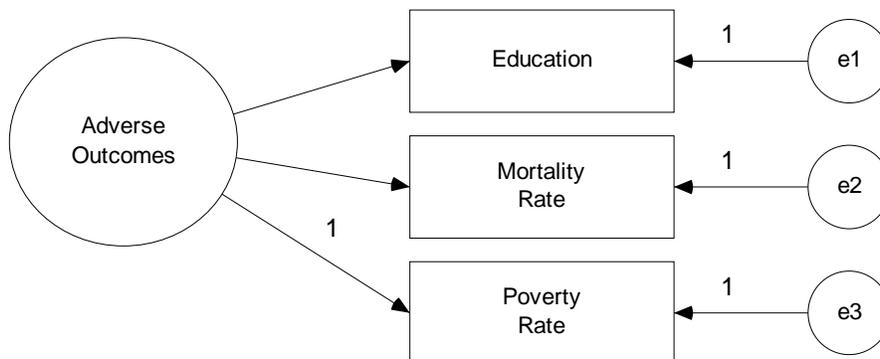


Figure 6: Adverse Outcomes Index

Path Analysis

Following analysis of the measurement models, the full model was estimated to address the remaining study hypotheses. The first model tested is displayed in Figure 7.

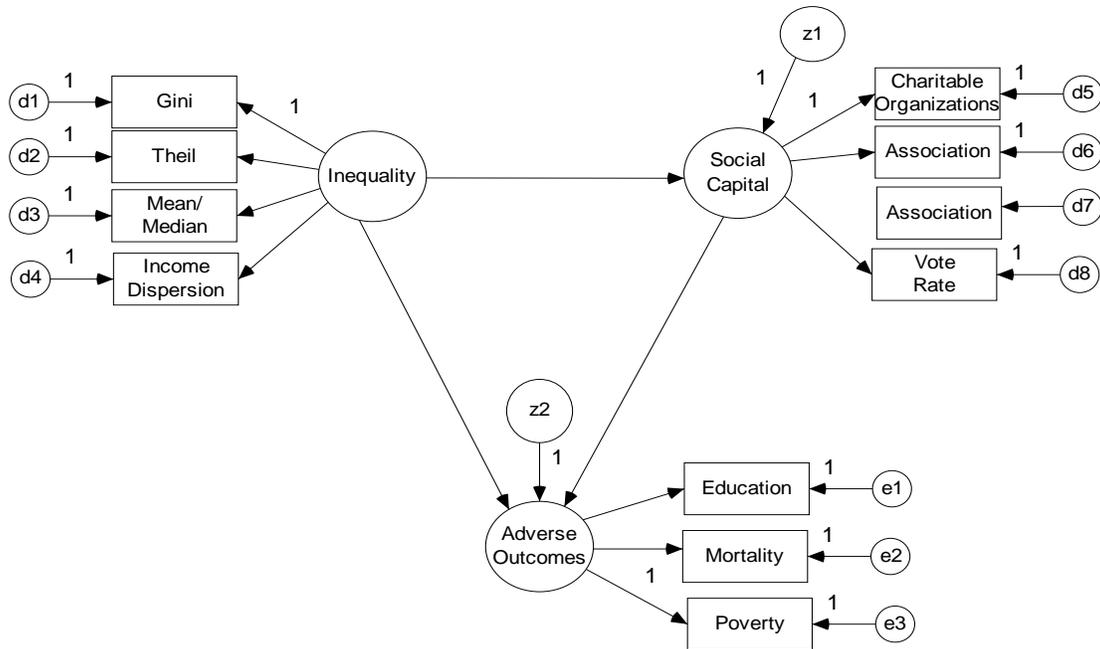


Figure 7: Model 1: Inequality, Social Capital and Adverse Outcomes

Table 12 presents the regression estimates for this model.

Table 12: Regression Estimates, Model 1

Indicators N=3088			Unstd Estimate	Std. Estimate	S.E.	C.R.	P
Social Capital	←	Inequality	-1.368	-.187	.146	-9.358	***
Adverse Outcomes	←	Inequality	1.171	.757	.024	48.072	***
Adverse Outcomes	←	Social Capital	-.057	-.271	.003	-	***
						17.398	
Income Dispersion	←	Inequality	3.732	.632	.092	40.710	***
Mean/Median	←	Inequality	1.026	.689	.023	45.326	***
Theil	←	Inequality	2.032	.814	.034	60.084	***
Gini	←	Inequality	1.000	.953			
Charitable	←	Social Capital	1.000	.889			
Association	←	Social Capital	.179	.694	.006	32.122	***
Vote Rate	←	Social Capital	.222	.598	.008	29.046	***
Education	←	Adverse Outcomes	1.181	.746	.027	44.385	***
Mortality	←	Adverse Outcomes	.121	.244	.009	12.859	***
Poverty	←	Adverse Outcomes	1.000	.888			
Response	←	Social Capital	.091	.197	.011	8.487	***

*** Indicates the variable is statistically significant at $p \leq .001$

Hypothesis 4

The relationship between income inequality and social capital will be negative and statistically significant at the $p \leq .05$ level.

The maximum likelihood estimates indicate that the income inequality index is negatively and significantly associated with the social capital construct at the $p \leq .001$ level. This result offers good support for hypothesis 4. A separate SPSS linear regression analysis was conducted using the factor scores for the social capital index and the individual inequality indicators as independent variables. All but one of the inequality indicators was significant at the $p \leq .05$ level; the income dispersion ratio was the exception, and somewhat qualifies the support

provided by the SEM analysis. The inequality index explained about 34% of the variation in social capital.

Hypothesis 5

The relationship between income inequality and adverse outcomes will be positive and statistically significant at the $p \leq .05$ level.

The analysis results also indicate a positive and statistically significant relationship between income inequality and adverse outcomes at the $p \leq .001$ level, thus the analysis offers support for hypothesis 5. More support was obtained from an SPSS regression using the individual inequality indicators as predictors regressed against an index composed of the adverse outcome PCA factor scores. All of the inequality indicators were significantly associated with the adverse outcomes index at the $p \leq .05$ level, and the analysis indicated that the inequality indicators explained 45% of the variation in adverse outcomes. However, the support for this hypothesis is only partial due to the deletion of the property crime outcome.

Hypothesis 6

The relationship between social capital and adverse outcomes will be negative and statistically significant at the $p \leq .05$ level.

Hypothesis 6 is also supported, as indicated by the positive relationship between social capital and adverse outcomes at the $p \leq .001$ level. The regression estimates for the full model indicated that the census mail response rate, which failed to achieve statistical significance in the measurement model, was significant at the $p \leq .001$ level in the structural equation model. This indicator contributed the least to the model, however, and the results of the model estimation

suggest that it could be trimmed if parsimony is a particular objective or when these statistics are unavailable.

Hypothesis 7

Income inequality will exert an indirect effect on the selected adverse outcomes through social capital.

The direct and indirect effects produced by the AMOS analysis supported hypothesis 7. The standardized total effect of income inequality on adverse outcomes was .807, with a standardized direct effect .757 and an indirect effect through social capital of .051. The direct effect of social capital on adverse outcomes was -.271. While these results do suggest that adverse outcomes increase as inequality depresses social capital, the effect is quite small and accounts for only about 6% of the effect of inequality on adverse outcomes.

Hypothesis 8

Income inequality will exert an indirect effect on adverse outcomes through social capital when controlling for specific demographic factors.

To test hypothesis 8, a set of demographic variables was introduced to determine whether non-structural extraneous factors could affect the relationship. These included the county population size; the percentage of the population over 65; the percentage of the county designated as rural, and the census region where the county was located. The regional variable was a dummy variable with 1 representing the south. Descriptive statistics for the control variables are shown in Table 13. Three of the four variables fall within the normal range for skewness and kurtosis. The exception is population size, which is extremely skewed due to a

large number of counties with small populations. About 22% of the database consisted of counties with populations below 10,000.

Table 13: Descriptive Statistics, Control Variables

Indicator N=3088	Mean	Std.	Skewness		Kurtosis	
	Statistic	Deviation Statistic	Statistic	Std. Error	Statistic	Std. Error
Population	86241.42	239140.948	8.971	.044	125.592	.088
%Rural	6.07	3.0398	-.187	.044	-1.089	.088
Over 65	14.76	4.1701	.528	.044	.968	.088
Region	2.60	.754	.086	-.161	-.285	.088

Since the ML estimation method is relatively robust, this violation of the assumption of normality was not expected to significantly affect the overall results. As a test of independent significance, each demographic control variable was added to the model individually. Table 14 presents the regression results. The estimates indicate that all demographic variables significantly impacted adverse outcomes. The percentage of the population over 65 had the greatest influence; inspection of the standardized total effects on the individual outcome variables revealed that the impact of this variable on the mortality rate—a standardized total effect of .747-- accounted for much of this effect.

The indicator for region had the next-highest influence on adverse outcomes; its effect was also most pronounced through the mortality variable, with a standardized effect of .224. Population size had the least effect, and was the only variable to produce a negative effect, indicating that as population increases, adverse outcomes decrease. However, this effect is quite small, with a standardized total effect of .05.

Table 14: Regression Estimates, Control Variables

Indicator N=3088	Unstandardized Estimate	Standardized Estimate	S.E.	C.R.	P
Population	.000	-.050	-.050	-3.529	***
%Rural	.002	.071	.071	4.634	***
Over65	.214	.948	.948	8.527	***
Region	.523	.277	.277	7.974	***

*** Indicates the variable is statistically significant at $p \leq .001$

Once the statistical significance of the control variables was established, the model was re-estimated to determine how the indirect relationship between income inequality and adverse outcomes was affected by the introduction of these demographic variables. In this analysis, the standardized total effect of inequality on adverse outcomes remained statistically significant, but was reduced from .807 to .760, with a direct effect of .671 (versus .707) and an indirect effect through social capital of .089 (versus .051). The addition of these variables essentially reduced the direct effect of social capital on outcomes by 6%, but doubled the proportion of the indirect effect from 6.3% to 11.7%.

The change in the strength of the relationship also raised the possibility that interaction between these variables could be affecting the result. To test for this effect, interaction terms were calculated for the demographic variables and added to the model. All but one of these terms (population * region) was statistically significant. Four of the interaction terms (population * over 65; rural * region; rural * 65 and region * 65) slightly diminished the effect of inequality on outcomes, but also slightly raised the indirect effect. These effects were similar to those obtained by the introduction of the individual control variables. The differences were not substantial and were close enough to the previously obtained values to conclude that much of the effect was captured in the model without these interaction terms. In the interest of parsimony, and since the

interaction terms degraded the model fit, they were deleted from the model. In the final analysis, the results support the hypothesis 8 presumption that income inequality exerts both direct and indirect effects on adverse outcomes through social capital when controlling for the selected demographic factors.

Hypothesis 9a:

The relationship between income inequality and adverse outcomes is mediated by social capital.

Hypothesis 9b

The model will validate a potential causal pathway from income inequality to adverse outcomes through social capital.

Validating the causal pathway posited by hypothesis 9b essentially depends on the mediational relationship hypothesized in 9a. A mediational relationship implies that the indirect path essentially *causes* the outcomes (Baron and Kenny, 1986). The results of the tests of the direct and indirect effects of inequality on adverse outcomes suggest the relationship is moderated, rather than mediated, by social capital. Thus, hypothesis 9a should be rejected. However, to further investigate the moderation effect, another interaction term—between the independent variables income inequality and social capital—was added to the model. The interaction was created by conducting a factor analysis in SPSS for each construct, then using the factor scores to construct an interaction index. The two index terms were multiplied to create the interaction term INXSC. A significant result for the interaction term would suggest that the

effect of income inequality on adverse outcomes depends to some extent on the relationship between income inequality and social capital.

In this analysis, the interaction term was significant at the $p \leq .001$ level. The fact that the interaction term had a negative effect on adverse outcomes (standardized $-.135$) indicates that the interaction decreases the effect of inequality on adverse outcomes. This improvement was somewhat slight, changing the direct effect of inequality on adverse outcomes from $.747$ to $.733$; however, the interaction did raise the indirect effect of inequality on adverse outcomes from $.087$ to $.090$. This result suggests the interaction reduces the effect of inequality overall, but may slightly increase the proportion of the impact that flows through social capital.

Nonetheless, the fact that the primary effect of inequality on adverse outcomes was direct rather than indirect indicates the relationship is moderated, rather than mediated, by social capital. The higher values for the direct effect of inequality reveal that levels of social capital are more likely to increase or decrease the strength of the effect, rather than causing it (Baron and Kenny, 1986). However, the interaction effect was relatively small and the addition of the interaction term did not improve the model fit. Thus, the term was deleted from further analysis.

The results of the model test did not support hypothesis 9b. The initial test returned a χ^2 of 16998.9 with 85 degrees of freedom and a p-value of $.000$ indicating a poor model fit. Modification indexes were consulted in an attempt to improve the model, and indicated the presence of correlated errors among the control variables. These included correlated errors occurred between the percentage of the population over 65 and the population size; percent rural; and region, as well as between population size and percent rural. This suggests some commonality among these variables that impacts this relationship but is not explained by this

model. The interaction of these variables, calculated in the discussion of hypothesis 8, may explain some of this commonality. Allowing these errors to correlate improved the model slightly, returning a χ^2 of 15679.7 with 81 degrees of freedom and a p-value of .000. Though improved, this model also failed to validate the posited causal path.

Model goodness-of-fit statistics demonstrated a poor model fit; a high RMSEA value of .250 indicates that even with unknown but optimally selected parameter values, the model would not approximate a good fit for the population covariance matrix (Byrne, 2001). The GFI of .629 and an AGFI of .450 also indicated the model could have been more parsimonious, thus raising the possibility that model trimming could improve the fit. Although all of the indicators were significant at the $p > .05$ level, the census mail response indicator, identified as non-significant during the initial measurement model test, contributed the least to the model.

Trimming this variable would make the social capital construct more useful since it is available only every ten years, while the other variables are available more frequently. To explore this possibility, factor analysis was conducted in SPSS and revealed that removing this variable raised the KMO measure of sampling adequacy value from .631 in the four-factor model to .636 in the three-factor model; more importantly, the analysis raised the effect size of the first principal component from 51% to 68%. Trimming the census mail response indicator reduced the χ^2 value to 14813.230 with 69 degrees of freedom, and had the additional benefit of reducing the correlated error between the response rate indicator and the number of charitable institutions.

Regression estimates for this model are depicted in Table 15. Deleting the response indicator reduced the χ^2 from 16998.9 with 85 degrees freedom to 14813.23 with 69 degrees of

freedom. Trimming this variable also reduced the control variable 'over 65' to non-significance at the $p \leq .05$ level. All other indicators remained significant and were in the expected direction.

Examination of the standardized total effects indicated that income inequality had the largest effect on adverse outcomes (.746), twice the size of the effect for social capital (-.368). Among the control variables, 'over 65', 'percent rural' and 'region' all had positive effects on adverse outcomes, indicating that adverse outcomes increase as the values for these variables rise. The highest effect was for percent rural, which had a standardized total effect of .245. The effects of the over 65 population and region were much lower, at .025 and .047 respectively. Population size was the only control with a negative relationship with adverse outcomes, with a standardized total effect of -.105. The standardized direct effect of inequality on adverse outcomes was .679, with an indirect effect of .067. These results were slightly different from those obtained in the previous model, with the moderating effect of social capital reduced from about 12% to about 9%.

Finally, as in earlier analyses, interaction terms were added to investigate their effect on the relationship. All but two of the demographic variables (population * region; rural * over 65) displayed significant regression weights, but adding them to the model did not improve the fit; the same was true of the interaction term INXSC. Nonetheless, analysis of these interactions provided some interesting observations about the relationship. As with the previous analysis, these terms tended to lower the effect of inequality on adverse outcomes, while raising the moderating effect of social capital and slightly increasing the effect of inequality on social capital. However, again the results were similar enough to conclude that most of the effect was

already captured in the model, and since they did not improve the model fit, the interaction terms were deleted.

Table 15: Regression Estimates, Model 2

Indicators N=3088		UnStd Estimate	Std Estimate	S.E.	C.R.	P
Social Capital	← Inequality	-1.259	-.183	.138	-9.125	***
Adverse Outcomes	← Population	.000	-.105	.000	-7.526	***
Adverse Outcomes	← Rural	.047	.272	.003	18.166	***
Adverse Outcomes	← Region	.490	.047	.133	3.696	***
Adverse Outcomes	← Inequality	.964	.679	.022	44.380	***
Adverse Outcomes	← Social Capital	-.076	-.368	.003	-23.488	***
Adverse Outcomes	← Over65	.032	.025	.017	1.842	.065
Income Dispersion	← Inequality	3.309	.579	.090	36.680	***
Mean/Median	← Inequality	.993	.688	.021	46.610	***
Theil	← Inequality	1.926	.797	.032	59.581	***
Gini	← Inequality	1.000	.984			
Charitable	← Social Capital	1.000	.864			
Association	← Social Capital	.188	.710	.005	34.623	***
Vote	← Social Capital	.241	.631	.008	31.743	***
Poverty	← Adverse Outcomes	1.000	.843			
Education	← Adverse Outcomes	1.301	.779	.027	47.648	***
Mortality	← Adverse Outcomes	.144	.276	.010	14.691	***

*** ** Indicates the variable is statistically significant at $p \leq .001$

Results for this model also failed to support the null hypothesis of model fit. Goodness-of-fit statistics are shown in Table 16. The p-value of .000 indicates the probability of model fit remains no different from zero. Trimming the model of the response variable improved the model fit slightly only slightly, changing the GFI from .629 to .630.

Table 16: Goodness-of-fit, Model 2

Model	NPAR	χ^2	DF	P	χ^2/DF	RMSEA
Default model	36	14813.230	69	.000	214.548	.263
Saturated model	105	.000	0			
Independence model	14	29880.481	91	.000	328.357	.326

The parsimony goodness-of-fit index (PGFI) of .414 for this model suggested the possibility that further model trimming could improve the fit; to test this possibility the income inequality construct was considered for trimming. Among the inequality measures, the income dispersion indicator measure contributed the least to the model and was the first indicator considered for deletion. However, trimming this indicator produced a negative variance. Further model trimming of the inequality indicators one by one also produced negative variances, indicating such models were poorly specified. In the end, a model which reduced the inequality construct to a single indicator, the Gini co-efficient--which contributed the most to the inequality construct--produced the best model, substantially reducing the χ^2 from 14813.23 with 69 degrees of freedom to 8288.4 with 40 degrees of freedom. Regression estimates for this model are depicted in Table 17. Goodness-of-fit statistics are presented in Table 18. Using the Gini co-efficient as the inequality indicator also raised the GFI from .630 to .711 and the AGFI from .437 to .523.

Table 17: Regression Estimates, Final Model

Indicators		UnStd Estimate	Std Estimate	S.E.	C.R.	P
Social Capital	← Gini	-1.367	-.201	.133	-10.279	***
Adverse Outcomes	← Population	.000	-.113	.000	-8.267	***
Adverse Outcomes	← Over 65	.049	.039	.016	2.965	.003
Adverse Outcomes	← Rural	.048	.270	.003	18.631	***
Adverse Outcomes	← Region	.420	.040	.130	3.233	.001
Adverse Outcomes	← Social Capital	-.077	-.370	.003	-23.739	***
Adverse Outcomes	← Gini	.934	.664	.019	48.083	***
Charitable	← Social Capital	1.000	.865			
Association	← Social Capital	.187	.714	.005	34.986	***
Vote	← Social Capital	.241	.630	.008	31.874	***
Poverty	← Adverse Outcomes	1.000	.845			
Education	← Adverse Outcomes	1.299	.781	.027	48.075	***
Mortality	← Adverse Outcomes	.143	.276	.010	14.706	***

*** ** Indicates the variable is statistically significant at $p \leq .001$

Table 18: Goodness-of-fit, Final Model

Model	NPAR	χ^2	DF	P	χ^2/DF	RMSEA
Default model	26	8288.376	40	.000	207.209	.258
Saturated model	66	.000	0			
Independence model	11	17075.811	55	.000	310.469	.317

This model returned the significance value for the over 65 population to significance at the $p \leq .05$ level. Examination of the standardized total effects indicated that using the Gini as the only indicator for inequality reduced the effect of inequality on adverse outcomes from .746 to .664 and slightly raised the effect of social capital on adverse outcomes from -.368 to -.370. Among the control variables, percent rural retained its place as the highest contributor with a standardized estimate of .270, slightly lower than the .272 obtained for the model containing all inequality indicators. The standardized estimates for population and the percentage of the

population over 65 population rose slightly from -.105 to -.113 and .025 to .039 respectively, while the estimates for region decreased from .047 to .040. The standardized direct effect of the Gini on adverse outcomes was slightly decreased from .679 to .664, while the indirect effect rose from .067 to .075. While deletion of the census response variable reduced the moderating effect of social capital by 6%, using the Gini as the only indicator increased the indirect effect by 9%.

As with the other models, an interaction term was calculated to test for interaction between the Gini and the social capital index. Again, the introduction of this term significantly degraded the model fit, raising the χ^2 to 22048.2 with 50 degrees of freedom, and since it also produced the negative variance indicative of poor model specification, the term was trimmed from the final model, which is depicted in Figure 8. The results of this model suggest that, among the four inequality indicators, the Gini co-efficient may be the best predictor for these outcomes. However, the p value for the model remained at .000, indicating the probability that this posited path is correct is not substantially different from zero, thus the null hypothesis of model fit posited by hypothesis 9b must be rejected.

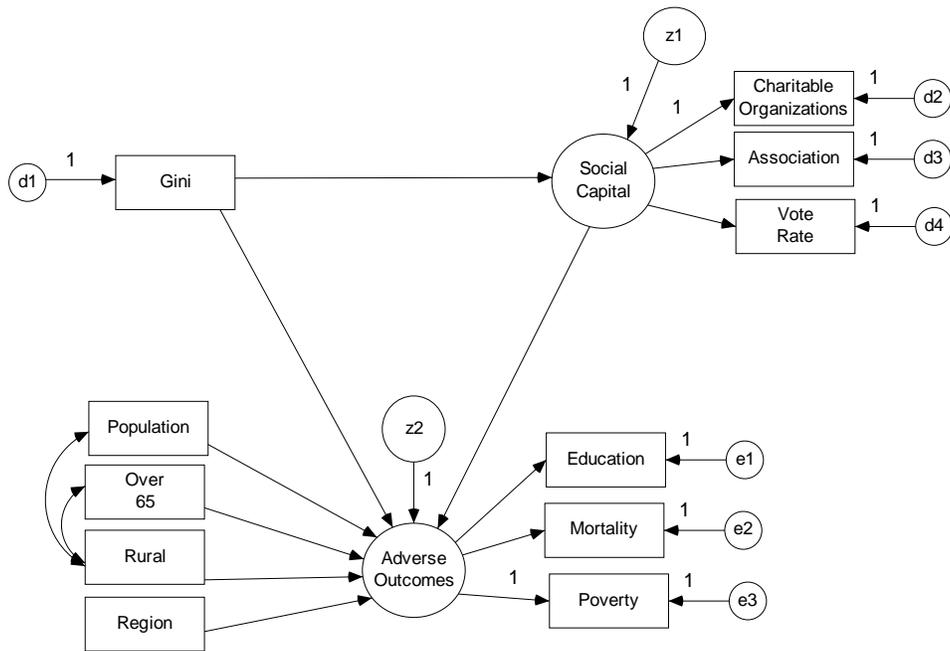


Figure 8: Final SEM Model

Summary and Discussion

Table 19 presents the results of the hypothesis tests.

Table 19: Results of Hypothesis Tests

Hypotheses	Variables	Significant Variables/Findings
<u>Hypothesis 1</u> : The four measures of income inequality exhibit enough commonality to form a valid index measure of the concept.	<ol style="list-style-type: none"> 1. Gini co-efficient 2. Theil index 3. Mean to median ratio 4. Income Dispersion ratio 	<ol style="list-style-type: none"> 1. Gini co-efficient 2. Theil index 3. Mean to median ratio 4. Income Dispersion ratio <p>Hypothesis 1 supported.</p>
<u>Hypothesis 2</u> : The four measures of social capital in the RGF model form a valid measurement instrument for the concept of social capital.	<ol style="list-style-type: none"> 1. Number of associations per 10,000 population 2. Number of charitable organizations per 10,000 population 3. Voter turnout rate 4. Percent of population responding to the 2000 census mail request 	<ol style="list-style-type: none"> 1. Number of associations per 10,000 population 2. Number of charitable organizations per 10,000 population 3. Voter turnout rate <p>Hypothesis 2 partially supported.</p>
<u>Hypothesis 3</u> : There is sufficient commonality among four selected indicators to form a valid index of selected adverse social outcomes.	<ol style="list-style-type: none"> 1. Poverty rate 2. Mortality rate 3. Education 4. Property Crime rate 	<ol style="list-style-type: none"> 1. Poverty rate 2. Mortality rate 3. Education <p>Hypothesis 3 rejected.</p>
<u>Hypothesis 4</u> : The relationship between income inequality and social capital will be negative and statistically significant at the $p \leq .05$ level.	<ol style="list-style-type: none"> 1. Gini co-efficient 2. Theil index 3. Mean to median ratio 4. Income Dispersion ratio 5. Number of associations per 10,000 population 6. Number of charitable organizations per 10,000 population 7. Voter turnout rate 8. Percent of population responding to the 2000 census mail request. 	<ol style="list-style-type: none"> 1. Gini co-efficient 2. Theil index 3. Mean to median ratio 4. Income Dispersion ratio 5. Number of associations per 10,000 population 6. Number of charitable organizations per 10,000 population 7. Voter turnout rate <p>Hypothesis 4 supported.</p>
<u>Hypothesis 5</u> : The relationship between income inequality and adverse outcomes will be positive and statistically significant at the $p \leq .05$ level.	<ol style="list-style-type: none"> 1. Gini co-efficient 2. Theil index 3. Mean to median ratio 4. Income Dispersion ratio 5. Poverty rate 	<ol style="list-style-type: none"> 1. Gini co-efficient 2. Theil index 3. Mean to median ratio 4. Income Dispersion ratio 5. Poverty rate

Hypotheses	Variables	Significant Variables/Findings
	6. Mortality rate 7. Education	6. Mortality rate 7. Education Hypothesis 5 supported after deleting Property Crime variable.
<u>Hypothesis 6</u> : The relationship between social capital and selected adverse social outcomes will be negative and statistically significant at the $p \leq .05$ level.	1. Number of associations per 10,000 population 2. Number of charitable organizations per 10,000 population 3. Voter turnout rate 4. Percent of population responding to the 2000 census mail request 5. Poverty rate 6. Mortality rate 7. Education	1. Number of associations per 10,000 population 2. Number of charitable organizations per 10,000 population 3. Voter turnout rate 4. Poverty rate 5. Mortality rate 6. Education Hypothesis 6 supported after deleting Property Crime variable
<u>Hypothesis 7</u> : Income inequality will exert an indirect effect on adverse outcomes through social capital.	1. Gini co-efficient 2. Theil index 3. Mean to median ratio 4. Income Dispersion ratio 5. Number of associations per 10,000 population 6. Number of charitable organizations per 10,000 population 7. Voter turnout rate 8. Percent of population responding to the 2000 census mail request 9. Poverty rate 10. Mortality rate 11. Education	1. Number of associations per 10,000 population 2. Number of charitable organizations per 10,000 population 3. Voter turnout rate 4. Poverty rate 5. Mortality rate 6.. Education Hypothesis 7 supported.
<u>Hypothesis 8</u> : Income inequality will exert an indirect effect on adverse outcomes through social capital when controlling for specific demographic factors.	1. Gini co-efficient 2. Theil index 3. Mean to median ratio 4. Income Dispersion ratio 5. Number of associations per 10,000 population 6. Number of charitable organizations per 10,000 population 7. Voter turnout rate 8. Percent of population responding to the 2000 census mail request 9. Poverty rate 10. Mortality rate	1. Gini co-efficient 2. Theil index 3. Mean to median ratio 4. Income Dispersion ratio 5. Number of associations per 10,000 population 6. Number of charitable organizations per 10,000 population 7. Voter turnout rate 8. Poverty rate 9. Mortality rate 10. Education 11. Total population 12. Percent Rural

Hypotheses	Variables	Significant Variables/Findings
	11. Education 12. Total population 13. Percent Rural 14. Percent over 65 15. Region	13. Percent over 65 14. Region Hypothesis 8 supported.
<u>Hypothesis 9a</u> : The relationship between income inequality and adverse outcomes is mediated by social capital.	1. Gini co-efficient 2. Theil index 3. Mean to median ratio 4. Income Dispersion ratio 5. Number of associations per 10,000 population 6. Number of charitable organizations per 10,000 population 7. Voter turnout rate 8. Percent of population responding to the 2000 census mail request 9. Poverty rate 10. Mortality rate 11. Education 12. Total population 13. Percent Rural 14. Percent over 65 15. Region	1. Gini co-efficient 2. Theil index 3. Mean to median ratio 4. Income Dispersion ratio 5. Number of associations per 10,000 population 6. Number of charitable organizations per 10,000 population 7. Voter turnout rate 8. Poverty rate 9. Mortality rate 10. Education 11. Total population 12. Percent Rural 13. Percent over 65 14. Region Hypothesis 9a was not supported; social capital moderates the relationship but does not mediate.
Hypothesis 9b: The posited model will validate a potential causal pathway from income inequality to adverse outcomes through social capital.	1. Gini co-efficient 2. Theil index 3. Mean to median ratio 4. Income Dispersion ratio 5. Number of associations per 10,000 population 6. Number of charitable organizations per 10,000 population 7. Voter turnout rate 8. Percent of population responding to the 2000 census mail request 9. Poverty rate 10. Mortality rate 11. Education 12. Total population 13. Percent Rural 14. Percent over 65 15. Region	1. Gini co-efficient 2. Theil index 3. Mean to median ratio 4. Income Dispersion ratio 5. Number of associations per 10,000 population 6. Number of charitable organizations per 10,000 population 7. Voter turnout rate 8. Poverty rate 9. Mortality rate 10. Education 11. Total population 12. Percent Rural 13. Percent over 65 14. Region Hypothesis 9b was not supported; posited causal pathway could not be validated.

Results of the statistical analysis offered at least some support for seven of the hypotheses tested in this study. The first three hypotheses were tests of measurement models for the concepts of income inequality, social capital and adverse outcomes. The income inequality construct was validated with both factor analysis and SEM. While the initial model did not return a good model fit, allowing correlated errors between the Theil statistic and the mean/median ratio significantly improved the model fit. The correlation between the two suggests there may be some common source of variation unexplained by the model that produces redundancy in the measurement of the two indicators. The redundancy may stem from the fact that both measurements tend to give more weight to lower end of the income distribution. The model with correlated errors returned χ^2 of .140 with 1 degree of freedom, a p-value of .709 and goodness-of-fit (GFI) statistics above .9, all of which indicate that the null hypothesis of model fit cannot be rejected. The final model indicated that the Gini co-efficient and Theil statistic contributed the most to the index, while the income dispersion measure contributed the least. And, although the source of the correlated errors between the Theil statistic and the mean-to-median ratio is unknown, the results suggested the possibility that absolute inequality may be a better predictor of outcomes than measures that give greater weight to the lower end of the distribution. This supposition was supported by the results of the best-fitting model, which used the Gini co-efficient as the only measure of inequality.

The second measurement model hypothesized that the four selected social capital indicators (the number of associations; the number of charitable institutions, the voter turnout rate and the census mail response) could be used as a valid model of the social capital construct. This hypothesis was only partially supported because the census mail response rate indicator

failed to achieve statistical significance at the .05 level, although the variable was significant at .073. Trimming the construct of this variable actually improved its ability to model the commonality in the concept; the four-factor model improved the model fit in SEM and increased the principal components analysis (PCA) factor score for the construct slightly, from .631 in the four-factor model to .636 in the three-factor model; more importantly, the analysis raised the effect size of the first principal component from 51% to 68%. These findings support the hypothesis that the four indicators of the RGF model developed by Rupasingha, Freshwater and Goetz (2006) form a valid measurement instrument for the concept of social capital; support is qualified here only because the census mail response rate failed to achieve statistical significance in the generic measurement model. However, the results of the maximum likelihood estimation in the SEM measurement model indicate that combining these variables to form a construct for structural equation modeling is entirely appropriate. The number of charitable organizations made the most significant contribution to the model, followed by the number of associations; the census mail response rate contributed very little to the model, and the fact that the construct modeled the commonality reasonably well without it actually makes this model more useful, since the mail response rate is only available every ten years. Two of the other indicators—the number of associations and charitable institutions—are available annually, and the voter turnout rate is available every two to four years. Given the data availability, this measurement model could be much more useful to social capital researchers if the concept of social capital can be measured as well or better without it.

The third measurement model was intended to represent a parsimonious set of outcome variables broadly representative of societal ills. Four indicators were chosen to represent the four

disciplines of criminal justice, health, public administration and social work. The hypothesis that the four indicators could share enough commonality to represent a construct of adverse outcomes was rejected when one of the indicators, property crime, was found to vary inversely with two of the other indicators in the model (mortality and education). This was an interesting finding that may deserve further investigation, but is beyond the scope of this analysis. Since SEM expects all construct variables to be scaled in the same direction, the property crime indicator was trimmed from the model. Trimming this variable meant that the measurement model could not be tested in SEM; a separate factor analysis in SPSS using the three indicators returned a KMO value of .547, just below the .6 or above level recommended.

While the statistical results indicate the three variables do not have enough commonality to represent a single idea or construct, the first principal component in the factor analysis explained 59% of the variation between counties. This result suggests enough commonality to combine the three values into an index which does not purport to represent a measurement instrument for adverse outcomes in general but which simply represents an index of the outcomes of interest in this analysis.

Following analysis of the measurement models, the study considered the relationships between the constructs to determine whether income inequality affects social capital and adverse outcomes. Hypothesis 4 was supported when the estimation found the relationship between income inequality and the three-factor model of social capital was in the expected direction and statistically significant at the $p \leq .001$ level. A separate SPSS linear regression analysis was also conducted using the factor scores for the social capital index and the individual inequality indicators as independent variables. All but one of the inequality indicators was significant at the

$p \leq .05$ level; the income dispersion ratio was the exception, and somewhat qualifies the support provided by the SEM analysis. The inequality index explained about 34% of the variation in social capital.

Hypothesis 5 tested the relationship between inequality and adverse outcomes. Analysis of the three-factor model of adverse outcomes also indicated a positive and statistically significant relationship between income inequality and adverse outcomes at the $p \leq .001$ level, thus the analysis offers support for hypothesis 5. More support was obtained from an SPSS regression using the individual inequality indicators as predictors regressed against an index composed of the adverse outcome PCA factor scores. All of the inequality indicators were significantly associated with the adverse outcomes index at the $p \leq .05$ level, and the analysis indicated that the inequality indicators explained about 45% of the variation in adverse outcomes. However, the support for this hypothesis is only partial due to the deletion of the property crime outcome variable from the adverse outcomes construct.

Hypothesis 6 posited a statistically significant and inversely related effect for social capital and adverse outcomes. This hypothesis was also supported, as indicated by the negative relationship (-.370) between the three-factor social capital construct and the three-factor adverse outcomes construct at the $p \leq .001$ level. Again, a separate linear regression offered partial support for the hypothesis in that one indicator, in this case the census mail response rate, failed to achieve statistical significance. This result is consistent with that obtained in the generic model, and suggests that, while the census mail response rate does contribute to the model, it could be trimmed for a more parsimonious model or in years where the mail response rate is

unavailable. The analysis indicated that the social capital indicators explained about 25% of the variation in adverse outcomes.

The final four hypotheses for this study examined the direct and indirect effects of income inequality and social capital on adverse outcomes. Hypothesis 7 tested the contention that income inequality exerted an indirect effect on adverse outcomes through social capital; for hypothesis 8, this relationship was further tested with the addition of demographic variables that could confound the analysis. Both hypotheses were supported; in the first hypothesis, the standardized total effect of income inequality on adverse outcomes was .807, with a standardized direct effect .757 and an indirect effect through social capital of .051. The direct effect of social capital on adverse outcomes was -.271. While these results do suggest that adverse outcomes increase as inequality depresses social capital, the effect is quite small and accounted for only about 6% of the effect of inequality on adverse outcomes.

To test hypothesis 8, a set of demographic variables was introduced to determine whether non-structural extraneous factors could affect the relationship. These included the county population size; the percentage of the population over 65; the percentage rural, and the census region where the county was located. The regional variable was a dummy variable with 1 representing the south. Regression estimates indicated that all demographic variables significantly impacted adverse outcomes. The percentage of the population over 65 had the greatest influence; inspection of the standardized total effects revealed that the impact of this variable on mortality—a standardized total effect of .747-- accounts for much of this effect. The indicator for region had the next-highest influence on adverse outcomes; its effect was also most pronounced through the mortality variable, with a standardized effect of .224. The effect of the

rural variable was quite small, with a standardized value of .071. Population size had the least effect, and was the only variable to produce a negative effect, indicating that as population increases, adverse outcomes decrease. However, this effect was quite small, with a standardized total effect of only .05.

Once the statistical significance of the control variables was established, the model was re-estimated; the addition of these variables essentially reduced the direct effect of social capital on outcomes by 6%, but doubled the proportion of the indirect effect of income inequality from 6.3% to 11.7%. The change in the strength of the relationship raised the possibility that interaction between these variables could be affecting the result. To test for this effect, interaction terms for the demographic variables were calculated and added to the model. The interaction terms slightly diminished the effect of inequality on outcomes, but also slightly raised the indirect effect. These effects were similar to those obtained by the introduction of the individual control variables. The differences were not substantial and were close enough to the previously obtained values to conclude that much of the effect was captured in the model without these interaction terms. In the interest of parsimony, and since the interaction terms degraded the model fit, they were deleted from the model. In the final analysis, the results support the hypothesis 8 presumption that income inequality exerts an indirect effect on adverse outcomes through social capital when controlling for the selected demographic factors.

The addition of the demographic variables completed the covariance structural model used for the test of the relative income hypothesis and the hypothesized causal path for the relationship. Hypothesis 9a posited that the relationship between income inequality and adverse outcomes is mediated by social capital. Although the terms mediation and moderation are often

used interchangeably, mediation actually implies that the primary effect of income inequality is a result of its impact on social capital. This implies that the indirect effect should be stronger than the direct effect. Results of the initial analysis indicated that the direct effect of inequality on outcomes was much stronger than the indirect effect. While the presence of some indirect effect does indicate that social capital moderates the relationship, the results did not rise to the level of mediation since the indirect effect was relatively small. These results suggested the null hypothesis of model fit should be rejected. However, to further investigate the moderation effect, another interaction term—between the independent variables income inequality and social capital—was added to the model. A significant result for the interaction term would suggest that the effect of income inequality on adverse outcomes depends to some extent on the relationship between income inequality and social capital.

In this analysis, the interaction term was significant at the $p \leq .001$ level. The fact that the interaction term had a negative effect on adverse outcomes (standardized $-.135$) indicates that the interaction decreased the effect of inequality on adverse outcomes. This improvement was somewhat slight, changing the direct effect of inequality on adverse outcomes from $.747$ to $.733$; however, the interaction did raise the indirect effect of inequality on adverse outcomes from $.087$ to $.090$. This result suggests the interaction reduces the effect of inequality overall, but may slightly increase the proportion of the impact that flows through social capital. However, since effect was relatively small and the addition of the interaction term did not improve the model fit, the term was deleted from the model. In the end, the higher values for the direct effect of inequality reveal that the impact of inequality on social capital is more likely to increase or

decrease the strength of the effect of inequality on outcomes, but the effect was relatively small. Thus, the hypothesis 9a prediction that social capital mediates the relationship was rejected.

These findings did not bode well for the hypothesis 9b presumption that that the causal path from income inequality to adverse outcomes runs through social capital. The model failed to return adequate goodness-of-fit statistics. Examination of the results indicated the presence of correlated errors among the control variables, including correlated errors between the over 65 population and population size; percent rural; and region, as well as between population size and percent rural. Allowing these errors to correlate improved the model only slightly; though improved, this model also failed to validate the posited causal path.

Inspection of model fit statistics revealed a high RMSEA value of .250 that indicated that even with unknown but optimally selected parameter values, the model would not approximate a good fit for the population covariance matrix (Byrne, 2001). However, the results also indicated the model could have been more parsimonious, thus raising the possibility of that model trimming might improve the results. Although all of the indicators were significant at the $p > .05$ level, the census mail response indicator, identified as non-significant during the initial measurement model and during the tests of the relationship between social capital and adverse outcomes, contributed the least to the model. As indicated earlier, an SPSS factor analysis revealed that removing this variable improved the social capital construct, raising the effect size of the first principal component from 51% to 68%. Trimming the census mail response indicator improved the model fit slightly, and also introduced some changes in the impact of the demographic variables. Deleting the response indicator reduced the control variable 'over 65' to non-significance at the $p \leq .05$ level. All other indicators remained significant and were in the

expected direction. Among the control variables, 'over 65', 'percent rural' and 'region' all had positive effects on adverse outcomes, indicating that adverse outcomes increase as the values for these variables rise. The highest effect was for percent rural, which had a standardized total effect of .245. The effects of the over 65 population and region were much lower, at .025 and .047 respectively. Population size was the only control with a negative relationship with adverse outcomes, with a standardized total effect of -.105. The standardized direct effect of inequality on adverse outcomes was .679, with an indirect effect of .067. These results were slightly different from those obtained in the previous model, with the moderating effect of social capital reduced from about 12% to about 9%.

Again, however, the standardized total effects indicated that income inequality had the largest effect on adverse outcomes (.746), almost twice the -.368 effect observed for social capital. As in earlier analyses, interaction terms were added to investigate their effect on the relationship. All but two of the demographic variables displayed significant regression weights, but adding them to the model did not improve the fit; the same was true of the interaction between the income inequality construct and the social capital construct. Nonetheless, analysis of these interactions provided some interesting observations about the relationship. As with the previous analysis, these terms tended to lower the effect of inequality on adverse outcomes, while raising the moderating effect of social capital and slightly increasing the effect of inequality on social capital. However, again the results were similar enough to conclude that most of the effect was already captured in the model, and since they did not improve the model fit, the interaction terms were deleted. In the end, results for this model also failed to support the null hypothesis of model fit. Trimming the model of the response variable improved the model

fit slightly only slightly, changing the goodness-of-fit index (GFI) from .629 to .630. However, the parsimony goodness-of-fit index (PGFI) value of .414 suggested further trimming could improve the model, and the inequality construct was examined to determine whether trimming this construct could improve the model.

The income inequality indicators were trimmed one by one until the best model was achieved using the Gini co-efficient as an observable indicator and the only measure of income inequality. This procedure produced the best model obtainable, reducing the χ^2 value by almost 50% from 14813.230 with 69 degrees of freedom to 8828.236 with 40 degrees of freedom, and raising the GFI statistic from .630 to .711. As with the other models, this change produced slightly different results. Among the control variables, the model raised the significance value for the over 65 population to significance at the $p \leq .05$ level; rural retained its place as the highest contributor with a standardized estimate of .270, slightly lower than the .272 obtained in the model containing all inequality indicators; estimates for population and the percentage of the population over 65 population rose slightly from -.105 to -.113 and .025 to .039 respectively, while the estimates for region decreased from .047 to .040.

Examination of the standardized total effects indicated that using the Gini co-efficient as the only indicator of income inequality reduced the effect of inequality on adverse outcomes from .746 to .664 and slightly raised the effect of social capital on adverse outcomes from -.368 to -.370. The standardized direct effect of the Gini co-efficient on adverse outcomes was slightly decreased from .679 to .664, while the indirect effect rose from .067 to .075. While deletion of the census response variable reduced the moderating effect of social capital by 6%, using the Gini as the only indicator increased the indirect effect to about 9%. The results for this model

suggest that, among the four inequality indicators the Gini co-efficient may be the best predictor for these outcomes. However, the p value for the model remained at .000, thus, the hypothesis 9b presumption of model fit was rejected.

The results of this test of the relative income hypothesis failed to substantiate the hypothesis presumption that income inequality exerts its effect on adverse outcomes through social capital. In all of the models tested, the analysis demonstrated that the primary effect of income inequality is more likely direct than indirect, and, although social capital appears to moderate the relationship, that effect is much smaller than anticipated by the relative income hypothesis. The introduction of demographic variables and interaction terms changed this effect only slightly, but did suggest the demographic variables and interaction terms tended to decrease the effect of inequality on outcomes while slightly raising the impact of the indirect path through social capital. The fact that the measurement models for inequality and social capital were validated lends some credence to these results as it suggests the failure to substantiate the causal path was not a result of inadequate measurement of the predictor variables. In the end, however, the analysis of the best model obtainable indicated that the total effect of income inequality on adverse outcomes was much larger, with a standardized total effect of .664, than the total effect of social capital on adverse outcomes, with a standardized effect of -.370.

Analysis of the effects on individual outcomes revealed that both inequality and social capital exerted their greatest effect on education, with a one-point increase in the Gini co-efficient associated with a 1.349 decrease in percentage of the 18-24 year old population without a high school diploma and a one-point increase in social capital associated with a 1.00 increase in educational attainment for this population.

The impact of income inequality on the poverty rate was also substantial, with unstandardized estimates indicating that for every one-point change in the inequality index, the poverty rate rose by 1.039, while a one-point increase in social capital was associated with only a .077 decrease in poverty. The impact on mortality rates for both predictor variables was much smaller, with a one-point increase in income inequality producing a .149 point increase in mortality, and a one-point increase in social capital associated with only a .011 decrease in mortality. These results suggest that it is income inequality, rather than social capital, that has the largest effect on adverse outcomes, including declining social capital. The impact of inequality on social capital is such that a one-point increase in income inequality is associated with a 1.367 decrease in social capital.

Separate regression analysis using the factor scores obtained for the constructs indicated that the Gini co-efficient explained about 45% of the variation in adverse outcomes; the demographic variables explained about 17% and social capital explained only about 2% of the variation. These results suggest that a policy focus on improving the income distribution could have much greater success in reducing adverse outcomes than policies designed to increase social capital.

CONCLUSION

The purpose of this study was to examine the relationship between income inequality, social capital and selected social welfare outcomes by testing a version of Wilkinson's (1992) relative income hypothesis. Wilkinson's (1992) study of the effects of income inequality on health status led him to hypothesize that income inequality creates a sense of relative deprivation and disadvantage that affects health status at an ecological level. Since then, Wilkinson and others have expanded the hypothesis to include other outcomes, and introduced the social capital theory concept that this sense of deprivation and disadvantage impacts social capital and could be a causal factor influencing the impact of inequality on adverse social outcomes. These theoretical assumptions were tested with an attempt to determine whether social capital mediates the relationship between income inequality and the selected outcomes. To test this possibility, it was first necessary to test the measurement instruments used to model the relationship.

For the year 2000, results of measurement models validated for the income inequality and social capital constructs supported the hypotheses that these indicators have enough commonality to suggest they are measuring the same underlying concept, but not so much as to suggest they are duplicating the measurement. The social welfare outcomes measurement model could not be validated due to the deletion of the property crime indicator, and a principal components analysis suggested the indicators did not have quite enough commonality to proxy a latent construct representing adverse social outcomes but could still be used as an index. Results of these analyses supported hypothesis 1, but only partially supported hypotheses 2 and 3.

Regarding hypothesis 2, which postulated that the four indicators used to model social capital have enough commonality to model the latent construct, the successful test of the RGF

model developed by Rupasingha, Freshwater and Goetz (2006) for social capital production in U.S. counties may help to validate a very usable model for social capital at the county level. This level of analysis incorporates the local perspective important to social capital researchers as well as providing for a larger sample size appropriate for regression analysis and structural equation modeling. In addition, although all the variables were significant in the final model, the fact that the census mail response rate contributed little to the model suggests that this variable could be deleted without substantial loss of power. In fact, factor analysis revealed that deleting this variable rate raised the explanatory power of the model from 51% to 68%.

The census mail response indicator was not initially deleted from the measurement model because one purpose of this study was to test the RGF social capital measurement instrument and correlating the errors between the response and charitable organizations variables obtained a good fit for the structural equation measurement model. Nonetheless, the finding that this indicator contributed the least to the model raised the possibility that it could be trimmed without significant loss of meaning in the construct. In fact, trimming this variable did improve the fit of the final SEM model. Paring the response indicator, which is available only every ten years, opens the opportunity for more frequent analysis of county-level social capital in years when census estimates and data on the other indicators is available.

Once the measurement models were tested, four premises that underlie the structural hypotheses were investigated to determine whether income inequality significantly affected adverse outcomes; whether income inequality affected social capital, and whether social capital significantly affected adverse outcomes (Baron and Kenny, 1986). In this case, the analysis supported hypotheses 4, 5 and 6; the posited relationships were validated by the regression

estimates, all of which were statistically significant and in the expected direction. Then, hypotheses 7 & 8 examined the direct and indirect effects of inequality to determine whether social capital exerted an influence on the relationship between inequality and outcomes. The results indicated the existence of an indirect effect, even when controlling for demographic factors and interaction terms. Although the indirect effect was small—representing only about 12% of the effect of inequality on outcomes--the results supported the hypotheses that income inequality exerts an indirect effect on adverse outcomes through social capital.

The final objective of this study was to determine whether a causal pathway from income inequality to adverse outcomes through social capital could be validated. The first test of this objective—hypothesis 9a--looked for a mediating, or causal effect. The analysis determined that the impact of the indirect path through social capital did not rise to the level of mediation; the relationship was found to be moderated, rather than mediated, and this effect, though statistically significant, was relatively small. This finding, along with the results of the best model estimation, resulted in rejection of hypothesis 9b as the posited hypothesis of model fit could not be validated. Examination of the modification indexes (MI) provided a clue to the failure of the model in the large number of correlated errors between constructs. Although some correlated errors within constructs were allowed to improve the model, the MI indicated that, essentially, every error in the model was correlated with several other errors, a situation which introduces so much ‘noise’ that, in the end, Halpern (2005) may be right in his contention that the situation is simply too complicated to distinguish a causal pathway. However, the limitations of this study could also have affected the ability of the model to validate the pathway.

Study Limitations

In this study, specification of a primary causal direction in SEM, along with the restrictions placed on control variables by Wilkinson and Pickett (2006), means the model will not reveal co-variances that suggest a compositional causal pathway. Wilkinson and Pickett, (2006) argue that controls that have a strong contextual effect should be factored out if the relative income hypothesis is to be tested in its most plausible form. In this case, control variables were selected to distinguish demographic and geographic differences that could confound the analysis, but other frequently used controls were culled out due to Wilkinson and Pickett's (2006) perspective on appropriate control variables requires distinguishing which potential control variables are influenced by social class distinctions and which are not. This study attempted to follow this reasoning, but the results indicate that even factoring out variables with a strong structural content failed to validate the relative income hypothesis.

With respect to external validity, the study sample covered 99% of the counties in the U.S., thus generalizability within the U.S. is not an issue. However, since the study was cross-sectional, the results may not be generalizable to other time frames. In addition, the literature has reported that studies on the relationship in other developed nations failed to replicate the association observed in the U.S. Subramanian and Kawachi (2004) contend that most of these other nations have more equal income distributions, and suggested the absence of an association in such countries could reflect a threshold effect of inequality. This contention may be supported by studies in countries with greater income inequality than the U.S. which show similar associations between high income inequality and poorer health. Differences in culture, economic

and political systems and institutional backgrounds may pose significant problems with respect to the generalizability of these results to other countries.

Internal validity was expected to be enhanced by the theoretical framework of the constructs and results of empirical studies which have used rigorous statistical techniques in attempts to validate the pathway posited by this study. Threats to internal validity include potential measurement error and construct validity. Review of the literature indicates that many studies use survey data to model the social capital concept. Since survey data have a number of recognized limitations, this study utilized measurements compiled by various official U.S. government sources; although some of the data was compiled from surveys (in particular, some of the census SF-3 data) this measurement method was considered superior because less of the data is self-reported and the reliability of these measurements has been validated by numerous studies. Although no measurement is perfect, these instruments are generally consistent across time and place and their wide use attests to their accepted reliability.

Construct validity is perhaps the greatest threat to the design, particularly with respect to the social capital and adverse outcomes constructs. The use of a validated measurement tool—the RGF model developed by Rupasingha et al.--was expected to increase construct validity for the social capital construct. Although the results indicated that the indicators used in this study have sufficient commonality to suggest that they do measure a common concept, the question of whether they accurately and adequately represent the concept of ‘social capital’ may be a matter for debate. Some researchers have suggested that social capital is a two-dimensional concept composed of both behaviors and attitudes; this study measures only the behavioral aspect. Nonetheless, the fact that the RGF model is similar to Putnam’s Instrument, which has been used

to model the social capital concept in several other studies, suggests the study is at least measuring those aspects of social capital that have been recognized as valid in other studies.

The validity of the adverse outcomes construct posed a more serious limitation. This construct was not intended to be a comprehensive measure of overall social welfare or encompass all social problems; there may be several other variables that could be included to provide a more comprehensive picture. In this case, the study trades some precision for parsimoniousness, and results may not be generalizable to other social problems. However, the property crime indicator was trimmed because it was found to be inversely related to some of the other indicators in the construct. Factor analysis of the remaining three indicators in the construct returned a KMO statistic of .547, below the recommended level of .600. This result indicates the three outcome variables do not share quite enough commonality to conclude that they are measuring the same concept. Nonetheless, the first principal component in the factor analysis explained a respectable 59% of the variation between counties. This result suggests enough commonality to combine the three values into an index which does not purport to represent a measurement instrument for adverse outcomes in general but which simply represents a broad, parsimonious index of the outcomes of interest in this analysis. Further research that can identify and test additional outcome variables could produce different results.

With respect to conclusion validity, the study deliberately used indicators that were found to be relevant in the literature to ensure sufficient power in the analysis. However, conclusion validity could be undermined by violations of statistical assumptions. In this case, the large sample size produced relatively normal distributions for all of variables except for population size. Violations of normality are more serious in small samples, and the large sample size used in

this analysis provides some protection against serious problems. Multivariate normality can also create problems; here again, only one indicator—the poverty rate--was affected. The P-P plots and scatter plots revealed some potential heteroskedasticity in the poverty rate indicator, which could cause the standard errors to be underestimated and inflate the significance of the result. Given the normality tests, the confirmatory factor analysis models were estimated using the maximum likelihood (ML) method, because this method is relatively robust with respect to violations of multivariate normality. Some multicollinearity was expected given the close correlations between the independent variables and a study design that anticipated commonality among the indicators and between the constructs. However, only one indicator, the Theil statistic, approached the .800 level and this variable was subsequently trimmed from the model, thus multicollinearity was not a significant problem. However, given the nesting of counties within states, spatial autocorrelation could violate the assumption of independence of observations; the programs and methods used in this analysis provide no tests or corrective measures for this possibility.

The cross-sectional design also poses problems for conclusion validity as the possibility of a threshold or tipping point for the effect of inequality on social capital and the outcome variables could undermine the validity of the conclusion for other years. The fact that a cross-sectional design does not provide for lag time between cause and effect also undermines the conclusion validity. Although there is no real consensus on how much lag time may be required to assess the impact of inequality on outcomes—including social capital—at least some effect for time is expected in the relationship. Longitudinal studies may be able to provide more insight into this aspect of the relationship, but sacrifice some generalizability due to data availability

problems. The census provides survey data each year as part of the American Community Survey, but the survey's annual data is only collected on counties with populations of over 65,000, thus it covers only about one-third of U.S. counties. Pooled data is available for three-year periods, but these data neglect counties with populations less than 20,000. It appears that both cross-sectional and longitudinal studies must sacrifice something; this study sacrificed lag time for more extensive coverage of a unit of analysis in rural areas that are frequently ignored in such studies.

In the end, perhaps the greatest limitation of this study was the large amount of error in the final model. Although all the measurement model RMSEA statistics were well within parameters, in the full path model a high RMSEA value of .250 indicates that even with unknown but optimally selected parameter values, the model would not approximate a good fit for the population covariance matrix (Byrne, 2001). In addition, inspection of the modification indexes for each model attempted revealed a high number of correlated errors, which suggests there is a great deal of commonality among these variables that was not measured by this model. This result suggests two major limitations were a poorly specified model, and a great deal of 'noise' in the study environment.

Conclusions

Speculation over the relative impact of income inequality remains a hypothesis because insufficient evidence has been accumulated to raise the supposition to the level of theory. Fischer and Thorngler's (2007) complaint about the gaps in the empirical research into these relationships is germane here. This study took the broader, more interdisciplinary approach called for to test

the theoretical proposition that social welfare problems share common roots, to identify those roots and ascertain how they influence adverse social outcomes.

Although the posited model failed to validate the relative income hypothesis, it should be noted that these results may not be a definitive rejection of the hypothesis; they apply only to the tested year and data set. The possibility of thresholds or tipping points could produce different results for timeframes where income inequality is greater. Nonetheless, this study adds a new model that helps illuminate the channel through which structural features such as economic inequality impact social welfare outcomes. In addition, while most previous research has concentrated on the effects of these relationships in a single disciplinary area, this study tested the relationship across an interdisciplinary spectrum of dependent outcomes in healthcare, criminal justice, governance and social welfare.

The study also used a broader unit of analysis which included counties with smaller populations than studies done using the American Community Survey (ACS) datasets, which delete counties with populations under 20,000 for three-year pooled data and counties with populations less than 65,000 for the ACS data for single years. The selected outcome variables for this study were also deliberately broad; future research on a narrower set of more specific outcome variables could provide more precise estimates of the effect of income inequality on social welfare problems.

In addition, given the limitations of cross-sectional analysis, future research using longitudinal designs may be worthwhile; longitudinal research may be somewhat problematic given the data availability, and results may not be generalizable to counties with smaller populations, but such research could shed light on the potential lagging effect of income

inequality on outcome variables. Also, considering comments by Subramanian and Kawasaki (2004) that the literature lacks systematic multilevel investigations into the possibility that state-level social capital could mediate the relationship between states, future research could also benefit from multilevel models (p. 10). The fact that U.S. states and their counties share similar institutional backgrounds makes comparisons at each level more meaningful by taking into account the conception that social capital produced at the local level has aggregate effects for a wider society (Subramanian and Kawasaki, 2004). The similar institutional backgrounds of counties nested within states can also help mitigate problems with model mis-specification and renders the analysis less susceptible to statistical problems of omitted variables and parameter heterogeneity (Western, et al., 2004). Multilevel structural equation modeling could be a particularly useful method to investigate structural relationships at both state and local level to examine and compare the impact of ecological variables at both levels.

In the end, however, the results substantiate the moderating influence of social capital, although the effect size was relatively small compared to the direct effects of income inequality and social capital on outcomes. From the perspective of decision-makers looking for root causes of social ills, it may be useful to know that the direct path from inequality to outcomes has much greater influence than the direct effect of social capital, and that although social capital appears to moderate the relationship, this moderating effect is not large. That information could help distinguish between two concepts that compete for policy attention as potential underlying causes of adverse social outcomes.

APPENDIX A: DESCRIPTION AND MEASUREMENT OF STUDY VARIABLES

Table 20: Description of Study Variables

Variable	Field	Description	Type	Values
<i>Relative Income Inequality</i>				
GINI Co-efficient	GINI	Income Inequality measurement based on the Lorenz Curve	Scale	0-1
County Mean to Median Ratio	MMR	Measures the difference between the mean and median income in each county	Ratio	1-∞
Income Dispersion Rate	IncDisp	Compares the county percentage deviation from median with the national median	Ratio	1-∞
Theil Index	Theil	Proportional measure of each county's contribution to overall U.S. inequality.	Scale	Any
<i>Social Capital</i>				
Census Mail Response Rates	Respn	Response Rate for Census Population and Housing Survey	Ratio	0-100
Vote	Vote	Percentage of Voting Eligible Population Voting in Presidential Election	Ratio	0-100
Charitable Organizations	NCCS	Number of non-profit organizations	Scale	0-∞
Association	Assn	Index; number of civic, professional; sports; religious and political organizations.	Scale	0-∞
<i>Adverse Social Outcomes</i>				
Property Crime	PCrime	Property crime rate per 10,000	Ratio	0-100
Mortality	Mort	Mortality rate per 100,000	Ratio	0-100
Education	HSD	Percentage of the 18-24 year old population without a high school diploma.	Ratio	0-100
Poverty	Pov	Percentage of population with incomes below Federal Poverty Rate	Ratio	0-100
<i>Control Variables</i>				
Population Size	PSIZE	Population Size	Scale	0-∞
Region	REG	Census Regions	Nominal	1-5
%Rural	URUR	% Rural Population	Ratio	0-100
Over 65	Over65	% of Population Over 65	Ratio	0-100

Table 21: Measurement of Study Variables

Constructs/Variables	Source of Information	Measurement
<i>Income Inequality (Exogenous)</i>		
GINI Co-efficient	University of Arizona GeoDa Center, Household Income Disparity	0=Perfect equality 100=Perfect inequality
Theil Index	University of Arizona GeoDa Center, Household Income Disparity	Positive values indicate the county contributes more to national equality; Negative values indicate the county makes a negative contribution.
Mean-to-Median Ratio	Calculated from U.S. Census 2000 SF-3 estimates	Higher values indicate more inequality
Income dispersion Ratio	Calculated from U.S. Census 2000 SF-3 estimates	Higher values indicate greater inequality
<i>Social Capital (Endogenous WRT Income Inequality; Exogenous WRT Social Welfare Outcomes)</i>		
Census Mail Response Rates	U.S. Decennial Census (2000)	Percentage response rates
Vote	Calculated from the number of votes cast for president. Raw data was obtained from the CQ Press statistics included in the U.S. Census City/County Data Book	Percentage response rates
Charitable Organizations	National Center for Charitable Statistics	Absolute number; organizations per 10,000
Association (Aggregate of 9 types of associations)	U.S. Census County Business Patterns	Aggregate of 12 types of organizations; organizations per 10,000 population
<i>Adverse Social Outcomes (Endogenous)</i>		
Property Crime Rate	US Census USA Counties file (from FBI Uniform Crime Report Statistics)	Rate per 1000 population
Education	U.S. Census USA Counties database	Percentage of population 18-24 without high school diploma
Mortality Rates	National Center for Health Statistics	Deaths per 100,000
Poverty Rate	U.S. Census USA Counties database	Percentage of population living under the poverty level
<i>Control Variables</i>		
Population Size	U.S. Census USA Counties database	Published Public Data;
Region	U.S. Census Designation	Published Public Data
% Rural	U.S. Census USA Counties database	Percentage of county rural population
% Over 65	U.S. Census USA Counties database	Percentage of county population over 65

APPENDIX B: COPYRIGHT PERMISSION

Jeannie H. Schiff
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March 10, 2010

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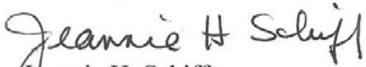
Dear Ms. Higginbotham:

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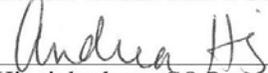
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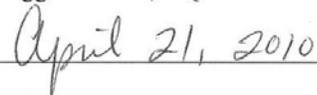
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Sincerely,


Jeannie H. Schiff

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Date: 

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