MANAGE THE MARGINS: THREE ESSAYS ON EFFECTIVE POLICYMAKING FOR SOCIAL INEQUALITY IN HEALTH

A Dissertation

by

LING ZHU

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2011

Major Subject: Political Science

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Approved by:

Chair of Committee,	Kenneth J. Meier
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ABSTRACT

Manage the Margins: Three Essays on Effective Policymaking for Social Inequality in Health. (August 2011)

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Chair of Committee: Dr. Kenneth J. Meier

This dissertation includes three studies devoted to trying to understand inequality in health between people from different social groups in a democratic society. In the U.S., social inequality in health takes various forms and the key to understanding how democracy solves the problem of inequality lies in a complex set of political and social factors. I take an institutional approach and focus on examining how political and policy institutions, their administrative processes, and the policy implementation environment are linked to social inequality in health.

The first essay, *Whose Baby Matters More*, uses a theoretical framework for evaluating heterogeneous group responses to public health policies and depicts how racial disparities in health are rooted in group heterogeneity in policy responses. The second essay, *Anxious Girls and Inactive Boys*, focuses on how state-level policy interventions and social capital interactively affect gender differences in health. The third essay, *Responsibility for Equity*, explores the link between publicness of state healthcare systems and social equity in healthcare access.

In the first essay, I focus on racial disparities in infant mortality rates and pool state-level data from 1990 to 2006. The empirical analysis suggests that enhancing the capacity of state healthcare systems is critical to improving population health. Blacks and whites, nevertheless, exhibit different responses to the same policy. Racial disparities could be reduced only when policy interventions generate more relative benefits for Blacks. In the second essay, I find that social capital conditions the effect of public health policies with regard to managing childhood obesity. There are gender differences, moreover, in health outcomes and behavioral responses to state and local-level obesity policies. In the third essay, I find that different institutional factors exhibit different impact on inequality in healthcare access. While public finance resources may reduce inequality in healthcare access, public ownership and the public healthcare workforce do not have significant association with inequality in healthcare access. State Medicaid eligibility rules exhibit moderate impact on inequality in healthcare access.

DEDICATION

To Xuejun Li and my parents

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This dissertation would not have been real without the support of several individuals who in one way or another gave me the possibility to finish this long journey.

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NOMENCLATURE

ACS	American Community Survey, U.S. Census Bureau
AHQR	Agency for Healthcare Research and Quality
AR(1)	First-Order Autoregressive Process
ASEC	Annual Social and Economic Supplement to the CPS
BMI	Body Mass Index
CDC	Centers for Disease Control and Prevention
CPS	Current Population Survey, U.S. Census Bureau
FGLS	Feasible Generalized Least Squares
GfK MRI	GfK MediaMark Research&Intelligence, LLC.
GLS	Generalized Least Squares
HHS	U.S. Department of Health and Human Services
IMR	Infant Mortality Rate
MI	Multiple Imputation
ML	Maximum Likelihood
NCHS	National Center for Health Statistics
NCSL	National Conference of State Legislatures
NIH	National Health Institution
OLS	Ordinary Least Squares
OMH	The Office of Minority Health (HHS)
PCSE	Panel-Corrected Standard Error
SHHPP	School Health Policies and Programs Study
SUR	Seemingly Unrelated Regressions
VIF	Variance Inflation Factor
YRBSS	Youth Risk Behavior Surveillance System

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1. INTRODUCTION: SOCIAL INEQUALITY IN HEALTH

A prominent feature of almost all industrialized democracies is the social gradient in health (Marmot 2003). Health inequality – broadly defined as group differences in preventable health risks and access to healthcare – is a major form of social inequality. It blights the lives of many people in both developed and developing countries (Wilkinson and Pikett 2009), impedes democratization, and undermines democracy (Tilly 2007). Charles Tilly writes in his book, *Democracy*, that:

> To the extent that citizen-state interactions organize around categorical differences also prevailing in routine social life, those differences undermine broad, equal, protected, mutually binding consultation. They block or subvert democratic politics because they inevitably install large resource disparities in the political arena. They inhibit coalition formation across categorical boundaries. Meanwhile they give members of advantaged categories both the incentive and means to invade outcomes of democratic deliberation when those outcomes counter their interests (Tilly 2007, 110).

In recent decades, modern democracies have devoted massive efforts in improving healthcare and using economic democracy as a means to tackle inequality (Wilkinson and Pickett 2009). Nowhere in the world emphasizes as much as the U.S. does on improving health through heavy investment in new

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This dissertation follows the style of *American Journal of Political Science*.

medicines and healthcare technologies (WHO 2010).[1] The quality of healthcare facilities, doctors, and medical technologies in the U.S. has been deemed as one of the best in the world. Ironically, American citizens do not benefit uniformly from the quality and availability of healthcare resources.

Social gradient in health is evident in the United States (Barr 2007). For example, African Americans have a disproportionate burden of various preventable health risks, such as high infant mortality rates, teen birth rates, HIV (Human Immunodeficiency Virus) infection rates, etc. (NCHS 2011). According to the National Center for Health Statistics (NCSH), from 2004 to 2006, the average Black infant mortality rate (IMR) was 13.5 deaths per 1,000 live births, and the average IMR for all races was 6.8 deaths per 1,000 live births (NCHS 2011, 127). In 2006, the average Black teen birth rate was more than 1.5 times the average teen birth rate for all races (NCHS 2011, 107). According to the Centers for Disease Control and Prevention (CDC), in 2006, the rate of new HIV infections among non-Hispanic Blacks (83.7 per 150,000) was 7 times the rate of new infections among whites (CDC 2008). Group differences in health also exist based on gender, age, income, etc. (Marmot 2003). Studies found that in the U.S., women have significantly lower self-reported health status, lower mean education, and income than men. On average, women also use more healthcare services than men (Macintyre et al.1996; Merzel 2000).

Despite the abundant documentation on health inequality, empirical evidence on causes and remedies of health inequality is still lacking. Mary Douglas and Aaron Wildavsky (1983) wrote in their seminal book, *Risk and Culture*, that in

[1] According to the World Health Organization's report, in 2008, the U.S. ranked No.1 in the world based on the per capita spending on health. In 2008, the U.S. spent about 16% of its Gross Domestic Product on healthcare, which were about 1.5 times as high as the healthcare spending in France and Germany, and twice as high as the healthcare spending in Japan (WHO 2010).

the U.S., the process of making preventive risk policies has a peculiar feature – " knowledge and action are out of sync: whatever programs are enacted to reduce risks, they conspicuously fail to follow the principle of doing the most to prevent the worst damage (1)." They contend that such a policy failure occurs because substantial disagreement remains over how to define risks, how to identify the most disadvantaged group, and how to mobilize the majority group to support policies when the most disadvantaged group belongs to the minority camp in a democratic system.

The paradox of mobilizing public support for policies that benefit a minority group in a majoritarian political system is not unique to the issue area of healthcare. The paradox of increasing distributive justice and improving the overall societal development is a generic problem existing in many policy areas. Social inequality, moreover, takes various forms and the key to understanding how democracy solves the paradox of equity lies in a complex set of political and social factors. The absence of systematic studies on political causes and remedies of social inequality prevents both scholars and practitioners from gaining useful knowledge on how to provide best policies to the most deserved.

How do politics matter for social inequality? This is an important, yet under-studied question in the political science and the public administration literatures. Gooden and Portillo (2011) observe that the field of public administration and public policy as a whole, needs to "strive even harder to press the value of social equity in scholarship and practice (161)." They point out that, "despite its many contributions, social equity research has grown quite limited in its methodology and scope (69)." Pitts (2011) observes that " it is problematic in research on social equity that scholars tend to reiterate normative arguments instead of asking

empirical questions about how these arguments operate in practice (77)." Absence of empirical evidence collected from systematic studies, according to Pitts (2011), leads practitioners to muddling through the policymaking process with only anecdotal evidence as the guide for how to reduce social inequality.

This dissertation addresses the broad question on how democratic institutions may solve the problem of social equity by focusing on health inequality as one major dimension of social inequality. Using three studies on health inequality in the U.S., I explore the links between provisions of public health policies, the social environment of policy implementation, institutional characteristics of public healthcare systems, and health inequality. The purpose of this dissertation is two-fold: to recognize social equity as an important normative value in the research area of public administration and public policy; and to develop systematic studies that empirically investigate effective policy tools for reducing social inequality. Though the empirical focus of this dissertation is health inequality, the proposed theoretical frameworks and empirical analyses can be useful for studying other topics in the area of social equity research.

1.1 Health Inequality: The Definition

It is important to clarify the definition of health inequality, because how to define the term has important implications for measurements and policy solutions to the problem. In this dissertation, "health inequality" is exchangeable with the term "health disparity."

Margaret Whitehead (1990) proposed a concise definition of health inequality, which has been adopted by the World Health Organization and used by many scholars in public health and epidemiology. According to Whitehead, health

inequality refers to differences in health, which "are unnecessary and avoidable", and in addition, are "considered unfair and unjust (29)." Similarly, the U.S. National Institutes of Health (NIH) defines health disparities as "differences in the incidence, prevalence, mortality, and burden of disease and other adverse health conditions that exist among specific population groups in the United States (NIH 2005, 81)."

Braveman (2006) provides a thorough review on 13 different definitions of health inequality (or health disparity) and points out two important points for clarifying the definition. Firstly, health inequality does not refer to individual-level absolute differences in health status and health risks. Though affected by biomedical and behavioral causes, health inequality is a society-level construct, which refers to the group-based, systematic differences in health. Hence, to explicitly identify the baseline group and the disadvantaged group is important for both the research on health inequality and practice in making policies for reducing health inequality.

Secondly, health inequality refers to avoidable differences in health caused by "persistently experienced social disadvantages (Braveman 2006, 167)." This is an important political meaning of health inequality. It implies that research on causes and remedies of health inequality should incorporate socioeconomic and political factors that are associated with cumulative social disadvantages. It also informs that health inequality is potentially shaped by political and policy factors, and may be reduced by political and policy means.

1.2 Political Determinants of Health Inequality

My theoretical focus is to conceptualize health inequality based on avoidable group differences in health and access to healthcare. Based on this conceptualization, I ask why some people in the same society are more vulnerable to certain health risks and have less access to healthcare resources than others. Do social and political factors cause differences in health? To addresses these questions, I focus on identifying necessary conditions for making effective policies for reducing health inequality.

In the literature on public health and health inequality, one can find a growing number of studies focusing on socioeconomic determinants of health, but very few indeed on the political determinants of health (Navarro 2008). Until recently, scholars find some evidence, which suggests that political variables may affect population health outcomes. In the U.S. context, scholars find that population health, to a significant degree, is an outcome of government policies. Governmental interventions in physical infrastructure, social protection, and generosity of the welfare system have a significant impact on population health status (Kaplan et al. 1996; Kennedy 2005; Kim and Jennings 2009). Less clear evidence exists, however, on how administrative and policy accommodations add success in reducing health inequality. This is remarkable, as scholars claim that political and policy inputs do matter for improving population health, but not so clear if they can reduce health inequality.

One reason for the deficit of studies on the link between politics and health inequality is that politics is narrowly defined as political ideologies in the policymaking process. Understanding how political ideologies shape the policy

landscapes in a democratic system is essential to explaining why some policy instruments are provided to the public but not others. It is, nevertheless, not sufficient to link political decisions to the actual health outcomes. Powell (2006) and Judge (2008) both observe that the absence of political factors in health inequality research in a major concern. Policy design and policy implementation, moreover, are even more neglected. The complex policy implementation process shapes public health outcomes and affects how policy benefits are distributed among citizens. In the literature, the missing link between political decisions on health issues and the health inequality that scholars have observed is how these programs are designed and implemented in the policymaking process. Hence, to explore the link between politics and health inequality, a series of political and institutional factors need to be examined.

Heterogeneous Policy Responses

Policymaking for health inequality takes place "in a fog of disagreement about goals, controversy about causes, and uncertainty about means (Judge 2008, 356)." In the process of using political means to reduce health inequality, different risk perceptions need to be coped. Men and women might have different awareness of their health conditions. Different racial and ethnic groups might concern different types of diseases as major health risks. Effective policymaking, furthermore, often requires collaboration among service providers (e.g. governmental agencies, non-profit organizations, etc.) and different targeted populations. Surprisingly, very little scholarly attention has been paid to understanding how different targeted populations may have heterogeneous policy responses. If group differences in health is partially shaped by the political and policy environment, then how the

targeted groups respond to a policy program is a key to understanding whether that policy can be effective in reducing group differences in health or not. In sum, focusing on heterogeneous group responses to policy interventions could add knowledge on the social equity implications of a particular policy design.

The Policy Implementation Environment

Public healthcare policies are implemented and managed through open, networked systems and are sensitive to the external environment. The contingent theory in public management suggests that organizations rely on their environment and effective policy implementation is constrained by the environmental characteristics (Pfeffer and Salancik 2003). The policy implementation environment are likely to affect how policy information is disseminated and how healthcare administrators and street-level professionals interact with citizens. Scholars also find a positive association between mobilized communities (i.e. social capital) and effective decision-making as well as service performance provided by public organizations (Andrews et al. 2008; Putnam 1993, 1995, 2000; Tam 1998; Uslaner 2000, 2004). How does the policy implementation environment affect policy success in reducing health inequality? Can a committed government combined with mobilized communities be effective in reducing health inequality? Is it possible that health inequality is partially shaped by different access to social and political resources that are available in the policy implementation environment? Evaluating characteristics of the policy implementation environment can help to add knowledge on how health inequality, as a complex social problem, may be managed in a policy system.

Institutional Characteristics of the Healthcare System

Effective policymaking does not happen in a vacuum. It needs government commitment in healthcare resources, the effort in policy enforcement, and collaboration among different healthcare providers. Policy effectiveness in reducing health inequality could be hampered by deficiencies in performance management, deficits in human capital, insufficient integration between policy sectors, and contradictions between health inequality and other policy imperatives. Institutional characteristics of a healthcare system are linked to all these key implementation factors. More specifically, institutional arrangements of a healthcare system determine whose health risks are covered, how healthcare is financed, and how healthcare services are delivered. If health inequality is defined by disadvantages in health that some groups systematically experience in a system, then it is important to examine if these group disadvantages are linked to how the healthcare system is designed and organized.

1.3 Three Essays on Effective Policymaking for Health Inequality

In this dissertation, the overarching goal of the empirical analyses is to examine whether health inequality can be linked to heterogenous groups responses to public health interventions, the policy implementation environment, and the institutional characteristics of the healthcare system. In the U.S., the level of health inequality, policy initiatives for reducing health inequality, and the institutional arrangements of the healthcare system vary substantially across states. Hence, state-level analysis can offer a comprehensive comparison on policy inputs, the

social and community conditions for policy implementation, and the institutional constraints on healthcare provisions.

To empirically measure the multifaceted construct of health inequality, I focus on two key points: (1) health inequality can be measured across different group identities; and (2) health inequality can refer to both unequal treatment (i.e. different access to healthcare resources) and disparate outcomes (i.e. different health risks). I conduct three empirical studies by operationalizing health inequality based on different social group identities and by examining inequality in health outcomes and healthcare access.

The first study, *Whose Baby Matters More? Bureaucratic Capacity, Heterogeneous Policy Responses, and Racial Disparities in Health*, focuses on the link between heterogeneity in policy responses and racial disparities in health. This study investigates whether neutrally-designed policies generate differentiable group benefits and how that may be linked to social inequality in health. Tracking changes in the Black-to-white infant mortality rates across fifty states and in the past two decades, I find empirical evidence that enhancing the capacity of state healthcare system is critical to improving population health, but not necessary a remedy for racial disparities in health. The health disparities between Blacks and whites can be reduced only when policy interventions generate more relative benefits for Blacks.

The second study, *Anxious Girls and Inactive Boys: Social Capital, Public Health Policies, and Gender Differences in Childhood Obesity*, focuses on gender differences in health. In this study, I examine how public health policies combined with social capital, induce different changes in health risk behaviors among male and female adolescents. Based on pooled-panel data analysis for forty-three states from 1991

to 2009, I find that overall, state-level health policy interventions are ineffective in reducing childhood obesity. The key reason for the policy failure is that social capital (i.e. the policy implementation environment) alters the link between policy interventions and group health outcomes. State-level childhood obesity policy initiatives, combined with active communities, increase female students' anxiety on their weight status and lead to unhealthy weight-control activities. Although the adopted policies increase male students' physical activities, they fail to consider intra-gender dynamics and fail to prevent male students from taking unhealthy weight-control activities. The mixed policy effects on students' dietary and weight-control activities, which are generated by both the policy interventions and community conditions, explain why in the past two decades, increased policy initiatives on childhood obesity fail to solve this public health crisis in the United States.

The third study, *Responsibility for Equity: Can the Public Sector Reduce Inequality in Healthcare Access*, explores the link between publicness of state healthcare systems and equal access to healthcare coverage. This study focuses on a central question in the issue area of healthcare: how should a democratic system divide government and individual responsibilities in covering health risks? Empirically, this study focuses on assessing how different state healthcare systems incorporate economically marginalized groups (the poor and the unemployed). Based on a systematic assessment on four institutional factors – ownership of state healthcare systems, the source of financial resources, the size of the governmental healthcare workforce, and state Medicaid eligibility rules – I find that both public financial resources and generosity of state Medicaid eligibility rules are negatively associated with the percentages of the uninsured population. Public commitment

in providing financial resources, moreover, have substantial impact on states' abilities of providing healthcare access to the working poor. State healthcare systems that have generous eligibility rules, in addition, have moderately lower uninsured rates than states with tight eligibility rules.

2. WHOSE BABY MATTERS MORE? BUREAUCRATIC CAPACITY, HETEROGENEOUS POLICY RESPONSES, AND RACIAL DISPARITIES IN HEALTH

2.1 Overview

Accounting for group heterogeneity to assess policy treatment effects is a major development in both the economics and sociology literatures on policymaking. Response heterogeneity as a key to understanding how various behavioral reactions to policy produce different political implications at the population level, however, has been understudied in political science. In this paper, I theorize how heterogeneous policy responses generate political implications for social equity in public healthcare. Focusing on racial disparities in health, I analyze under what conditions state healthcare systems and policies produce different group benefits for Blacks and whites. Pooling state-level data from 1990 to 2006, the empirical analysis suggests that enhancing the capacity of state healthcare systems is critical to improving population health. Blacks and whites, nevertheless, exhibit different responses to the same policy. Racial disparities could be reduced when policy interventions generate more relative benefits for Blacks.

2.2 Introduction

Persistent social inequality has become a challenge to American liberal democracy. In his book, *Unequal Democracy*, Larry M. Bartels (2008,1) describes that the U.S. has entered the "New Gilded Age," whereby the substantial escalation of economic inequality can be observed. Income inequality, nonetheless, is not the only aspect reflecting the "unequal democracy." Public health scholars have documented the persist racial disparities in health (Smedley et al. 2003; Williams and Collins 2001).[2] According to the Institute of Medicine's report, *Unequal Treatment: Confronting Racial and Ethnic Disparities in healthcare*, minorities had lower health status after controlling for factors such as insurance coverage and income. They were less likely to get heart medication, bypass surgeries, and dialysis (Smedley et al. 2003).

While racial disparities in health in the U.S. have been well documented, solutions for reducing them are less clear. The conventional wisdom attributes racial and ethnic health disparities to individual-level factors such as social economic circumstances, physical and genetic factors, personal management on health, etc. (Braveman 2006; Williams and Jackson 2005). Less has been said in terms of how public healthcare systems, their administrative and bureaucratic processes, and healthcare professionals affect health disparities. In the U.S. federal system, moreover, devolution or decentralization of national healthcare programs is a common practice in the process of policy implementation, public health management, and healthcare service delivery. As state governments are given more responsibilities in policymaking and implementation, it is important to

[2]There are various ways to measure health disparities. For the purpose of this research, health disparity is defined as "the quantity that separates a group from a specified reference point on a particular measure of health that is expressed in terms of a rate (Keppel et al. 2005, 2)."

evaluate whether they are capable of taking on these responsibilities (Honadle 2001). Efforts to reduce the disturbing level of racial disparities may fall to pieces without addressing the complex interplay of political and organizational influences (LaVeist 2005; Mechanic 2005).

The purpose of this research is to fill the gap in the literature by studying how the characteristics of state healthcare policies matter for promoting minority health and reducing racial disparities in health. I develop a policy theory to capture heterogeneous responses to the same set of healthcare provisions. More specifically, I contend that the demands of healthcare provisions are heterogenous across racial groups depending on the different group attributes and context. Different group attributes also generate different margins of improvement when some policy measures are employed as interventions. When different group responses occur to the same policy measure, health disparities can be reduced only when the at-risk group benefits more from the policy intervention. Health-care provisions, therefore, can generate redistributive effects that have profound implications on social equity outcomes.

This essay is organized in the following manner. First I discuss the theoretical framework that depicts heterogeneous policy responses. I then link the theoretical framework of heterogenous policy responses to racial disparities in health. Next, I pool data for fifty states from 1990 to 2006 and systematically assess how the same set of public healthcare provisions affect racial disparities in health. Based on the commonly used population health indicator – infant mortality rate (IMR), I demonstrate how public spending on health and public health professionals

interactively contribute to reduce health disparities between Blacks and whites.[3] Last, I discuss both theoretical and practical implications of the empirical findings.

2.3 Heterogeneous Policy Responses and Health Disparities: Why We Have It

Public healthcare programs are often developed to solve population-level or group-level health problems. Students in public administration and public healthcare find that various factors can affect the effectiveness of public health-care provisions: organizational and bureaucratic capacity (Latane et al. 1979; Newhouse 1973; Manning et al. 1984; Donahue et al. 2000), access to care (LeVeist 2005), government regulations and initiatives in healthcare (Kennedy 2005; Rothstein 1998; Matland 1995), etc. There is no consensus among scholars, however, regarding why we see health disparities across different racial groups. Less has been said, furthermore, in terms of how public healthcare provisions and their administrative processes affect racial disparities in health.

Scholars who are interested in the politics of health disparities have focused their studies on assessing how the unequal political system is associated with racial disparities in health (Andrain 1998; Brown et al. 2000; Budrys 2003; Patel and Rushefsky 2008). While it is compelling to think of health disparities as some form of social inequality induced by the unequal political system (i.e. the political sources), it is also worth evaluating whether differentiable health outcomes across racial groups are generated by neutrally-designed policies.[4] I theorize that government interventions in healthcare might generate different relative

[3]The empirical focus of this essay is to compare Blacks with whites. The theoretical framework, however, could be applicable to compare health disparities across other social groups (such as gender groups, or different age groups).

[4]In this research, neutrality refers to policy programs that do not explicitly exclude particular racial groups from the targeted populations.

gains for different targeted populations. This redistributive effect has profound implications for social equity outcomes in healthcare. Heterogeneous policy responses (based on race) provide a theoretical perspective that is complimentary to the existing literature on unequal political system and racial disparities in health.

Heterogenous Health Risks and the Marginality of Improvement

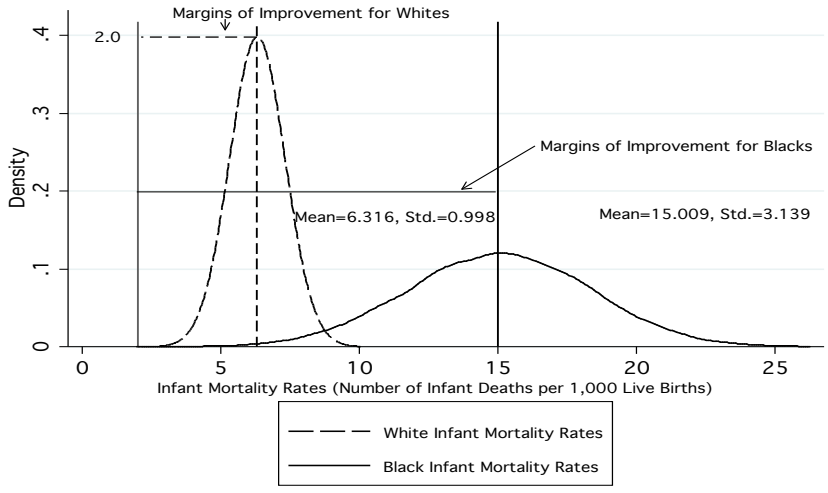
I start from a few assumptions and definitions. First, define a healthcare policy as some form of treatment T_i. Second, the population can be divided into different groups based on their differentiable health risks, i.e. heterogeneity in health risks, R_i (Heckman 2001). I use R_{base} to denote the baseline group and R_{risk} to denote the at-risk group.[5] Group differences in health risks can occur due to various reasons, such as economic inequality (Mellor and Milyo 2001; Wilkinson and Pickett 2009), perceived discrimination in care (William and Jackson 2005), social and community conditions (Williams and Collins 2001), different cultural contexts (Douglas and Wildavsky 1983), and so on. Given a historical level of risk (for a particular group), the margins for policy improvement are defined as changes in health risks, ΔR_i. Hence, given a fixed policy goal, R_g, the margins for policy improvement are different between the baseline group and the at-risk group:

$$\begin{aligned} R_{base} &< R_{risk} \\ \Delta R_{base} &= R_{base} - R_g \\ \Delta R_{risk} &= R_{risk} - R_g \\ \Delta R_{base} &< \Delta R_{risk} \end{aligned} \tag{1}$$

[5]The baseline group and the at-risk group are defined in a relative context. The at-risk group faces greater health risk than the baseline group.

Regardless of the factors that generate different group-level health risks, the presence of heterogeneous health risks will lead to different demands on the healthcare treatment that counters the health risks. Figure 1[6] illustrates the heterogeneous health risks and different group marginality for improvement based on health risks measured by infant mortality rates.[7] In this empirical example, Blacks and whites have different health risks measured by infant mortality rates. Different group means show that on average, Black infants are three times more likely to die before age 1 than white infants. Given a fixed policy goal, e.g. to reduce the population infant mortality rate to 2 per 1,000 live births, the margins for improvement for whites (ΔR_w) are much less than the margins for improvement for Blacks (ΔR_b).

Figure 1: Group Heterogeneity in Health Risks and Different Margins for Improvement: State-Level Black and White Infant Mortality Rates, 1990–2006



[6]Data Source: Centers for Diseases Control and Prevention, Vital Statistics, State Mortality Tables, 1990–2006.

[7]Infant mortality rate is defined as the number of infant dying before reaching one year of age, per 1,000 live births.

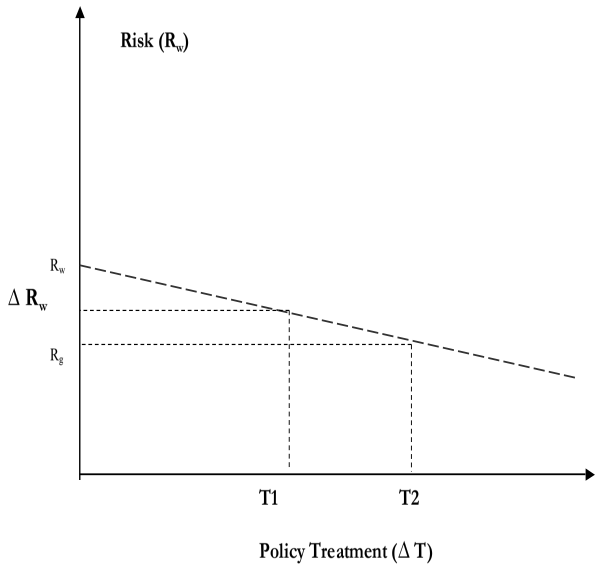
Heterogenous Treatment Effects and Health Disparities

I then proceed to theorize how certain policy treatment, i.e. the quantity of healthcare policy provisions, T_i, may affect racial disparities in health. Policy (treatment) effects can be defined by the health risk elasticity of policy interventions. Substantively, it refers to the reduction in the health risk in response to the supply of certain healthcare policies. Because the margins for policy improvement are different between the baseline group and the at-risk group, I expect to see different policy elasticities between the two groups (Meier 1999). Formally, the elasticity (E_{R_i,T_i}) is defined as:

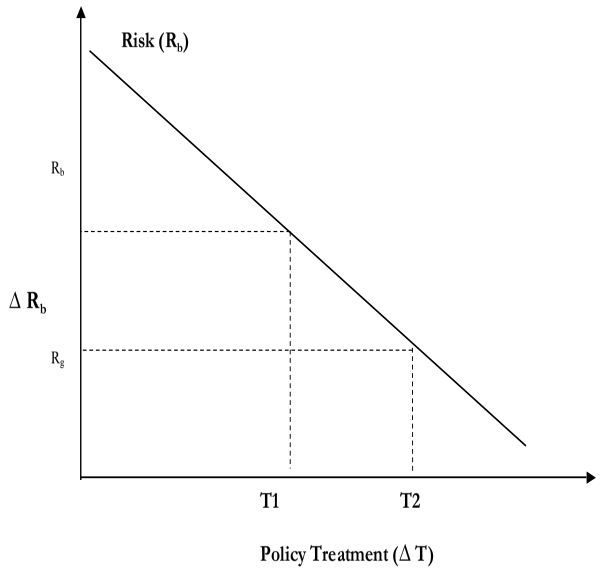
$$E_{R_i,T_i} = \frac{\partial R_i}{\partial T_i} \cdot \frac{T_i}{R_i} \approx \frac{\%\Delta R_i}{\%\Delta T_i} \tag{2}$$

Because $\Delta R_w < \Delta R_b$, (i.e. compared with Blacks, whites have lower demand on health provisions and a smaller margin for policy improvement), when the same amount of policy treatment is introduced, I expect to see different treatment effects across the two groups. Figure 2 illustrates the differentiable policy responses between Blacks and whites. Firstly, because the heterogenous risks, at the policy node, T_1, the level of health risks is higher for Blacks than what is for whites. Secondly, as policy treatment increases (i.e. moving from T_1 toward T_2), health risks for both groups decrease. However, the gap between two groups will decrease only when ΔT (i.e. policy change) becomes sufficiently large and generates more relative gains for Blacks.

Figure 2: Group Responses to Healthcare Provisions



(a) Treatment Effects for Whites



(b) Treatment Effects for Blacks

Because of the heterogenous policy responses, public healthcare provisions might generate different relative gains for the at-risk group, thus exhibiting different implications for social equity outcomes in healthcare. I further illustrate three possible theoretical scenarios for why we have health disparities, and when we expect to see diminishing gaps between group outcomes.

Figure 3 refers to the first set of theoretical scenarios, which depicts changes in health disparities.[8] It characterizes situations when the policy treatment generates more relative gains for the at-risk group (Blacks). Based on equation (2), this means that when $E_b > E_w$ given the same policy treatment, we could expect to see a decrease in health disparities. Empirically, there are two possibilities: (1) a policy only benefits the at-risk group, or (2) a policy benefits both groups but more benefits will be generated for the at-risk group.

Figure 4 characterizes the second set of scenarios, which illustrates no changes in health disparities.[9] The normative implications of the two cases in Figure 4 are different. For the left-hand side figure, a policy treatment generates equal improvement for both groups, hence, neither group becomes worse off. However, because the treatment is not sufficiently large to generate more relative gains for the at-risk group, we do not see changes in health disparities. The right-hand side figure, in turn, represents situations when the policy treatment is ineffective. It does not reduce health risks for both groups, thus it does not lead to changes in health disparities either.

[8] In Figure 3, the left figure refers to the situation, in which both groups are better off and there are decreases in health inequality. The right figure refers to the situation, in which only the at-risk group is improved and there are decreases in health inequality.

[9] In Figure 4, the left figure refers to the situation, in which both groups are improved but without changes in health inequality. The right figure refers to the situation, in which neither groups benefits from the treatment and no changes in health inequality.

Figure 3: Theoretical Scenario 1: Decreases in Health Inequality

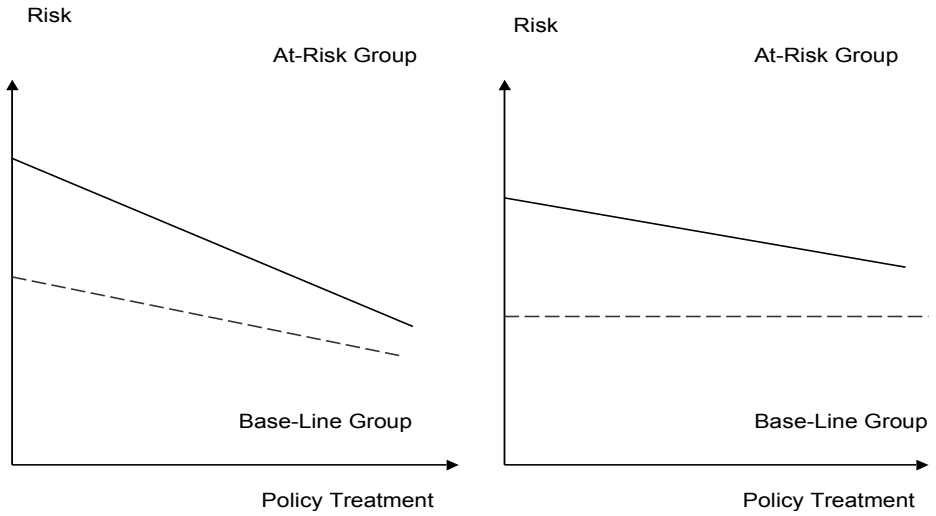


Figure 4: Theoretical Scenario 2: No Changes in Health Inequality

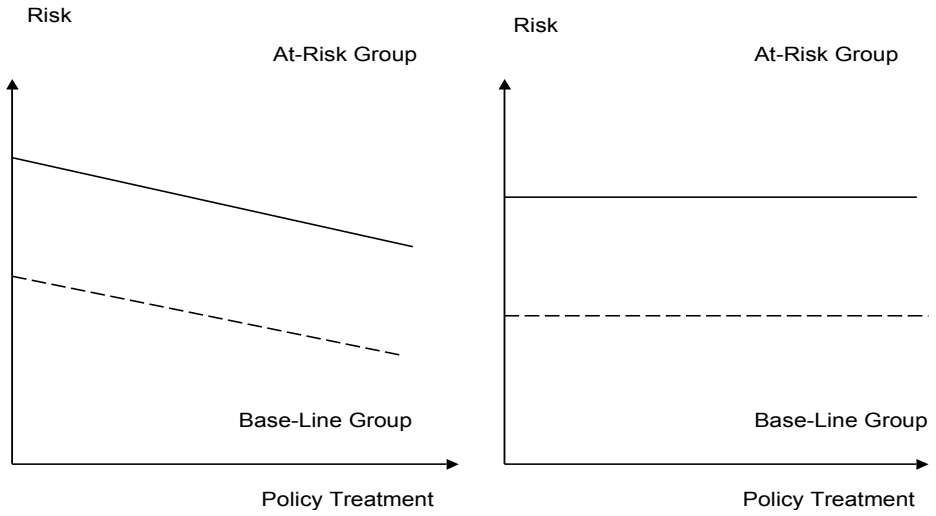
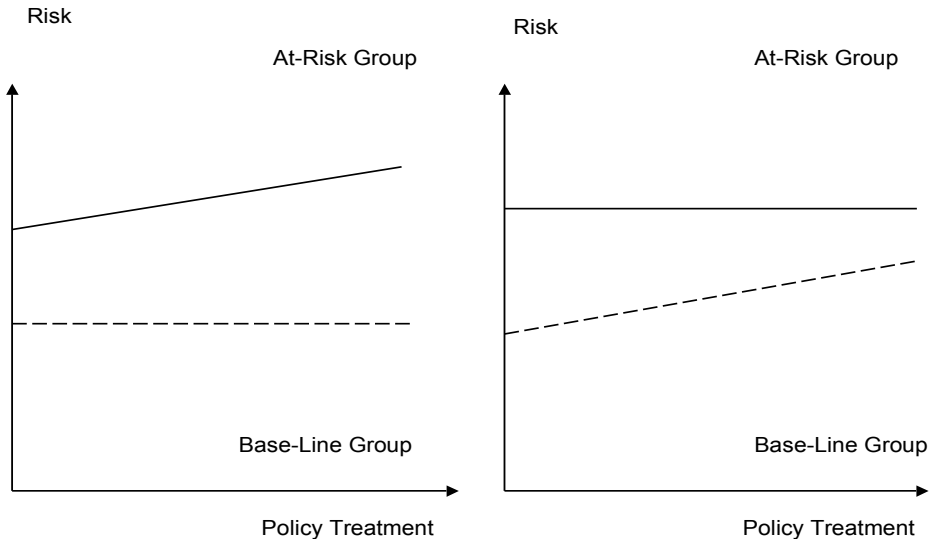


Figure 5 characterizes the third set of scenarios, which shows that policy interventions do not reduce health risks for the at-risk group.[10] The left-hand side figure refers to the situation, whereby there are policy failures for both groups and there are relatively larger losses for the at-risk group. In such a situation, racial disparities increase under policy interventions. The right-hand side figure refers to unintended consequence, whereby health disparities are reduced artificially, because the level of health risks for the baseline group is increased and the policy treatment does not generate any improvement for the at-risk group.

In sum, the theoretical implications are political: there are policy tradeoffs between obtaining more policy efficiency (to reduce the overall population health risks) and to generate more equal outcomes (to reduce the gap between different social groups). While various public healthcare provisions are implemented through different political and policy landscapes, they might have different implications for health inequality. Heterogeneous policy responses across different racial groups can be one of the factors for explaining why we have racial disparities in health. The heterogeneity in treatment effects is partly driven by health differences generated historically, and partly driven by whether there are sufficient public health provisions.

[10]In Figure 5, the left figure refers to the situation, in which the health risk increases for the at-risk group and there are increases in health inequality. The right figure refers to the situation, in which health disparity is changed in a unintended manner.

Figure 5: Theoretical Scenario 3: Unintended Consequences



2.4 State Healthcare Capacity and Racial Disparities in Health: An Empirical Assessment

In this section, I use empirical data to evaluate the link between heterogeneous policy responses and racial disparities in health. As Figure 3-5 demonstrate, the key to reducing health disparities is to generate relative gains for the at-risk group.[11] In the context of racial disparities in health between Blacks and whites, the key to policy success is to design policy instruments that can generate more relative gains for Blacks.

[11] An intended policy outcome is to reduce inequality in health, and at the same time, to generate some positive population gains. The last scenario in Figure 5 does not qualify to be the intended case, because neither group becomes better off even when the disparities are reduced.

In theory, two types of policy designs may be effective in reducing racial disparities: (1) a neutrally-designed policy that can reduce more health risks for Blacks than whites; and (2) a policy that is designed to specifically target Blacks.

Firstly, a neutrally-designed policy does not commit resources to either group in an exclusive manner. When a policy is designed to benefit both groups, racial disparities may be reduced only when the policy reduces more health risks for Blacks than for whites. If a neutrally-designed policy improves health for both Blacks and whites, but benefits whites more, then racial disparities in health will increase. This implies that a policy design that generates positive population gains might also generates greater health inequality. Secondly, a policy that is designed to target Blacks may reduce health disparities. If a policy is designed to improve health for Blacks, then resources are committed to Blacks in an exclusive manner. When whites are not harmed by such a policy, racial disparities can be reduced. Such a policy design recognizes the heterogeneity in health risks and is constructed based on the rationality that allocating resources to promoting minority health can help to reduce racial disparities. The intuition is simple, given certain historical gaps, an effective policy for reducing health disparities should "doing the most to prevent the worst damage (Douglas and Wildavsky 1986, 1)."

A systematic empirical analysis that inquires the distributive justice of various health policies requires data that track major policy interventions over time. Although racial disparities in health has been on the federal governments' agenda since the Reagan Administration, no federal reforms have significantly

reduced disparities (Stone 2006).[12] State governments, in contrast, have great influence on making public health policies. As Stone (2006) points out, state governments have their own authority over education and licensing for the healthcare professionals, defining eligibility rules for their own Medicaid and Children's Health Insurance programs. State governments operate their public health departments, manage their community health centers, and collaborate with non-governmental organizations in the process of delivering public health services (129). At the state-level, there are also more variations in terms of when and how policy programs are initiated for reducing racial disparities in health. These all make it an appropriate choice to compare and analyze state-level policies. Although states follow the federal government's policy advice and budgetary guidelines, state policymakers have their own political leverages on collecting scientific information for policy-decisions, choosing specific policy programs, and allocating financial and human resources for policy implementation. Hence, state-level policy analysis not only adds empirical knowledge on what works as effective policy choices, but also helps to understand what state governments could do when effective policymaking is absent at the federal level.

[12]The first federal policy initiative on racial disparities in health was the creation of the Office of Minority Health (OMH) in the U.S. Department of Health and Human Service (HHS) in 1985. Two major federal programs on eliminating racial and ethnic health disparities were established during the Clinton Administration. One is President Clinton's *Initiatives on Race*, which created *Healthy People 2010*, the 10-year national objectives on eliminating racial and ethnic disparities in health. The second was the Congressional Black Caucus and the Congressional Hispanic Causes' *1999 Minority HIV/AIDS Initiative*. Following these two national initiatives, OMH developed a strategic implementation plan for eliminating racial disparities in health, which includes: (1) to identify at-risk groups (needs assessment), (2) to develop social marketing campaigns, (3) to enhance outreach to minority communities, (4) to increase access to treatment, (5) to provide continuing education and training to health professionals across state (OMH 2000). The scope of policy success, however, is very limited. Taking the infant mortality rate as an example, CDC reported that the overall U.S. infant mortality rate was 6.68 infant deaths per 1,000 live births in 2006, but varies from 4.52 per 1,000 live births for Central and South America mothers to 13.35 for non-Hispanic black mothers. To date, racial disparities in health are still persistent (Mathews and MacDorman 2010).

Scholars in public health administration contend that state governments' capacities in providing healthcare provisions are key factors that affect the amount of risk protections and the characteristics of policy interventions. The concept of bureaucratic capacity has been discussed in a variety of ways in the public administration literature. As such, capacity can be defined in a plethora of ways. Polidano (2000, 808) describes the capacity as "the ability of an organization to act effectively on a sustained basis in pursuit of its objectives." The term can also be defined as financial capacity, human resources, environmental capacity (Aldrich 1979), managerial capacity (Donahue et al. 2000), administrative, governance and a variety of other ways. Bureaucratic capacity, furthermore, has been viewed as an essential factor that can shape policy outcomes, affect benefits distribution, and have profound implications for democratic governance and social equity. As Derthick (1990,184) argues, "...the assumption that pervades policymaking is that the agency will be able to do what is asked of it because by law and constitutional tradition it must. It does not occur to presidential and congressional participants that the law should be tailored to the limits of organizational capacity."

Informed by the prior literature, I empirically evaluate two aspects of neutrally-designed public healthcare provisions that are related to state capacity in health-care: monetary commitment and available healthcare human resources. States often use neutrally-designed policies to build the monetary capacity and to develop human resources for public healthcare. Hence, these two capacity factors are used for evaluating how heterogeneous policy responses are linked to racial disparities when implementing the same policy treatment to both groups. State governments, furthermore, also take different initiatives for promoting minority health. These policy initiatives have explicit goals for generating favorable

outcomes for racial and ethnic minorities. Hence, state initiatives on minority health are used for examining how targeted policy programs are related to the effectiveness in reducing racial disparities.

Public Healthcare Spending

Racial disparities in health are complex social problems, with no simple solution. How to improve minorities' access to healthcare and to build better community infrastructures to support healthier life styles are essential to eliminate racial disparities. Reducing racial disparities in health requires a substantial amount of government inputs. Informed by the policy implementation literature, I emphasize the importance of state capacity in implementing various public healthcare programs. Hill and Hupe (2002) argue that public policymaking is government in action, and very seldom are decisions self-executing. State implementers stay at the nexus of a series of communication channels in the intergovernmental networks for public healthcare. Hence, state-specific factors such as financial capacity could affect both the quality of service delivery and the policy outcomes that concern social equity (Goggin et al. 1990; Hill and Hupe 2002; Hjern and Hull 1982; Matland 1995).

Financial resources might constrain the ability to deliver quality services and information to all citizens equally. Studies have found that monetary capacity can affect public health outcomes. Meier and McFarlane (1994) find that publicly subsidized family planning and funding for abortions generates positive health benefits. Cremieux et al. (1999) find that in Canada, low healthcare spending is associated with an increase in infant mortality and decrease in life expectancy.

While state spending in public health may be positively associated with population health outcomes, does it generate relative gains for racial and ethnic minorities compared with whites? Some empirical studies suggest that it may be helpful to deal with some major causes of racial disparities in health. According to the resource deprivation theory, racial disparities in health exist because minorities are more likely than whites to live in communities that are lacking in the necessary infrastructure to support a healthy lifestyle (LaVeist 2005; Stadfford and Marmot 2003). When individuals face resource deprivation, public healthcare spending becomes an important source for social compensation. States and local governments that have higher monetary capacity, can provide more social compensation to minorities to reduce health disparities caused by resource deprivation.

Another major cause of racial disparities in health is that access to care and the quality of care are differentiable across racial and ethnic groups. Prior research show that racial and ethnic minorities are more likely to have lower rates of healthcare utilization than whites (LaVeist 2005). Drawing from NCHS' survey data in 2003, LaVeist (2005, 112) contends that more Blacks (16.4%) reported that they had not had a single medical encounter in the preceding year than whites (14.3%). There are several structural barriers, moreover, for minorities to access good quality of care. These barriers include: lack of healthcare insurance, more difficult transportation and scarcity of care providers in inner cities and communities with large minority populations, and so on (Williams and Collins 2001; Zuvekas and Taliaferro 2003). Monetary resources are pivotal to building state infrastructure and capacity to improve service quality and remove all these structural barriers (Corrigan and McNeill 2009).

The Role of State Healthcare Employees

Public healthcare spending could be important to provide more social compensation to minorities, improving minorities' access to healthcare resources, and increasing their service utilization. Its effects on reducing health disparities, nevertheless, are conditioned by human resources in the healthcare systems. Donahue et al. (2000, 7) underscore the importance of capacity in terms of human resources, suggesting that organizations "boil down to people." Similarly, O'Toole and Meier (2009) explore the role of human resources within public organizations. Through a systematic study of managers, they find that investing in internal management of human resources plays a role in organizational performance.

A few empirical studies document the effects of human resources in effective policymaking in healthcare. Examining the link between human resource management, work organization and patient care quality in the U.S. long-term care settings, Eaton argues that improved front-line workforce in service delivery consistently leads to higher quality care in nursing homes (Eaton 2000). Bodenheimer and Grumbach (2005,176) explain that "the most valuable resource in healthcare is not the latest technology or the most state-of-the art facility, but the health professionals and others workers who are the human resource of the healthcare system." States with a larger portion of public health workers offer more resources, knowledge, and personal interaction with citizens and thus could provide better healthcare services to citizens and be more effective in reaching the clients who need government support in healthcare. Successful policy implementation in reducing health disparities relies on the effective interactions between street-level bureaucrats, public health professionals, and the targeted

populations. Low-level of human capacity in state healthcare systems may create barriers for effective policymaking.

Beside conceptualizing both monetary capacity and human resources as important factors for assessing state capacity in healthcare, I also ask how these two components can increase policy effectiveness in eliminating racial disparities in health. The literature has tended to treat human resources and monetary capacity as separate entities; however, I contend that they could mutually reinforce each other. Donahue et al. (2000, 411) explain that "how governments translate resources into services is a question of long-standing significance to public administration." I argue that one way resources are turned into services is through implementation by bureaucrats on the street-level. Human resources within state agencies and in the state healthcare systems can not only constrain effectiveness policy implementation, but also condition the distributive effects of various public healthcare programs.

First, state healthcare professionals determine if healthcare programs are carried out effectively. In their book, *Implementation Theory and Practice: Toward a Third Generation*, Goggin et al. (1990) argue that organizational capacity in human resources is an intervening variable that conditions policy effectiveness. "The more personnel a state devotes to implement a program, the greater the likelihood of prompt implementation without modifications (182)." One of the longstanding problems in the U.S. healthcare system is its inadequate supply of healthcare professionals, particularly minority healthcare professionals. Despite the overall deficit in physicians and nurses, minority physicians only represent a very small percentage of the total physicians in the country (LaVeist 2005, 123).

Human resource deficits in the healthcare system could lead to delayed services and thus affect healthcare outcomes.

Quality information and public health resources, moreover, are conditioned upon the amount of human resources available. Eliminating racial disparities in health is not only about providing healthcare services efficiently, but also about improving the quality of healthcare services and to distribute healthcare resources more equally. At the core of reducing health inequality is the fact that the government could enhance its service delivery capacity or is capable of co-ordinating policy implementation with the private sector and non-governmental third parties (Hill and Hupe 2002). Human resources in state healthcare systems become particularly important because they determine how government agencies monitor the collaboration with the private sector and non-governmental third parties, how the target populations are reached, and how healthcare information is disseminated.

Federal and State Policy Initiatives

To this end, I have argued that both monetary capacity and human resources in the state healthcare systems are important for addressing the issue of racial disparities in health. Healthcare professionals, moreover, could exhibit a conditional role in translating financial resources into a more equitable healthcare outcome. Both capacity components, however, are only necessary conditions for addressing the issues of racial disparities. Building state capacity in public health, moreover, do not provide policy benefits to racial and ethnic minorities in an exclusive manner. Needless to say, broad and neutrally-designed programs that focus on increasing state capacity in healthcare are critical for making health services more

accessible, improving the quality of healthcare, and benefiting citizens across different social groups. Whether racial and ethnic minorities can gain more health improvement than whites, nevertheless, may also be contingent upon if public health services fall within the domain of the minority health entities. States not only can implement neutrally-designed public health programs, but also can focus on enhancing essential public health services for the minority communities.

Kennedy (2005) summarizes that efforts in eliminating racial disparities in health were intensified under the Clinton Administration, after the introduction of the *Healthy People 2010*, the federal government established several administrative initiatives for reducing racial disparities in health. These programs include, Health Disparity Collaboratives, Racial and Ethnic Approaches to Community Health (REACH), Excellent Centers to Eliminate Ethnic/ Racial Disparities (EXCEED). Congress has advanced the agenda on minority health as well. For example, "the Minority Health and Health Disparities Research and Education Act (2000) created the National Center for Minority Health and Health Disparities at the National Institutes of Health (NIH), mandated the Agency for Healthcare Research and Quality (AHRQ) to conduct research on minority health and health disparities, and directed the National Academy of Sciences to examine and report on the minority data collection practices of the Department of Health and Human Services (HHS) (454)."

To date, all fifty states have adopted the federal policy goal of eliminating health disparities. State-level initiatives, nonetheless, vary substantially. First, some states have been leaders in adopting federal goals and initiating plans for improving minority health, while others have being slower. For example, Ohio was the first state that initiated state plans for eliminating health disparities in

1987. Other states, such as New Mexico, North Dakota, and Pennsylvania, created state plans just three to five years ago. According to NCSL's (National Conference of State Legislatures) report, "State Profiles: Minority Health and Health Equity Offices", Ohio created the commission on minority health to promote health and the prevention of disease among members of minority groups in 1987. New Mexico created its state office of health equity in 2005, North Dakota and Pennsylvania created their minority health offices in 2007 (NCSL 2010). Different states initiated their specific plans for improving minority health through different channels. In some states, the efforts are more substantive, and in others the efforts may have been more symbolic. For example, Arizona initiated its state plan for eliminating health disparities with a specific implementation agenda on how to target each racial group in the state. South Dakota, on the contrary, has only appointed a minority health coordinator within the state health department as a contact for the issue of health disparities.

Varying state policy initiatives and implementation plans that specifically target the minority populations might reduce health disparities. Rothstein(1998) contends that citizens' interests are better enhanced, and unfairness is minimized where entitlements are clear and thus rights are self-enforcing. Ingram and Schneider (1990) point out that, clear and specific descriptions on bureaucratic responsibility are essential to successful implementation. States that have adopted the federal goal earlier and developed detailed implementation plans might perform better in planning financial and human resources. States that have been slow in adopting the federal goal or only initiated a symbolic policy for reducing health disparities might not be able to solve the problem effectively because they

could fail to solve the problems related to both ambiguity of goals and ambiguity of means (Matland 1995).

2.5 Research Design

Based on the aforementioned theoretical framework and empirical discussion on what constitute major policy treatments for reducing racial disparities in health, I derive three hypotheses to empirically assess how characteristics of the state healthcare policies affect racial disparities in health. Both monetary capacity and human resources in the state healthcare systems are expected to decrease racial disparities in health. Policy implementation in eliminating health disparities should be enhanced if a state government has ample resources to devote to health service delivery or to increase human resource within state health agencies. State initiatives, moreover, matter because they could provide clarification on both goals and means for reducing health disparities and may benefit racial and ethnic minorities in an exclusive manner. The theoretical framework, in addition, informs an interactive relationship between these two important components of bureaucratic capacity.

$H1$ posits the effects of monetary capacity on racial disparities in health. Monetary resources are expected to decrease health disparities, but conditioned by the level of healthcare human resources. Effective policy implementation in reducing health disparities not only relies on improving healthcare services, but also depends on behavioral changes of the targeted population. Street-level bureaucrats play a crucial role in interacting with the targeted population and inducing their positive behavioral changes. Hence, I expect to observe significant and negative marginal effects of public spending on racial disparities when there

are sufficient healthcare human resources. When there is a deficit in public health bureaucrats, only increasing monetary inputs might not lead to a decrease in racial disparities.

$H2$ posits the effects of human resources on racial disparities in health. Healthcare professionals are expected to decrease health disparities, but conditioned by how much financial resources are available in different state healthcare systems. Public health administrators, street-level bureaucrats, and healthcare professionals are important for improving minority health and eliminating health disparities. Their ability of enhancing service quality and improving minority health, however, would be limited if there were no sufficient financial resources. Hence, I expect to observe significant and negative marginal effects of human resources on racial disparities in states with high monetary capacity. When states' monetary capacity is low, increased human resources might not lead to a decrease in racial disparities.

$H3$ refers to the relationship between state initiatives on improving minority health and racial disparities in health. States that have been leaders in adopting federal goals, might have devoted more resources in addressing the issue of health disparity, developed state agencies to handle this particular policy issue, and have more experiences in managing collaborative efforts in care delivery. Thus, states that are leaders in adopting the federal goal of eliminating racial disparities might exhibit less disparities than states that are laggards. [13]

[13] Although I expect that government commitment in financial and human resources and policy initiatives might work to reduce health disparities, they work through different mechanisms. As discussed in the theoretical section, changes in disparities will occur only when a neutral policy treatment benefits the minority (at-risk) group more. This is possible because of the heterogeneous policy responses. State initiatives as policy treatments with specific targets, are expected to generate more relative gains for the minority group by design.

H1: Increased monetary capacity in healthcare in states with more human resources will decrease racial disparities in health.

H2: Increased human resources in healthcare in states with higher monetary capacity will decrease racial disparities in health.

H3: State initiatives in minority health are negatively associated with racial disparities in health.

Variables and Measures

To test the aforementioned hypotheses, I pool state-level data on racial disparities, state capacity in public healthcare, state policy initiatives on minority health, and a series of socioeconomic indicators from 1990 to 2006.[14]

Racial Disparities in Health. In the public health literature, there is a lack of consensus on how to measure health disparities (Braveman 2006; Keppel et al. 2005; Scanlan 2006). Both health indicators and disparity indicators can be measured by different quantities, such as rates, proportions, percentages, etc. "Measurement choices can affect both the size and direction of disparity measured at a point in time and conclusions about the size and direction of changes in disparity over time (Keppel et al. 2005, 1)." Hence, it is important to be precise in terms of what health indicators are chosen to measure health disparities and how disparity measures are calculated.

The ability to protect the most vulnerable members of the population – infants – is generally recognized as an indicator of a society's competence. Following this reasoning, "infant mortality rates are often used as one of the major important

[14]The panel data include fifty states. Washington D.C. is not included.

indicators of the health and well-being of a society (Sullivan and Sheffrin 2003, 474)."[15] Keppel et al. (2005) and Scanlan (2006) also contend that a reliable measure of health disparities should be constructed by choosing a common reference point.[16] Therefore, I use infant mortality rates to calculate racial disparities in health. In this essay, I choose whites as the reference group and calculate disparity scores based on the Black-to-white ratios: [17]

$$\text{Disparity} = \frac{R_b}{R_w} \tag{3}$$

Based on the panel data, there are varying racial disparities across fifty states. As for the Black-to-white ratios of infant mortality rates, the average disparity score ranges from 1.91 to 3.04. [18]

Public Healthcare Spending. The monetary capacity of state healthcare systems is measured by per capita public spending on health and hospitals. Data for the total spending are drawn from the U.S. Department of Health and Human Services,

[15]Infant mortality rates are defined as the number of infant deaths (one year of age or younger) per 1,000 live births.

[16]They also argue that if comparisons are made between two groups, the group with more favorable outcomes should be used as the reference point.

[17]Keppel et al. (2005) provide a thorough discussion on methodological issues in measuring health disparities and recommend three ways for measuring disparities in relative terms: simple difference ($R_b - R_w$), ratio($\frac{R_b}{R_w}$), and percentage difference ($\frac{R_b - R_w}{R_w} \times 100$). I calculate the racial disparity measure by using the three equations. The correlation between the percentage difference measure and the ratio measure is 1. The correlation between the difference measure and the other two measures are both 0.89. Because the ratio measure is simple for calculation, takes a positive value, and is easy to interpret, I choose to use the ratio measure.

[18]One concern of measuring racial difference based on outcome ratios is that, they do not capture factors that might cause changes both in the numerator and the denominator simultaneously (Yates and Fording 2005). Hence, it is important not to over analyze the relative differences between two group outcomes and it might be better to examine how the same set of social/political determinants affects each group separately, i.e. to compare differences in marginal effects instead of to compare differences in outcomes. In the subsequent section for empirical analysis, I first analyze how the state healthcare systems affect Blacks and whites differently by estimating systems of regressions of Black and white infant mortality rates as two dependent variables. I then provide additional analysis by using the racial disparity measure as the dependent variable.

Centers for Medicaid and Medicare Services Expenditure Reports. I include three components in the public spending measure: federal aid to state, state spending, and local spending.[19]

Human Resources. I measure human resources for public healthcare by assessing the size of the public sector in healthcare at two governmental levels: the state and the local-level. I draw data from the Census Bureau Annual Survey on Government Employment and Payroll.[20]

The human resource measure is calculated as a health professional-to-clientele ratio:

$$\text{Human Resources} = \frac{\text{The Number of State and Local Public Health Employees}}{\text{10,000 Residential Population}} \tag{4}$$

State Initiatives on Minority Health. I create a dummy variable to measure state initiatives in promoting minority health. This variable is coded as 1 after any form of the initiatives has been launched and 0 otherwise. For example, in May 1991, Alabama established the Minority Health Section within the Alabama State Department of Primary Care and Rural Health to facilitate local and state-level

[19]The specific expenditure report I use is *Annual Health Expenditures by State and Provider*. The annual total spending data are adjusted into 2000 constant dollars.

[20]The survey provides data on full-time and part-time employment, part-time hours worked, full-time equivalent employment, and payroll statistics by governmental function. Data from 1992 to 2006 are accessed from the historical data archive. Data in 1990 and 1991 are coded from Census Bureau Annual Statistical Abstract. Specifically, I use the state summary tables in Section 8: "State and Local Government Finances and Employment " and "State and Local Government Full-Time Equivalent Employment by Selected Function and State." Data in years before 1994 do not separate hospitals from public health, data in years after 1994 have disaggregated information for these two categories. I use the total number combining both categories. Community and social workers, part-time employees, and professionals in the private sector are not included.

partnerships for addressing health disparities in Alabama. *State Initiatives*, are coded as 1 for Alabama from 1992 to 2006 and 0 in 1990 and 1991.[21]

Access to Other Healthcare Resources. Beside government spending on health and public healthcare professionals, individuals might have access to other healthcare resources, such as care and service provided by the private sector or the non-governmental third party. Hence, I include two other indicators for measuring access to healthcare resources. *Health Insurance* refers to the percent of state population who are not covered by health insurance programs.[22] The variable *Physicians* refers to the number of active physicians per 100,000 residential population. Shi et al. (2004) find that after controlling for state-level education, unemployment, and population demographics, primary care physician supply is negatively associated with infant mortality rates. Therefore, I control for physician supply in all empirical models.[23]

[21]Although all fifty states have adopted the federal goal in eliminating health disparities, they enforce the policy goals through various channels, such as executive orders, state legislations, and bureaucratic reorganization. A common practice of bureaucratic reorganization is to set a special office for minority health either within the state health department or as an independent agency. Some states only appointed a state coordinator or contact within their health agencies for minority health without providing a specific plan with time-lines for implementation. I do not code these cases as 1. Coding decisions are based on a comprehensive policy summary by NCSL(National Center for State Legislations),"State Profiles: Minority Health and Health Equity Offices." The accessed version is updated in September, 2010. www.ncsl.org/IssuesResearch/Health/DisparitiesStateProfiles/tabid/14299/Default.aspx.

[22]The span of health insurance is used as a measure of individuals' access to healthcare resources. Data for the span of health insurance are drawn from "The Annual Social and Economic Supplement (ASEC) to the Current Population Survey (CPS)." The ASEC to CPS is a Census Bureau survey of about 78,000 households and includes detailed health insurance questions asked of the household respondent for every household resident. I access data from 1999 to 2006 from the ASEC Historical Tables (HIA Series), HIA-4 "Health Insurance Coverage Status and Type of Coverage by State-All Persons: 1999 to 2008." I access data from 1990 to 1999 from the ASEC Historical Tables (Original Series), "Health Insurance Coverage Status and Type of Coverage by State-All Persons: 1987 to 2005." All data are accessed from the webpage: http://www.census.gov/hhes/www/hlthins/data/historical/index.html.

[23]Data for physician supply by states and year are accessed from the Census Bureau Annual Statistical Abstracts, "Health&Nutrition: healthcare Resources," Table "Active Physicians and Nurses by States." The original data are collected by the American Medical Association, Chicago, IL.

Socioeconomic Controls. To isolate the impact of state capacity in healthcare and state initiatives on racial disparities in health, I control for a series of socioeconomic variables and demographic variables. *Poverty* is measured by the percentage of the state population who are under the 100% poverty line. *Unemployment* is measured by the annual state unemployment rates. These two variables are included as proxies for state wealth and economic conditions. *Education* is measured the percentage of the state population who at least have a high school diploma. *Aged Population* is measured by the percentage of the state population who are older than 65. *Minority Population* is measured as the percentage of state population who are Black.[24] I also include the Berry et al. (1998) measure of *State Liberalism*.[25]

"Socio-environmental theories state that disparities in health exist because of differences in race and ethnicity in the community context in which people live (LaVeist 2005, 136)." As such, both socioeconomic conditions and state political ideology can shape the socio-environmental contexts in which people live. Racial disparities might be greater in states with poor socioeconomic conditions. For instance, in states where the poor and less educated population is large, and in states with poor economic conditions, state governments might face resource constraints and less money can be spent on health disparity issues. Political ideology can also affect social inequality. In the United States, "ideology differences in economic philosophy and distributional priorities are especially striking in the realm of taxation policy (Bartels 2009, 54)." Liberal

[24]Data for Poverty, Education, Aged, and Black Population are drawn from the Census Bureau American Community Survey (ACS). Data for Unemployment are drawn from U.S. Bureau of Labor Statistics, "Geographic Profile of Employment and Unemployment."

[25]I use the "Revised 1960-2008 State Ideology Series" from Richard Fording's website, http://www.uky.edu/ rford/stateideology.html.

states might raise higher tax revenues and spend more on healthcare issues than conservative states. Hence, it could be a reasonable expectation that state liberalism is negatively associated with racial disparities in health. In addition to the aforementioned socio-environmental controls, I also include teen birth rates by race as a proxy for behavior risks. Teen birth rates are included as proxies for behavior risks, because according to medical and health studies, teenage childbearing is strongly associated with both infant mortality rates and low birth weight infant rates (Corcoran 1998; Ventura et al. 2001).

Methods and Model Specification

Missing Data. I construct the dataset for the empirical analysis by pooling data for fifty states from 1990 to 2006. Due to the presence of missing data, the pooled dataset includes unbalanced panels. Some of the missing values are because of incomplete archives. The missing values in infant mortality rates, however, are due to suppressed data in the CDC archive.[26] Conducting statistical analysis only including observed values is problematic and could introduce bias, because data are not missing in a random manner (Hocker and King 2010). For filling the missing values I use both mean interpolation and the Multiple Imputation (MI) procedure (King et al. 2001).[27]

Model Specification. The empirical assessment has two purposes: firstly, to assess if there are heterogeneous policy responses across racial groups; and

[26]Missing data for Black infant mortality rates mainly occur in the following states: Alaska, Maine, New Hampshire, Hawaii, South Dakota, Utah, Vermont, and Wyoming. Data are suppressed by CDC because the reported events are less than 20 and are not reliable. In other words, if these suppressed values were used for calculating racial disparities, both the direction and the magnitude of racial differences will be changed.

[27]Table 12 in the Appendix reports details for data imputation. The reported MI values are means based on five imputed datasets.

secondly, to evaluate the effects of policy treatments on health disparities between whites and Blacks. Hence, I estimate two sets of models. First, I implement a system of equations for Black and white infant mortality rates using the Seemingly Unrelated Regression Estimation (SURE) (Zellner 1962). This statistical approach is chosen for two theoretical considerations. One consideration is that the SURE method can generate two sets of slope coefficients for each racial group, so that I can compare the relative policy effects across the two groups. The second reason is that some unmeasured factors affecting the infant mortality rates for one group might also affect the other group. Estimating the two equations separately (e.g. an OLS estimation) will generate inefficient estimation because cross-regression error correlations are useful information for understanding the overall changes in health outcomes. SURE is a more useful approach in situations, whereby changes in the overall measure (of some outcomes) are driven by different changes in sub-group measures (Martin and Smith 2005; Smith 2006). In the case of assessing Black-to-white ratios of infant mortality rates, changes in both Black and white IMRs will affect changes in the ratio measure, hence it is more helpful to use the SUR estimator than to the OLS estimator.

To assess the overall policy effects on racial disparities in health, I estimate a FGLS (Feasible Generalized Least Square) model for panel data. Given that I include 17 years of data for each state, I first examine if the dependent variables – Black infant mortality rates, white infant mortality rates, and the racial

disparity index– are panel stationary. I find all the dependent variables are panel stationary.[28]

Baltagi (2008) and Beck and Katz (1995) argue that if data have panel level heteroskedasticity and panel unit-root is detected in the dependent variable, using a lagged dependent variable with panel corrected standard errors is a more efficient specification. According to Baltagi (2008), this model specification is efficient only when spatial auto-correlation is present and there is no serial auto-correlation. Hence, as a second step to specify the model, I perform statistical tests on error structures. I perform Arellano and Bond Test (Arellano & Bond 1991) for serial autocorrelation, the White Test, and the Modified Wald Test for groupwise heteroskedasticity. Both serial autocorrelation and group-wise heteroskedasticity are detected. Therefore, I use least squares with a lagged dependent variable, panel-corrected standard errors, and an AR(1) correction for serial autocorrelation.

The two key explanatory variables are public health spending and public employees in healthcare. Both variables measure state capacities in providing broad healthcare services. Given that government decisions in making spending budgets and hiring decisions are made based on fiscal cycles, I take a one-year lag for both variables. The theoretical framework, moreover, informs an interactive model to determine how human resources and monetary capacity in healthcare

[28]I perform the Fisher Test for panel unit-root (Maddala and Wu 1999). Fisher's test assumes that all series are non-stationary under the null hypothesis against the alternative that at least one series in the panel is stationary (Im, Pesaran, and Shin 2003). Hence, insignificant Chi-square statistics indicate the presence of unit-root. I perform three variants of the Fisher Test: with lag=2, with a Phillips-Perron specification, and with an Augmented Dickey-Fuller specification. Test results consistently show that both Black and white infant mortality rates are not panel stationary. The test statistics based on the Phillips-Perron specification with 1-period lag are as follows: (1) for Black infant mortality rates, $\chi^2(100)=549.449$, p=0.000; (2) for white infant mortality rates,$\chi^2(100)=210.245$, p=0.000; and (3) for the racial disparity index, $\chi^2(100)=210.245$, p=0.000.

interactively influence implementation outcomes– changes in racial disparities in health. Thus, I include interaction terms between human resources and monetary capacity in the model specification.[29] The model equation is specified as following, in which i and t index the state and year observations.

Model Equation:

$$\begin{aligned}\text{Racial Disparities}_{it} = B_0 + B_1\text{Racial Disparities}_{i,(t-1)} + \\ B_2\text{Healthcare Spending}_{i,(t-1)} + B_3\text{Public Health Insurance}_{it} + \\ B_4\text{Human Resources}_{i,(t-1)} + B_5\text{Human Resources}_{i,(t-1)} \\ \times\text{Healthcare Spending}_{i,(t-1)} + B_6\text{State Initiatives}_{it} + \\ B_7\text{State Liberalism}_{(it)} + B_8\text{Controls}_{it} + \epsilon_{it}\end{aligned} \tag{5}$$

2.6 Empirical Findings

Heterogeneous Policy Responses by Race

Table 1 reports the empirical results obtained from the SUR estimation.[30] Overall, Table 1 shows heterogeneous policy responses based on race. Firstly, findings on how access to healthcare resources and economic conditions are consistent

[29]One concern of including an interaction term is that it leads to the problem of multi-collinearity by adding correlated variance into the model. It is also possible that monetary capacity and human resources in healthcare are positively correlated to each other as they both indicate organizational capacity in the state healthcare systems. I checked for the variance inflation factor (VIF) statistics after estimating an OLS model and not surprisingly, the highest VIF value is associated with the interaction term. The VIF for the interaction term is 5.73 and for the two corresponding linear terms are 4.60 (spending) and 2.22 (human resource). These, however, are not abnormally high VIF values given the nature of the model specification (Kam and Franzese 2007). I also checked for the correlations between the spending measure and the human resource measure by running a factor analysis. The purpose is to assess if these two indicators represent the latent concept–organizational capacity– along the same dimension. I used principle factor analysis and the results suggest that these two indicators do not load in the same factor (with an Eigenvalue of 0.93).

[30]The model equation for the SUR estimation take the same specification, except that it includes a system of two equations, one uses white infant mortality rates as the dependent variable and the other uses Black infant mortality rates as the dependent variable. The variable *Unemployment* is differenced because this variable is also panel non-stationary.

with the existing literature. Physician supply is negatively associated with both Black and white infant mortality rates. Lacking of health insurance coverage may increase both Black and white infant mortality rates. Also, increases in the poverty rates and unemployment rates will lead to an increase in white infant mortality rates. Increases in unemployment rates are also positively associated with Black infant mortality rates.

The magnitudes of how these variables affect the two groups, however, are different. The coefficients of *Physicians* are -0.015 and -0.002 in the equations for Black and white IMRs, respectively. This suggests that increasing physician supply may reduce infant mortality rates for Blacks more than for whites. The coefficients of *Health Insurance* are 0.032 (in the equation for white IMRs) and 0.139 (in the equation for Black IMRs), which mean that lacking of health insurance coverage adds disproportionate health burdens on Blacks. The comparison of the two coefficients is stark: a one-unit increase in the percentage of the uninsured population leads to an increase in Black infant mortality rates by 0.139, and an increase in white infant mortality rates by 0.032. A similar comparison can be found in the coefficients of changes in unemployment: the coefficients are 0.050 (in the equation for white IMRs) and 0.209 (in the equation for Black IMRs). This means that on average, increases in unemployment will add more burdens on Blacks than on whites. A one-unit increase in the unemployment rate only increases white infant mortality rates by 0.050, but may lead to an increase in Black infant mortality rates by 0.209.

Table 1: Heterogeneous Policy Responses to Public Healthcare Provisions in Fifty U.S. States, 1990-2006

Variable	White Rate Coefficient	(Std. Err.)	Black Rate Coefficient	(Std. Err.)
State Healthcare Provisions				
Public Spending$_{t-1}$	-0.001**	(0.0003)	-0.002*	(0.001)
Human Resource$_{t-1}$	0.003	(0.002)	-0.010	(0.010)
Public Spending$_{t-1}$	3.82e-06	(3.57e-06)	0.00002	0.0001
$\times$Human Resource$_{t-1}$				
Healthcare Access				
Physicians	-0.002**	(0.001)	-0.015**	(0.002)
No Health Insurance	0.032**	(0.007)	0.139**	(0.036)
Political and Policy Factors				
State Initiatives	0.124**	(0.016)	-0.401**	(0.214)
State Liberalism	0.002**	(0.008)	-0.011	(0.008)
Socioeconomic Controls				
% White/Black Population	0.006	(0.002)	0.019	(0.013)
% Aged Population	0.034**	(0.010)	0.122**	(0.054)
Education	0.001	(0.003)	0.027*	(0.014)
Poverty	0.037**	(0.010)	-0.255	(0.040)
ΔUnemployment	0.050*	(0.019)	0.209*	(0.123)
Teen Birth Rates	0.028**	(0.006)	0.025**	(0.008)
Infant Mortality Rate$_{t-1}$	0.424**	(0.030)	0.309**	(0.032)
Intercept	1.649*	(0.904)	0.431	(3.033)
N	800		800	
R^2	0.5839		0.3143	

Notes:

1. * $p < .10$, two-tailed t-test. ** $p < .05$, two tailed t-test
2. The dependent variables are Black and white infant mortality rates.

Turn to the three key policy variables – per capita public spending in health, public healthcare employees, and state initiatives on minority health –, Table 1 shows that both public health spending and state initiatives on minority health impact Blacks and whites differently. As for the public healthcare spending, the coefficient in the Black equation is as twice large as the coefficient in the white equation, meaning that when human resources equal to 0, increases in public spending lead to more reduction in the Black infant mortality rates than in the white infant mortality rates. The values of both coefficients are small, because this variable is scaled based on per capita spending. The effects of increasing states' financial capacity are in fact meaningful if we consider greater increases in the per capita spending.

To illustrate the policy effects substantively, I calculated the predicted infant mortality rates for both Blacks and whites based on different levels of public healthcare spending. Figure 6 shows the substantive impact of public healthcare spending on infant mortality rates for both races.[31] As Figure 6 suggests, Black infant mortality rates can decrease substantively if the per capita public spending on health is increased from $500 to $1,000. When states spend more than $1,500 per person, the mean-predicted Black infant mortality rates are less than 13 deaths per 1,000 live births.

[31]In Figure 6, the predicted Black and white infant mortality rates are generated based on the SURE analysis in Table 1. The variable, *State Initiatives on Minority Health*, is set to be 0. All other variables are held at their means.

Figure 6: Predicted White and Black Infant Mortality Rates with 95% Confidence Intervals

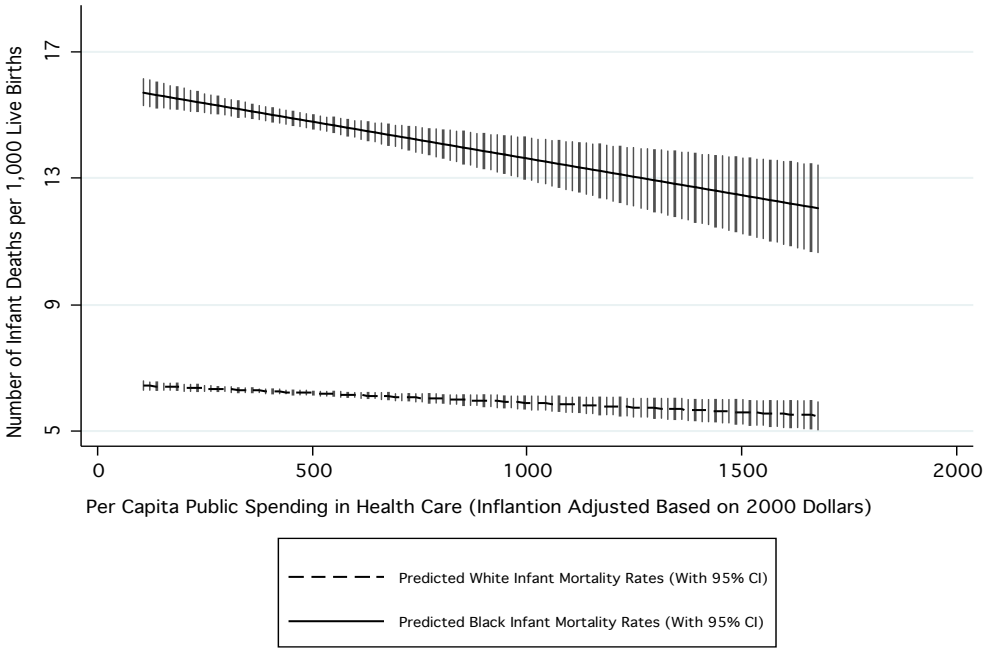


Table 2 further presents predicted infant mortality rates based on different levels of public health spending and the corresponding number of infant deaths in both racial groups. It is also worth to note the comparison based on different ways to gauge the substantive policy effects. One the one hand, increasing states' financial capacity in health decreases both Black and white infant mortality rates in a significant way. One the other hand, we see that the same amount of public financial commitment can save more white babies than Black babies with respect to their population sizes. With respect to the group population sizes, the health risk that each Black newborn faces is still higher than the health risk that each white newborn has. This may also suggest that although programs on promoting minority health may work more effectively in reducing racial disparities than

those broader policies designed at the population-level, politically they may be less viable if group competition exist between Blacks and whites.

Table 2: Predicted Infant Mortality Rates and Number of Infant Deaths Based on Public Healthcare Spending

Per Capita Public Spending	White IMR (# White Infant Deaths)	Black IMR (# Black Infant Deaths)
150	6.559 (15,262)	15.546 (9,697)
194	6.513 (15,031)	15.452 (9,672)
310	6.390 (14,776)	14.977 (9,394)
418	6.275 (14,522)	14.743 (9,239)
528	6.259 (14,474)	14.375 (9,016)
795	6.105 (14,118)	14.176 (8,892)
1200	5.946 (13,750)	13.282 (8,331)
1400	5.644 (13,051)	12.875 (8,076)
1750	5.315 (12,291)	11.544 (7,240)
Number of New Borns(2007)	2,312,473	627,230

Notes:

1. Predicted Black and white infant mortality rates are generated based on the SURE analysis in Table 1.
2. The variable for state initiatives on minority health is set to be 0 and all other variables are held at their means and
3. Predicted number of infant deaths are reported in parentheses. They are calculated based on the total number of Black and white new borns in 2007.

Improving State Capacities vs. Focusing on Minority Health

Different from the policy inputs in building state capacities in healthcare, policy initiatives on promoting minority health exhibit significant but substantively different impacts on Black and white infant mortality rates. The coefficient of *State Initiatives* in the white equation is positive (0.124), but in the Black equation it is negative. It means that states with legislative mandates or executive orders on promoting minority health have higher white infant mortality rates, but lower Black infant mortality rates than state without these policy initiatives. Comparing the two types of policy designs, the underlying mechanisms for how they may reduce racial disparities are different. Policies that enhance state capacities in healthcare do not explicitly target the minority group and could generate policy benefits for both groups, but not necessarily decrease racial disparities. Policies that explicitly target the minority group may be more effective in reducing health risks for Blacks, but may not benefit whites.

The aforementioned findings also imply that in some states, relatively small racial gaps might be caused by relatively high white infant mortality rates. Similar patterns are also found in terms of how poverty affects racial disparities in Black and white infant mortality rates. Table 3 reports the results of the FGLS estimation for the racial disparity measure. As Table 3 shows, poverty has a negative and significant association with the disparity measure. This might be counter-intuitive at the first glance. Substantively, it means that health disparities are greater in states with less poor people and are smaller in states with more poor people. It is possible that, when there are more poor people in some states, both whites and minorities are doing worse in health thus the racial differences become smaller.

Table 3: Heterogeneous Policy Responses and Racial Disparities in Health: Black-to-White Ratios of Infant Mortality Rates, 1990-2006

Variable	**Coefficient**	**(PCSEs)**
State Healthcare Systems		
Public Spending$_{t-1}$	0.003**	(0.001)
Human Resource$_{t-1}$	-0.001	(0.001)
Public Spending$_{t-1}$		
$\times$ Human Resource$_{t-1}$	-0.0003**	(0.00001)
Healthcare Access		
Physicians	-0.014**	(0.005)
No Health Insurance	0.156**	(0.071)
Political and Policy Factors		
State Initiatives	-0.178**	(0.061)
State Liberalism	-0.011	(0.015)
Socioeconomic Controls		
% Black Population	0.003	(0.003)
% Aged Population	-0.004	(0.009)
Education	0.004*	(0.002)
Poverty	-0.020**	(0.007)
ΔUnemployment	0.154**	(0.032)
Minority Teen Birth Rates	0.001	(0.002)
Health Disparity$_{t-1}$	0.164**	(0.082)
Intercept	1.932**	(0.339)
N	800	
R^2	0.150	
ρ	0.108	

Notes:

1. * $p < .10$, two-tailed t-test. ** $p < .05$, two tailed t-test.
2. The dependent variable is measured by Black-to-white ratios of infant mortality rates.

In relatively wealthier states, minorities are disproportionally worse off in their health status, thus the disparity measures become bigger. This pattern has been found in some of the state comparisons. For example, the average poverty rate in Louisiana is 20.4% while the average poverty rate in Wisconsin is around 9%. Based on the poverty measure, Wisconsin is much wealthier than Louisiana. The average health disparity score (based on Black-to-white ratios) in Wisconsin (2.97), however, is larger than it is in Louisiana (2.18). The average white infant mortality rate in Louisiana (6.67) is higher than it is in Wisconsin (6.00). Despite that Wisconsin's overall infant mortality rate has been decreases during the past decade, racial disparities have persisted. Wisconsin's rank based on Black infant mortality has fallen from among the best rates in the country to among the worst (Wisconsin Department of Health Services 2010). Nor do the unusually high racial disparity scores occur in states with large minority populations. States with relatively small minority population and less capacity exhibit greater health disparities. This suggests that the state healthcare systems and how relevant policy programs are implemented might have some salient effects on racial disparities in health.[32]

Findings on state minority health initiatives and the poverty measure provide the similarly policy story: in some states, policymakers may need to cope with very high level of Black infant mortality rates and relatively high white infant mortality rates. In theory, a more effective policy design for reducing racial disparities is to provide more protection for the most disadvantaged group. In practice, nevertheless, this may not always be the adopted design.

[32]Another possibility to see this statistical relationship is that there might be some endogenous relationship between poverty and health disparities. Given this consideration, I checked for possible endogenous relationship and by assessing if the racial disparity measure can predict the poverty rates. I did not find such an endogenous relationship.

When Might Neutrally-Designed Policies Work?

Given that there might be policy tradeoffs in choosing between enhancing the overall state healthcare capacities and adopting more specific programs that target the minority population, it is necessary to further assess when these broader policies may work for reducing racial disparities. The interactive relationship between states' financial and human capacities may offer additional information on when these broader policies may have substantively significant impact on racial disparities. Because I interact the two variables for state healthcare capacity, it is best to use graphical illustrations to gauge both the substantive and statistical significance of their marginal effects on racial disparities (Brambor, Clark & Golder 1994).

Figure 7 shows the marginal effects of per capita public health spending on racial disparities conditioned by state healthcare human resources. According to Figure 7, when there are deficits in healthcare human resources (approximately, less than 50 public health employees per 10,000 population), increased public health spending is associated with racial disparities between Blacks and whites.[33] When human resources are ample in the state healthcare systems, increased public spending on health begin to decrease racial disparities between Blacks and whites. The marginal effects of spending on Black-to-white ratios of infant mortality rates

[33]The distribution of the human resource measure is skewed toward the low end. Sample density is much higher when the human resource measure is less than 100 than when it is larger than 100. This might raise the concern that the findings are driven by outlier observations, i.e. state/year observations, in which the measurement score is large. To examine how such a skewed sample might bias the empirical analysis, I performed sensitivity analysis by incrementally dropping cases at each threshold value defined by the human resource measure. Table 13 in the Appendix reports the results of sensitivity analysis for the overall model. Table 13 shows that the model estimation is very consistent. I also perform the other two robustness checks: to jackknife the sample by levels of the disparities and by year. Table 14 and Table 15 in the Appendix reports the corresponding results.

become negative and significant only when there are about more than 130 public health employees per 10,000 residential population.

Figure 7: The Conditional Marginal Effects of Public Health Spending on Racial Disparities in Health (Black-to-white Ratios, Infant Mortality Rates)

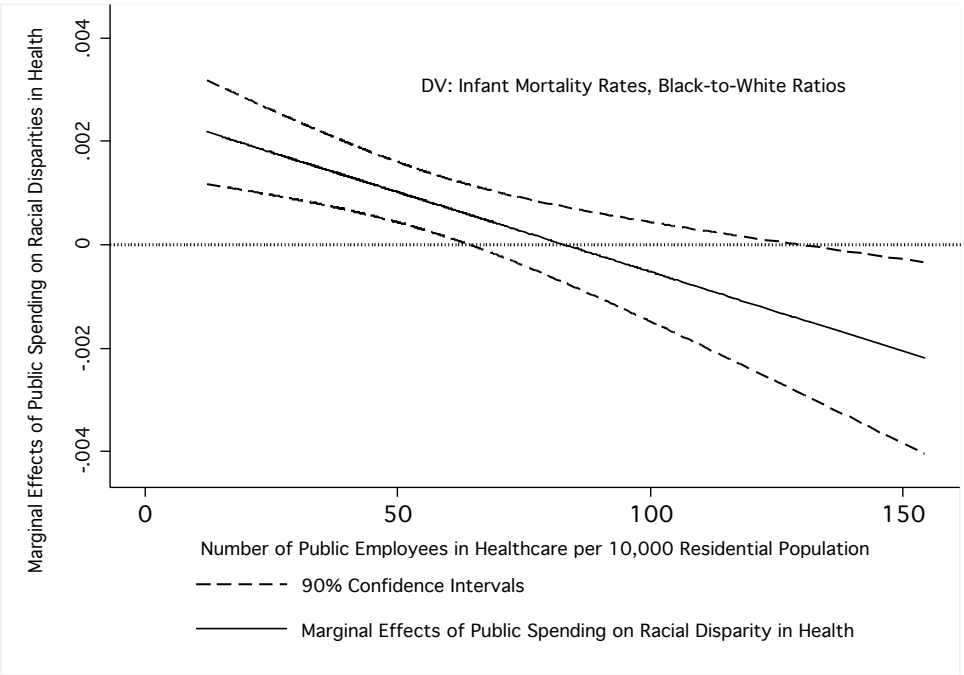


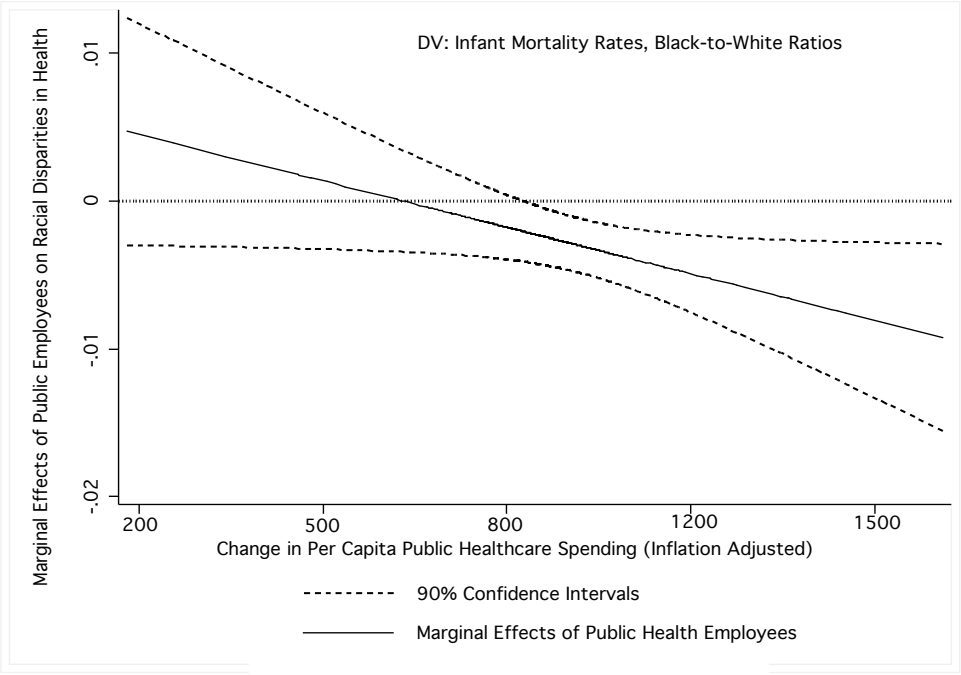
Figure 8 shows the marginal effects of healthcare human resources on racial disparities conditioned by available public healthcare spending.[34] As Figure 8 demonstrates, when there is a decrease in per capita public health spending, increases in public healthcare human resources do not reduce health disparities between Blacks and whites (i.e., the marginal effects are statistically insignificant).

[34]Both figures present the 90% confidence intervals. The marginal effects of public healthcare human resources are not significant at the 95% level. See Figure 16 in the Appendix for a comparison with Figure 8.

Public healthcare professionals, however, can reduce health disparities between Blacks and whites when the per capita public spendings is more than $800.

Figure 7 and Figure 8 exhibit empirical support for $H1$ and $H2$. They show that public spending and human resources in state healthcare systems condition each other in terms of reduce racial disparities in health. Although, on average, an increase in public health spending may reduce racial disparities, its policy impact in contingent upon whether there is sufficient healthcare workforce. Figure 7 and 8 also demonstrate an intriguing comparison in terms of how deprivation in different types of healthcare resources may affect racial disparities differently.

Figure 8: The Conditional Marginal Effects of State Healthcare Human Resources on Racial Disparities in Health (Black-to-white Ratios, Infant Mortality Rates)



According to Figure 7, insufficient financial commitment does not increase racial disparities, nor does it change the existing level of racial disparities. According to Figure 8, however, deficits in state healthcare human resources may increase racial disparities. This comparison indicates that state healthcare professionals may affect not only the quantity but also the quality of healthcare services provided to both groups.[35] Why can not healthcare professionals generate more relative gains for Blacks when there are not sufficient financial resources? It may be because that group competitions for healthcare resources could be intensive when resources are extremely limited than when resources are sufficient. When facing resource deprivation, deficits of minority healthcare professionals may lead to disproportionate burdens for minorities.[36]

In sum, broad and neutrally-designed policies in building state healthcare capacities might work more effectively in states where both financial and human resources are relatively ample. It is likely that high levels of resource deprivation may be associated with high levels of group competition and add excessive burdens on minorities. Programs that explicitly target the minority group may be politically more viable in states with diverse demographics or larger minority populations. Policymakers and healthcare administrators, nevertheless, also need to deal with health risks for white infants, because the average white

[35]Here, quality of care refers to both the quality of medical technologies and the quality of healthcare service. Some aspects of the healthcare quality may not be improved simply by increasing monetary inputs.

[36]According to the Census-EEOC data on the demographic characteristics of different healthcare occupations, Blacks are underrepresented in most healthcare occupations. This structural feature exists in both the public and private sector. There are large deficits in Black physicians and Black healthcare administrators in the healthcare workforce. The deficits, moreover, are across all fifty states. According to the 2000 Census data, the percentages of Black healthcare administrators range from 0 (in states such as Vermont and Maine) to 26.3 (Maryland). The percentages of Black physicians range from 0 to 12.4. In 37 states, in addition, the percentages of Black physicians were less than 5 (EEOC 1990, 2000).

infant mortality rate is still much higher than those in most developed countries. These complex underlying policy paradoxes help to explain why in the U.S., the substantial decline in the national infant mortality rate has not led to reductions in racial disparities between Black and white infant mortality rates.

2.7 Conclusion

Despite that "the evidence of racial disparities in health is persuasive and remarkably consistent across a range of health conditions and procedures," the existing literature does not suffice for an unambiguous account for how disparities could be reduced (Smedley et al. 2003, 125). While the federal and state governments have continued in devoting efforts to address the issue of racial disparities in health, little research has been done in assessing what bureaucratic and administrative conditions can contribute to promote minority health and reduce racial disparities in health. The disconnection between theory and practice is unsatisfactory. Theories in public administration and policy implementation could inform a useful framework to understand how political factors are linked to the persistent problem of health inequality. Most policy studies, however, emphasize on gauging policy effects at the population-level. In this research, I provide a theoretical framework that connects the bureaucratic characteristics of the state healthcare systems to heterogeneous policy responses by race. The key for understanding changes in racial disparities hinges on whether a policy design could generate relative gains for the minority group in states.

I find that both monetary capacity and human resources in the state healthcare systems matter for managing the issue of racial disparities in health. The relationship between state capacity in policy implementation and policy outcomes

is more complex than the existing literature describes. Different components of bureaucratic capacity condition each other in terms of how they influence healthcare outcomes. The effects of monetary capacity on healthcare outcomes are conditioned by healthcare human resources. This interactive relationship occurs because in a policy area such as public healthcare, solving policy problems not only needs government spending, but also needs information and professional knowledge carried out by public servants. Only improving the public healthcare system on one dimension (such as only increasing financial resources, or hiring more healthcare professionals) might not be sufficient to generate positive policy outcomes.

The empirical findings also demonstrate that policy designs that specifically target minority groups might work effectively for reducing racial disparities. More broad and neutrally-designed policies, such as increasing the financial inputs for the entire population, could be effective for reducing racial disparities when resources are ample. When facing resource constraints, it is likely to be ineffective in generating more relative gains for minorities. This raises a potential paradox for public policymaking in healthcare: which policy designs should policymakers choose to reduce racial disparities, the one is neutrally-designed or the one that only targets minorities? While a policy that targets minorities might be more effective in reducing health disparities, it is more difficult to gain political support across race groups. A neutrally-designed policy may gain broad public support, but such a policy does not always lead to a reduction in health disparities. There are policy tradeoffs between the overall efficiency (to make improvement for both groups) and the need to reduce racial disparities (to improve more for

minorities). This policy paradox can become more challenging when states lack the financial and human resources in healthcare.

The other possible challenge comes from how to deal with the persistent gap across the races effectively. In the case of Black and white disparities in infant mortality rates, while some policy treatments exhibit positive effects in reducing racial disparities, substantively we still see more infant deaths among Blacks than among whites with respect to their population sizes. This is a practical paradox because it raises the question about how practitioners should empirically evaluate racial differences in health status and health risks.

State initiatives on minority health, in addition, are found to be negatively related to racial disparities in health. In this research, however, I only show that states with these initiatives can do better in reducing racial disparities than states that have not taken any substantive policy efforts. To date, all states have established their minority health offices or entities, but they are organized and managed differently (e.g. an office, commission, council, research center, or an official contact within state health agencies, etc.). States also take their specific ways of addressing most pressing issues among the needy populations. Do different organizational forms and capacities matter for achieving the goal of reducing racial disparities in health? Do these different organizational mechanisms affect agencies' ability in producing desired service performance? How do these state entities on minority health coordinate their financial resources and human capital in the administrative processes? Who manage these agencies and how they are managed? Future studies that combine theories in policy studies and public management are needed to extend both the theoretical and empirical scopes for studying racial disparities in health.

Last but not least, although race continues to be a salient factor that is associated with health inequality, race might not be the only social source that produces heterogenous policy responses and disparate health outcomes. The theoretical framework of heterogeneous policy responses can be generalized to other social dimensions including gender, income groups, age groups, etc. Neutrally-designed policies might produce biased policy outcomes for some groups in the society while benefiting others more if they fail to recognize the heterogeneity in policy responses. In theory, it is necessary to consider group-level diversity and use diversity as a causal variable for social inequality. In practice, there are no simple solutions to social inequality. Both policy scholars and public administrators should acknowledge the social heterogeneity that is associated with various social equity issues. Public healthcare is one interesting issue area to evaluate how diversity may be related to social inequality, but certainly, not the only one.

3. ANXIOUS GIRLS AND INACTIVE BOYS: SOCIAL CAPITAL, PUBLIC HEALTH POLICIES, AND GENDER DIFFERENCES IN CHILDHOOD OBESITY

3.1 Overview

There is a burgeoning literature on the concept of social capital and its influences on population health. Numerous studies found that social capital is associated with improvement in various population health outcomes. Improvement in health outcomes, nevertheless, do not always occur uniformly across different social groups. While social capital in general may improve public health, is it also a key to understanding group differences in health outcomes?

In this research, I examine how social capital conditions the effectiveness of public health policies, and its implications on gender differences in health. Taking a timely policy issue – childhood obesity – as the empirical case, I explore the link between state and local policy interventions, social capital, and health outcomes. I combine three main concepts across U.S. states for the empirical analysis: health outcomes data related to childhood obesity from 1991 to 2009, policy programs designed to reduce and prevent childhood obesity, and measures for social capital. I find that social capital conditions the effect of public health policies with regard to managing childhood obesity. There are gender differences, moreover, in health outcomes and behavioral responses to state and local-level obesity policies. The empirical analysis also finds a mixed pattern in terms of how social capital and public health policies interactively affect males and females.

3.2 Introduction

Enhancing the effectiveness of government organizations and public policies has captured increasing attention among scholars in both public administration and health policy management (Boyne et al. 2005). Advocates of social capital and communitarian theorists suggest that social capital is associated with effective decision making and service performance by governmental agencies (Andrews et al. 2008; Putnam 1993, 2000; Tam 1998; Uslaner 2004). The "social capital thesis" has deeply influenced scholars in thinking about the effectiveness of policymaking, substantive policy outcomes, and democracy. Empirical studies, however, show that social capital might be a mixed blessing: on the one hand, the concept encourages community support; on the other hand, it does not always lead to better policy outcomes that benefit all social groups uniformly (Hero 2003). There is little agreement, additionally, on if social capital is a key to understanding different policy benefits across social groups.

This research fills the gap in the literature by linking social capital to public health interventions and comparing their effects on different social groups. Using gender as a lens to examine social strata, I provide a theoretical framework that conceptualizes both the direct and indirect effect of social capital on health inequality. I then use childhood obesity as an empirical case to test whether access to social capital may explain the observed differences in health outcomes between males and females.

I organize the subsequent sections in the following manner. First, I review the literature on social capital and the effectiveness of public health policies. I then layout a theoretical framework that posits the potential influence of social capital

on health inequality. Based on this theoretical framework, I propose an interaction model for testing the link between social capital, public health policies, and gender differences in health. Finally, I analyze data on childhood obesity across forty three states to test the proposed hypotheses. I conclude with a discussion on the theoretical and practical implications of considering social capital as a key to understanding effective policymaking for health inequality.

3.3 Social Capital and Health: The Literature

Social capital is an expansive concept that has received considerable attention from social scientists in the past few decades (Lin, Cook & Burt 2008). The concept of social capital stems from the sociology literature (Blau 1967; Bourdieu 1986; Coleman 1988; Lin 2001) and is developed by Robert Putnam's seminal work, *Making Democracy Work* (1993). Putnam (1993, 1995) broadly defines social capital as an asset that is inherent in social relations, trust, and networks. Putnam's collective approach of social capital emphasizes the community-level characteristics such as civic engagement, network associability, as well as reciprocity and trust among community members (Putnam 2000).[37]

[37]Lin (2001) offers a detailed comparison of individual and collective approaches of social capital in the extensive sociology literature. According to Lin (2001), the individual approach of social capital follows the Marxian tradition of taking capital as the theoretical foundation. Social capital is deemed as individuals' investment in social relationships and "how individuals capture the embedded resources in the relations to generate a return (21)." The collective approach of social capital, on the contrary, emphasizes the community and societal level features, such as social structures, networks within and across social groups, etc. Lin, Cook, and Burt (2008) point out that "one major controversy in the social capital literature is whether social capital is a collective or an individual good (9)." Theoretically, it is essential to differentiate the individual and collective approaches, because they inform different empirical measures of social capital. In this research, I adopt the collective approach of social capital, because the theoretical focus is to investigate how macro-level policy interventions and community conditions may interactively affect health outcomes of different social groups.

One recent theoretical development in the social capital literature leads to a distinction between the cognitive (trust) and structural components (network associability and civic engagement) of social capital (Bain and Hicks 1998; Song, Son and Lin 2009; Wall et al. 1998).[38] The literature on civic engagement and network associability, in particular, substantiates the relationship between social capital and effective policymaking. For example, Barnes and Walker (1996) argue that public organizations that receive more public support, and engage citizens in public service decisions can reap dividends for service quality. Rice (2001) finds that civic engagement and community support are positively related to administrative effectiveness. Coffe and Geys (2005) show that active citizens (i.e. civic engagement) can positively influence financial management at the local-level.

Adding to this body of research on social capital and effective policymaking, is the growing literature on how active communities are associated with improvement in public health. There is a well documented statistical association between state-level measures of civic participation and various public health indicators. Kawachi et al. (1997) find that community-level social capital, combined with

[38]Wall et al. (1998) contend that diverse conceptualization of social capital creates more confusion than clarity and could weaken the theoretical power of the concept. In the social capital literature, there is no consensus on how different social capital concepts can be integrated into a unified framework. In practice, however, scholars tend to separate trust and reciprocity from the other two components (network associability and civic engagement). The practical reason for separating trust from network associability and civic engagement is that trust is one of the most difficult concepts to measure directly (Blaxter 2004). The theoretical reason for separating trust from network associability and civic engagement is that trust refers the cognitive component of social capital and is largely driven by perceptions and norms of reciprocity, while network associability and civic engagement refer to the structural components of social capital. Studies find that trust, as a subjective measure of social capital, do not always correlated with less subjective measures of social capital (e.g. civic engagement and participation) at both the individual and aggregated level (Brehm and Rahn 1997). In a few empirical studies on social capital, trust is also treated as a distinctive concept from civic engagement and participation (Hero 2001; Uslaner and Brown 2005).

income inequality, can explain state-level variations in population mortality. They report a negative association between state-level civic participation and mortality rates. Gold et al. (2002) find the similar link between state-level measures of civic participation and behavioral health indicators, such as teen birth rates. Scholars also find that a higher level of civic engagement is associated with better recall of health messages and thus lead to more effective public health interventions for cardiovascular disease (Viswanath et al. 2006), mental health and psychiatric morbidity (Lauder, Kroll and Jones 2007), daily smoking and drinking (Carpiano 2007), as well as drug use (Winstanley et al. 2008), etc.

Though scholars have found consistent evidence for linking social capital to favorable health outcomes, far less is known about whether different social groups within the same community gain health improvement equally. Those scholars, who use aggregated measures of social capital health outcomes in their empirical analyses, often assume that social capital may affect various social groups in a homogenous way.

Only a few scholars have acknowledged that the link between social capital and favorable health outcomes may be altered by disaggregating health outcomes based on different social groups. Albritton (1990) and Hero (1998) find that "the relationship of social capital to minority infant mortality does not indicate worse outcomes for minorities; but neither are the outcomes any better (Hero 1998, 78)." Lochner et al. (2003) report mixed findings on how social capital affect different race groups' health outcomes. They find that civic participation decreases heart disease rates only for whites, not for Blacks. In their study on social capital and health risk behaviors (smoking and drinking), Chuang and Chuang (2008) report

evidence from Taiwan that there are differential effects of social capital between genders. Strong effects of social capital are found for women, but not for men.

Mixed findings across different social groups suggest that it is necessary to develop a theoretical framework that conceptually differentiates health inequality (i.e. group differences in health) from the overall population health outcomes. Most prior studies conceptualize social capital as a plausible contextual determinant of health (or other good policy outcomes), and do not consider the potential link between social capital and inequality. It may be conceivable that resources embedded in social structures can be mobilized to serve different group interests. The extent to which social capital may generate different group returns is a critical issue for pressing the research agenda on social capital and inequality. This issue, nevertheless, is understudied in the theoretical literature and is unexplored in the empirical literature. Empirical studies that find no significant statistical relationship between social capital and group-based health outcomes, in addition, indicate that the relationship between social capital and health outcomes may take different forms: the relationship may be nonlinear or may not be there.

3.4 Social Capital, Policy Interventions, and Group Differences in Health: An Integrated Framework

Although the literature on social capital and health is extensive, is dose not provide an integrated framework that uses social capital as a causal variable to explain health inequality. The literature, furthermore, is tenuous and less informative on whether social capital has a direct or indirect impact on health inequality across social groups. Limited theoretical exploration of the causal linkages between social capital, policy interventions, and health inequality diminishes

the usefulness of social capital as a variable for research on effective policymaking in public healthcare.

The Link between Social Capital and Health Inequality

Health inequality refers to the difference "in which disadvantaged social groups such as the poor, racial/ethnic minorities, women and other groups who have persistently experienced social disadvantage or discrimination systematically experience worse health or greater health risks than most advantaged social groups (Braveman 2006,167)." Whether social capital might be associated with health inequality remains to be unclear in the empirical literature (Carlson and Chamberlain 2003). Prior empirical studies, however, provide a foundation for advancing the concept of social capital in relation to health inequality. Kennedy et al. (1998) find that, after controlling for income inequality and average education attainment, social associations in the community can benefit whites more than Blacks. Raphael et al. (2001) and Cattell (2001) provide insights that "poverty alone does not cause poor social relations (Carlson and Chamberlain 2003, 330)." Variations in community norms and social interactions explain health differences between comparable low-income neighborhoods.

These empirical findings suggest that group differences in health may be partially caused by different social norms and community conditions. The micro-level mechanism that links social capital to health inequality is that social networks can provide resources and information to individuals who have access to the networks. An individual who has stronger social ties and is more integrated in community-based activities may possess more resources and information than an individual who has less social capital. Hendryx et al. (2002) contend that

well-connected individuals are more informed on health risks and how to find access to local health services. Studies have shown that health information affects individuals' health behaviors, preventive actions, and their decisions in choosing healthcare services (Dutta-Bergman 2004; Langlie 1977; Ronis 1992).

An alternative mechanism to health information seeking is the maintenance of health behavioral norms through informal social control and the psychological process that provides affective support (Kawachi and Berkman 2000). MuCulloch (2001) contends that social capital applied is related to features of a community that build cohesion, increase a sense of belonging, and enable community members to cooperate. Therefore people with live in a well connected community may have better mental and physical health than people who live with less social capital. He finds that people in the lowest categories of social capital have increased risk of psychiatric morbidity.

Muntaner and Lynch (1999) turn from the relational aspect of social capital to its political implications. They assert that social interactions and networks can also be a source of inequalities in power (e.g. class or gender relations). Social networks and interactions create group memberships, which may benefit in-group members rather than out-group members. This is an important extension to the access-to-information argument and the social cohesion argument, because powerlessness plays a role in health inequality (Hawe and Shiell 2000).

In sum, social capital may not only diverge individuals' access to health information and health services, but also create social powers for individuals in the society. It could empower individuals who are with more social ties and who participate more in community activities. When the consequences and benefits of

social capital are not equally distributed among individuals in the society, it may become a cause rather than a cure for health inequality.

Which Group Has More Social Capital? The Capital Deficit Argument

As aforementioned, social networks and civic engagement may not generate equally distributed benefits (in terms of health promotion) at the individual level. The micro-level mechanisms alone, however, are not sufficient to connect social capital to health inequality between groups. If health inequality is driven by comparative disadvantage of one social group to another, then it is necessary to further theorize whether social capital can be linked to systematic differences between social groups. French sociologist Bourdieu is the pioneer in theorizing social networks as a source of social stratification. Bourdieu (1986) conceptualizes that sources of social capital are embedded in durable networks, which produce institutionalized relationships of mutual recognition (i.e. group membership). Social institutions, according to Bourdieu (1986), motivate within-group exchanges and benefit group members in an exclusive manner (249-251).

Empirical studies confirm Bourdieu's social-stratification thesis. Hero (1998) observes that in the U.S., racial diversity influences state politics and distributive effects of various public policies. Using multiple policy cases (e.g. education, health, and welfare), Hero finds that minorities are better off relative to whites only in states with higher level of racial diversity. Focusing on health service utilization, Lee (2008) finds differences in women's and men's social capital, which in turn affect their utilization of health services related to HIV/AIDS prevention. Gigengil and O'Neill (2006a, 3) substantiate that men and women socialize themselves into different social organizations and networks. They note

that "men are much more likely than women to spend their leisure time in sports activities...women, meanwhile, are more likely than men to undertake voluntary work related to health, social services, and education."

Though focusing on different social group identities, these studies produce a common theoretical argument: both quantity (i.e. how much social capital) and quality (i.e. what types of social ties and organizational memberships) of social capital may be different across social groups. If social capital in general produces positive social outcomes, then the group that has more social capital may generate more social returns than the group that has less access to social capital. Similarly, different types of social ties and organizational memberships may produce different social benefits. Turning to the context of healthcare, if members in group A are socialized more with healthcare organizations than members in group B, then it is expected that group A may generate more positive health comes than group B. To sum, it is the deficit in social capital for a particular social group that puts this group in a socially disadvantaged position. This capital deficit argument is applicable to different social group identities, it may help to explain both racial and gender differences in health.

Would the Same Social Capital Generate Different Group Returns?

Prior studies suggest that social capital may channel individuals' access to health information, empower individuals in the society, and increase collective resources that may benefit mental and physical health. These findings may support the political imperative of building good and healthy communities. It is still unclear, however, whether building social capital may generate equal returns for different groups. Lin (2001) substantiates that, social capital is by no means always good.

It is similar to physical capital, human capital, or any other forms of capital in that it can generate different group returns. According to Lin (2001,100), inequality may rise if given the same amount of resources, one group is capable in generating more returns than another group. Lin's return-deficit argument is a complimentary mechanism to the power-resource argument in two ways. First, this proposed mechanism takes account into the possibility that the same level of social capital and similar types of civic activities may generate different group returns.

It is well documented in public health and epidemiology studies that norms and values regarding health and health-related behaviors vary across social groups, such that some groups may be more resistant to the influences of their social environment. Similar community conditions and social ties may coexist with different social norms for men and women. For example, Chuang and Christakis (2005) find that women are more likely to face high social penalty for being overweight than men. Although social networks are found to have protective effects on people's health (Herzog et al. 2002; Michael et al. 2001), they do not necessarily benefit social groups equally.

Second, the return-deficit argument implies that social capital may influence collective efficacy and group differences in health through its linkage with other mechanisms, such as social norms on health and health-related behavior, changes in community stability, and policy-related mechanisms. In their study on sexually transmitted infection (STI), Thomas and Thomas (1999) find that social capital, combined with migration patterns, can affect racial disparities in STI. Hogben and Leichliter (2008) find that healthcare provisions and use are critical to the effect of preventive interventions. Social capital, however, can mediate the effect of

policy provisions. It is easier to deliver health services and implement preventive interventions in well connected communities.

Social capital may be linked to group differences in health through both direct and indirect mechanisms. The direct link between social capital and health inequality depends on both capital deficit and return deficit. The indirect relationship between social capital and health inequality may hinges on how social capital is related to other causal factors (e.g. healthcare provisions). As such, recognizing both direct and indirect effects of social capital allows an examination of the interactive relationship between the policy environment, public health interventions, and group differences in health. The aforementioned theoretical conjectures can be summarized as follows. Firstly, social capital may be directly linked to group differences in health. If group A has more access to social networks and participated more actively in community activities than group B, then social capital is expected to generate more positive health outcomes for group A than for group B. Inequality may also rise if using the same social capital, group A generates more health returns than group B. Secondly, social capital may interact with other health promotion factors (such as public health interventions) and exhibit indirect effects on group differences in health. Health interventions implemented in more active communities may have stronger effects on health outcomes than policies implemented in less active communities. Given the same set of health interventions, in addition, the group that has more social capital will benefit more than the group with less social capital.

3.5 Empirical Assessment Using the Case of Childhood Obesity

Statewide Social Capital, Gender and Childhood Obesity: Hypotheses

Social networks and community engagement may be linked to group health outcomes through direct and indirect mechanisms. Systematic empirical assessment of the aforementioned theoretical conjectures requires data on a salient public health issue, whereby group differences in outcome measures are well documented. It also requires empirical measures for relevant public health interventions and social capital in the systems, in which intervention programs are implemented. Childhood obesity serves as an excellent interactive case of civic engagement, networked associability, and effective policymaking for following reasons.

Firstly, childhood obesity is a serious public health crisis now. Obesity, long thought to be a private concern, has pushed itself on the national policy agenda in the United States. The prevalence of childhood obesity has more than tripped in the past a few decades, and this public health crisis now affects every state (Ogden et al. 2008). The increasing issue salience and public attention on childhood obesity lead to an increasing number of policy interventions adopted at the state-level and implemented through public school systems. Changes in the number of policy interventions over time would allow an evaluation of policy effectiveness by examining the association between obesity outcomes and variations in policy interventions.

State-level analysis is chosen for two reasons. On the one hand, states are primary policy adopters in the case of childhood obesity. Federal agencies, such as Centers for Disease Control and Prevention (CDC), have provided guidelines

for reducing or preventing childhood obesity. More policy efforts, however, are initiated at the state-level. To date, public schools are deemed as the major battle field for childhood obesity. School programs vary considerably according to different state-level legislative initiatives. Hence, a state-level analysis incorporating both variations in legislative initiatives and school-based programs could generate a comprehensive policy comparison. On the other hand, longitudinal empirical data that track obesity prevalence rates and health risk behaviors based on gender groups are more comprehensive and much better documented at the state-level than at the local-level.[39]

Secondly, the current policy development for combating childhood obesity focuses on implementing nutrition and physical education policies through state, local, as well as public school systems, screening children's Body Mass Index scores, and promoting active life styles. All these intervention programs are implemented through a decentralized and networked-environment and require successful co-production with service users and communities. It is conceivable that state social capital such as civic engagement and public mobilization may affect policy effectiveness. Kim et al. (2006) argue that in the case of preventing obesity, statewide social capital are very important, social capital in larger geographic scales can affect both policy mechanisms and directly influence local-level collective policy efforts (1046).

Hence, the policy case of childhood obesity, can be used to test following to hypotheses:

[39]Because different states enacted legislative bills for preventing childhood obesity in different years, it is necessary to use longitudinal data on both health outcomes and policy interventions. The Centers for Diseases Control and Prevention maintain the most comprehensive data archives for obesity trends. County-level estimates are available for adults older than 20 years old. As for CDC's local-level estimates on childhood obesity, only a few counties and metropolitan areas are sampled in their health risky surveillance surveys.

H1: Social Capital will be positively associated with health outcomes related to childhood obesity.

H2: Obesity policies in states with more social capital will generate more positive health outcomes than in states with less social capital.

Hypothesis 1 posits how social capital may be directly linked to better health outcomes. This is to evaluate the general "social capital thesis" that better health outcomes are associated with more active communities. Hypothesis 2 posits that social capital may interact with public health interventions and condition the effect of health intervention programs. States with more supportive community conditions may implement their obesity prevention programs more effectively.

Childhood obesity, furthermore, is also an excellent policy case to examine the links between social capital, policy interventions, and health inequality. Gender, in this policy case, is a key identity for assessing systematic differences in health across social groups. Boys and girls are different systematically based on their group distributions in Body Mass Index (BMI) scores, risk-perceptions, and weight-control activities. Wisniewski and Chernausek (2009) conduct a comprehensive literature review based on peer-reviewed, published studies on childhood obesity from 1974 to 2008. They examine relevant studies on children aged 0 to 18 and conclude that "boys and girls are different in body composition, patterns of weight gain, hormone biology, and the susceptibility to certain social, ethnic, genetic, and environmental factors (76)." Girls have greater fat mass than boys. Boys in all race groups except non-Hispanic Blacks, however, have

higher obesity prevalence rates than girls.[40] Gender differences in biomedical conditions, risk-perceptions, perceived body-images, and health behaviors may help to test the deficit-in-return argument. Because women may have greater social punishment than men for being overweight (Chuang and Christakis 2005), it is arguably possible that boys may be more resistant to their social environment than girls. As such, social capital may generate more health returns for girls than for boys.

Comparing gender differences in childhood obesity may also help to test the power-resource mechanism, i.e. those who have much access to social capital may have favorable health outcomes than those who have less access to social capital. It is documented in empirical surveys that men and women socialize themselves with different types of civic organizations and in general women pay more attentions to healthcare issues than men (Gigengile and O'Neill 2006b). There are also gendered differences in terms of children and adolescents' access to social capital. Hooghe and Stolle (2004, 1) analyze anticipated political participation among American adolescents (fourteen-year-olds) and find that "girls at this age mention more actions they intend to engage in than boys do." They also find "distinct patterns with regard to the kinds of action favored, with girls being drawn more toward social-movement related forms of participation (15-16)." If in general, girls have more access to health-related social capital than boys, then it is possible that social capital is linked to gender differences in health, with females benefit more from their access to social capital. Thus, the third testable hypothesis is:

[40]The empirical focus on gender does not mean that gender is the only way to examine group differences in the case of childhood obesity. The prevalence of obesity among children in the United States also varies across race/ethnic groups and is based on family income levels. Gender, however, is a more salient identity.

H3: Obesity policies in states with more social capital will generate more favorable health returns for girls than for boys.

3.6 Data, Measures, and Method

To operationalize the theoretical concepts with the case of managing childhood obesity, I examine policy outcomes by using policy objectives, and focus on evaluating both obesity prevalence measures and youth weight-control activities. The concept of social capital is operationalized by focusing on the structural components – social networks and civic engagement. To empirically test the aforementioned hypotheses, I pool data for forty-three states from 1991 to 2009.[41]

Dependent Variables: Obesity Prevalence Rate and Dietary Behavior

I operationalize policy outcomes by using three indicators: *Childhood Obesity Prevalence Rate*, *Physical Inactiveness*, and *Risky Weight Control Activity*. Data for health outcomes are drawn from the CDC's longitudinal studies – Youth Risk Behavior Surveillance System (YRBSS) (CDC 2009). YRBBS includes a national school-based survey conducted by the CDC and state education agencies. YRBSS monitors primary health-risk behaviors that relate to the childhood obesity

[41]California, D.C., Oregon, Pennsylvania, Virginia, and Washington are not included in the sample because no data are available for health outcome measures related to childhood obesity. Hawaii and Alaska are not included in the sample because no data are available for social capital measures for these two states.

epidemic. I use survey items from the Module on Dietary Behaviors. All health outcomes variables are calculated for both genders.[42]

Childhood Obesity Prevalence Rate is measured by the percent of students who are obese or overweight.[43] Figure 9 illustrates distributions of state-level childhood obesity prevalence rates based on gender groups. On average, 22.01% female students are above overweight and 29.35% male students are above overweight.

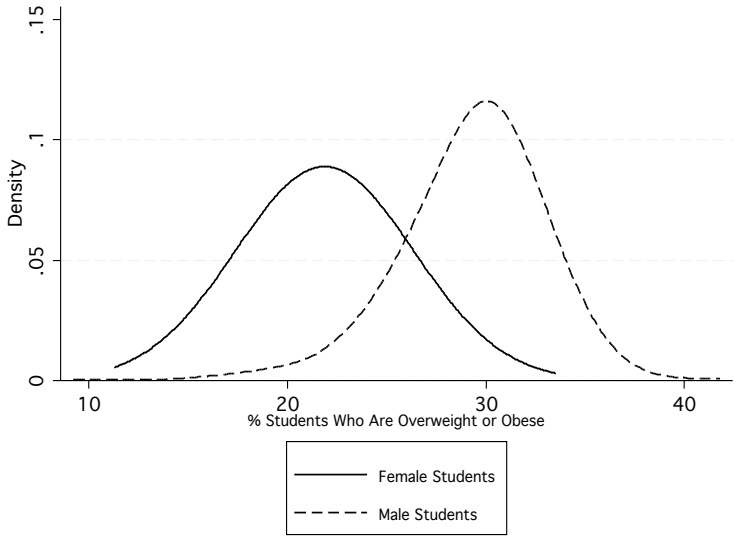
Childhood obesity prevalence rates also vary considerably across states. From 1991 to 2009, Utah has the lowest average female and male prevalence rates (15.64% and 24.47%, respectively). Mississippi has the highest female and male prevalence rates (30.36% and 33.37%, respectively). At the national level, both male and female prevalence rates vary from year to year, but only with incremental changes. For example, the average female prevalence rate in 1999 was 19.8%. It increased into 20.25% and 21.51% in 2001 and 2003, respectively. The average male prevalence rate was 28.1% in 1999. It became 28.6% in 2001 and 29.22% in 2003. At the state-level, changes in childhood obesity prevalence rates are more dynamic. For example, in Arizona, both female and male prevalence rates were increased from 1991 to 1996, decreased from 1997 to 1999, and increased

[42]The survey has been conducted every other spring semester from 1991 onward, with random school-based samples based on K-12 students. state-level surveys are coordinated through state education and health agencies and based on in-classroom self-administrated questionnaire with local parental permission procedures. All regular public, Catholic, and other private students were included in the sampling frame. The sample size in each wave is larger than 10,000 and the overall response rate for each was larger than 60%. Mean interpolation is used to convert biannual survey data into annual data.

[43]Students, who participated in the surveys, reported their own weight and height. CDC use self-reported weight and height to calculate individual BMI scores and the percent of students who are obese or overweight. For children and adolescents (aged 2-19 years), their BMI values are evaluated based on the CDC growth charts for the corresponding age-adjusted BMI percentiles. A child is overweight if he or she has a BMI at or above the 85th percentile and lower than the 95th percentile. Obesity is defined as a BMI at or above the 95th percentile adjusted for the same age and sex (CDC 2009).

again from 2006 to 2009. The magnitudes of changes in childhood obesity also vary across states. For example, from 2007 to 2009, the female prevalence rate was increase by 2.9% in Louisiana, but decreased by 1.2% in New York. The male prevalence rate was increased by 2.9% in Maine, but decreased by 1.5% in Wisconsin.

Figure 9: Obesity Prevalence Rates by Gender Groups: Centers for Disease Control and Prevention, Youth Risk Behavior Surveillance System (1991-2009)



Notes:

1. Obesity prevalence rates are measured by the percent of students who are obese or overweight. Overweight is defined as a BMI at or above the 85th percentile and lower than the 95th percentile. Obesity is defined as a BMI at or above the 95th percentile for children of the same age and sex.
2. As for female students, the sample mean is 22.01% and the range is 11.3%-33.6%. As for male students, the sample mean is 29.35% and the range is 9.2%-41.8%. Group means are statistically different.

I also create two behavioral indexes to measure youth weight control practices. Various school policy programs on childhood obesity are designed to target the youth population and induce sound weight control practices, such as exercise and healthy diets. Hence, behavioral change can be viewed as an indicator of policy outcomes. Specifically, these behavioral indicators are measured as a percentage of students who engage in a particular type of activities in the past 30 days. All data are coded along the risky direction, i.e. not helpful for reducing or preventing childhood obesity. Two behavioral indexes are created based on a principal-component factor analysis of five weight control activities: (1) students who did not exercise to control their weight in the past 30 days; (2) students who did not eat less food, fewer calories, or low-fat foods to lose weight or to keep from gaining weight during the past 30 days; (3) students who fasted (went without eating more than 24 hours) to lose weight; (4) students who took diet pills to lose weight; and (5) students who took laxative pills to lose weight. Factor analysis renders two factor indexes: *Physical Inactiveness* and *Risky Weight Control Activity*. Table 4 reports summary statistics for each behavioral index.[44]

As Table 4 shows, each factor index takes a mean value around 0 and a standard deviation around 1. A positive value refers to a riskier behavioral trend and a negative value refers to a healthier behavioral trend. For example, as for the overall index of Physical Inactiveness, the observation with the maximum value is New Jersey-1991. Based on students' self-reported dietary behavior (in New Jersey, 1991), 54.6% students did not exercise to lose weight and 71.8% students

[44]For each behavioral indicator I extract from the survey data and use the aggregated percentage at the state-level. To construct the factor index, I conduct principal-component factor analysis. The first two indicators load in one factor and the other three indicators load in one factor. The first factor-index is used to measure physical inactiveness and the second factor is used to measure risky weight control activities.Table 16 in the Appendix reports Eigenvalues and factor loading scores for each behavioral index.

did not eat less to lose weight. Figure 10 further illustrates behavioral trends based on the overall sample means and by gender groups. In Figure 10, subfigure (a) shows gender differences in being physically inactive and subfigure (b) shows gender differences in taking risky weight control activities. Gender differences in weight control activities are salient. From 1991 to 2009, there is a behavioral shift in terms of what activities are taken by male and female students to control their weight. Before 2001, more male students are reported to be physically inactive than female students, and the group trends are reversed after 2001. Before 2004, more female students are reported to take risky weight control activities than male students, and the group trends are reversed after 2004.[45]

Table 4: Factor Indexes of Students' Weight Control Activities: Summary Statistics

Behavior Index	Mean	Std. Dev.	Min	Max
Physical Inactiveness				
Overall	-0.001	1.033	-4.220	5.450
Female	0.021	1.029	-3.373	3.750
Male	-0.028	1.028	-3.486	4.403
Risky Weight Control Activity				
Overall	-0.016	1.046	-3.750	5.063
Female	-0.002	1.044	-3.733	5.237
Male	-0.002	1.052	-3.553	6.555

[45]Note that the group comparisons are drawn based on across-state means, hence, it only refers to the overall national trends.

Figure 10: Behavioral Trends of Students' Weight Control Activities: Centers for Disease Control and Prevention, Youth Risk Behavior Surveillance System (1991-2009)

(a)

(b)

Obesity Policy

I measure obesity policy by focusing on state-level legislative initiatives for reducing and preventing childhood obesity and policy programs that are mandated or recommended through the school systems. Data on state-level legislative initiatives are drawn from the CDC database, *State Legislative and Regulatory Action to Prevent Obesity and Improve Nutrition and Physical Activity* (CDC 2011). I extract information on the number of newly enacted legislative bills that are relevant to improving children's nutrition, enhancing physical education, promoting physical activities, mandating or recommending BMI screening at schools, and sharing children's BMI information with parents. From 2001 to 2009, there are 103 new legislative bills enacted to improve nutrition, 64 new bills enacted to promote physical activity, and 14 new bills enacted for BMI screening.

As for implementing childhood obesity policies, states mainly require or recommend public schools to adopt school-based policies in health education, nutrition development, and physical education. To incorporate information on school programs for reducing childhood obesity, I draw data from the CDC database on *School Health Policies and Programs Study (SHPPS)* (CDC 2006). SHPPS is a national survey periodically conducted to assess school health policies and practices at the state, district, school, and classroom levels. More specifically, I use policy survey items for following programs: (1) restricting junk food in schools; (2) incorporating topics on healthy nutrition and dietary behavior in nutrition education; (3) enhancing physical education; and (4) mandating fitness test. There are substantial variations across states in terms of how these programs are introduced in schools and how many of their schools have implemented these programs. For example, some states only recommended their schools to

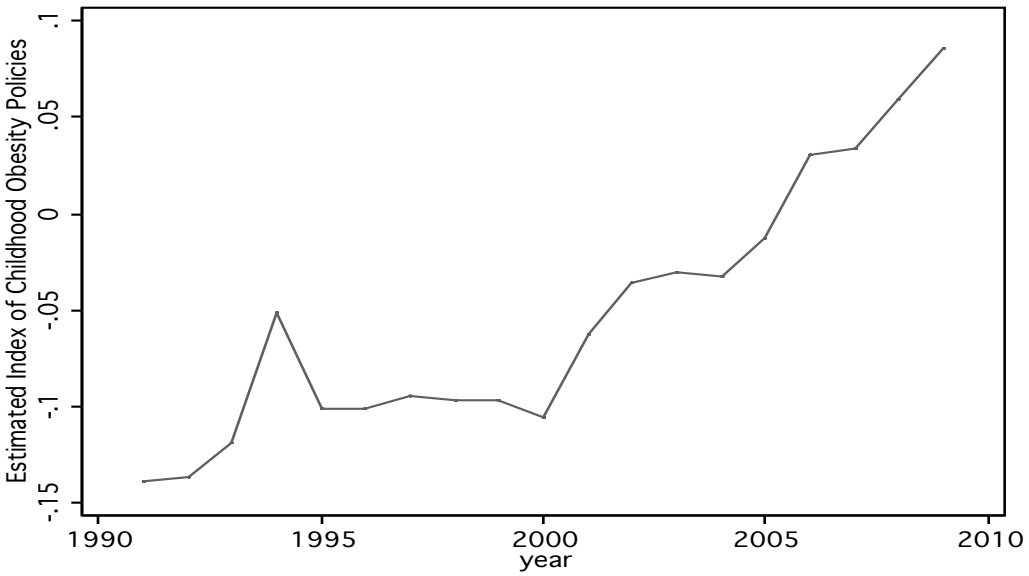
use these programs for obesity prevention, while others mandated all their k-12 schools to implement these programs. According to the CDC's data summary, the percentage of schools that included deep-fried food in school meals decreased substantially, from 40% (in 2000) to 18.8% (in 2006). In 2006, however, near half of the schools did not offer low-fat salty snacks (46.7%) and low-fat yogurt (49.7%) to students (O'Toole et al. 2007).

I combine information on state legislative actions and school-based programs and create a policy index based on principal-component factor analysis.[46] Table 5 reports specific policy indicators that are used to construct the obesity policy index as well as their factor loadings. The estimated policy index scores ranges from -1.554 to 1.118. Higher values mean that more policy initiatives are taken by a state to reduce and prevent childhood obesity. Figure 11 summarizes the mean trend of changes in state-level childhood obesity policies. Overall, there has been an increasing effort in adopting more childhood obesity policies. Policy initiatives have increased dramatically in years after 2000.[47]

[46]The most recent SHPPS survey was conducted in 2006. SHPPS was also conducted in 1994 and 2000. I used all three waves to construct the policy index. Years between 1991 and 1994 are coded based on the 1994 survey items. Years between 1994 and 2000 are coded based on 2000 items. Years after 2000 are coded based on the 2006 items. I firstly compute a policy index based on available information on state legislative and regulatory actions (annual data from 2001 to 2006). I then compute another policy index based on school-policy surveys (1996, 2000, and 2006). The Pearson correlation between the index for legislative actions and school-policies in 2006 (r=0.991, p=0.000) is used to impute combined policy index scores across all the years.

[47]The policy index is estimated partly based on newly enacted state legislative bills on childhood obesity and partly based on school-based obesity prevention programs. Decreases in index scores are driven by the fact that fewer new legislative bills were enacted in a given year than in the previous year. For example, the index score drops from 1994 to 1995, from 1999 to 2000, and from 2004 to 2005.

Figure 11: Estimated Policy Index for Reducing and Preventing Childhood Obesity, Centers for Disease Control and Prevention (1991-2009)



Dynamic Social Capital Index

Though the theoretical literature on social capital is rich, fewer studies have developed empirical measures for social capital that are comparable across all states in the United States. Robert Putnam quantifies a state-level comprehensive social capital index (Putnam 2000). Putnam's state-level social capital index is constructed based on five components: participation in public activities, participation in community organizations, community volunteerism, informal sociability, and social trust (291). One limitation of this empirical index, as Putnam points out in his book, *Bowling Alone*, is that it does not capture changes in social capital over time (415-17). Hawes and Rocha (2010) contend that theories that explore the link between social and policy changes and social inequality often have dynamic elements, thus a dynamic measure of social capital is needed

to better reflect the cross-time changes. Hawes, Rocha, and Meier (2006) and Hawes and Rocha (2010) use state-level consumer survey data to construct a dynamic measure of social capital, which varies across states and time. The social capital measure is operationalized based on three major components: community organizational life, engagement in public affairs, and community volunteerism (Hawes and Rocha 2010, 6). According to Hawes and Rocha (2001, 4), the overall correlation between their dynamic social capital measure and Putnam's index is high (r=0.742, p=0.000).

Table 5: Factor Loadings for the Index of Obesity Policy

Survey Item	Factor Loadings
State Legislative Actions[1]	
Nutrition law	0.859
Physical education law	0.894
BMI law	0.549
Eigenvalue	1.838
School-Based Obesity Programs[2]	
Restricting junk food on campus	0.120
Teaching healthy nutrition	0.924
Enhancing physical education	0.920
Mandating fitness test	0.238
Eigenvalue	1.77

Notes:

1. As for state legislative actions, each item are coded based on the number of newly enacted legislations in the policy category.
2. As for school-based obesity programs, each item is coded as 1 if schools are recommended to implement relevant policies, 2 if schools are mandated to implement policies, and 0 otherwise.

I replicate Hawes and Rocha's dynamic social capital index (from 1986 to 2000) and expand the index to 2009.[48] Data for computing the dynamic social capital index are drawn from *Survey of the American Consumer*, conducted by the GfK MediaMark Research & Intelligence (GfK MRI), LLC. GfK MRI conducts annual consumer surveys based on approximately 26,000 in-home, face-to-face consumer interviews. They implement a randomly stratified sampling procedure to select households and the face-to-face interview method generates response rates approximately from 60% to 70%.[49] Individual-level data on public activities, leisure activities, media usage, and political outlook are aggregated by state clusters in the original GfK MRI data. Table 6 present details on main theoretical components used for constructing the dynamic social capital index, selected GfK MRI indicators for each theoretical component and their corresponding factor loading coefficients.

The concept of community organizational life is measured by six survey items that based on group membership of fraternal orders, civic clubs, veteran clubs, local governments, and country clubs. The concept of engagement in public affairs is measured by seven items, including writing to an editor of a magazine or newspaper, writing to a radio or television station, writing to an elected official, writing something that has been published, working for a political party or

[48]Data for years after 2000 are critical for analyzing the linkages between obesity policies, social capital, and policy effectiveness for two reasons. Firstly, as shown by the data on state-level childhood obesity legislations and school-based obesity programs, more policy initiatives have been taken in years after 2000. Including data in more recent years is critical to capture major policy changes. Secondly, CDC's YRBSS studies show that there are behavioral shifts in terms of what weight-control activities are taken by females and males. Without data in more recent years, it is impossible to empirically assess whether these behavioral shifts are associated with changes in policies and social capital.

[49]More details on data reliability, survey samples, and data collection can be accessed via the GfK MRI website:
http://www.gfkmri.com/ProductsServices/TheSurveyoftheAmericanConsumer.aspx.

candidate, engaging in fund-raising, and state-level voter-turnout for national and congressional elections. The concept of community volunteerism is measured by average contribution to public television or radio stations.[50]

To assess measurement reliability, I check Pearson correlations between Putnam's social capital index, the dynamic social capital index constructed by Hawes and Rocha (2010), and the dynamic social capital index computed by adding data from 2000 to 2009. The overall Pearson correlation between the dynamic social capital index (with data from 1990 to 2009) and Putnam's index is 0.565 (p=0.000). The Pearson correlation between the new social capital index and Hawes and Rocha's (2010) social capital index is 0.930 (p=0.000). When adding more data in recent years, the correlation between the new dynamic social capital index and Putnam's index becomes smaller than what is reported in Hawes and Rocha (2010). It drops from 0.742 to 0.565. This is because Putnam's index does not change over years. To cross-validate the measurement reliability, I also assess the correlation between Putnam's index and the new dynamic social capital index based on state-means. The Pearson correlation between the mean dynamic social capital index and Putnam's index is 0.751(p=0.000).[51]

[50]I include fewer survey items than what are included in Hawes and Rocha's index, because GfK MRI dropped some of their old survey items from 2004 to 2009. For example, in the category of engagement in public activities, they excluded the question on whether respondents addressed a public meeting or not. I only include survey items that have data from 1990 to 2009. The Gfk MRI survey data, moreover, are coded based on state clusters, thus, states in the same cluster (e.g. South Carolina, North Carolina) take same item values. Hawes and Rocha (2010) acknowledge that this is less problematic since state clusters are creased based on similar consumer demographic characteristics. Also, I replicate their dynamic index by adding the same voter turnout data. State-level voter turnout data are drawn from Michael McDonald's United States Elections Project (McDonald 2010). I use the Voting-Age Population (VAP) turnout measure in the dataset.

[51]Figure 17 in the Appendix presents correlations between Putnam's social capital index and the state-means calculated based on the dynamic social capital index.

Table 6: Factor Loadings for Dynamic Social Capital Index (1990-2009)

Survey Item	Factor Loadings New Dynamic Index	Factor Loadings Hawes & Rocha's Index
Community Organizational Life		
Fraternal order	0.587	0.660
Religious club	0.304	0.221
Civic club	0.481	0.375
Veteran club	0.563	0.503
Body of Local Government	0.460	0.532
Country Club	0.266	0.363
Engagement in Public Activities		
Wrote to an editor of a magazine/newspaper	0.698	0.683
Wrote to a radio/ television station	0.455	0.610
Wrote to an elected official	0.631	0.762
Wrote something that has been published	0.600	0.612
Actively worked for a political party/candidate	0.528	0.473
Engaged in fund-raising	0.471	0.687
Voter turnout	0.431	0.685
Community Volunteerism		
Contribute to public radio/television	0.450	0.596
Eigenvalue	3.948	8.750

Control Variables

To isolate the effects of obesity policy and social capital on health outcomes related to childhood obesity, I include a set of control variables that are related to childhood obesity and children's health.

Characteristics of State Healthcare Systems. I include three indicators to reflect monetary resource and bureaucratic capacity available in the public health sector. *Healthcare Spending* is measured by total state and local spending on hospitals and healthcare as a percentage of Gross State Product. *Public Health Employment* is measured by full-time equivalent state and local public employees in healthcare and public hospitals per 100, 000 residential population.[52] I also include *Children's Access to Health Insurance*, measured by the percentage of children under 18 who are not covered by health insurance.[53] The Berry et al. (1998) measure of *Citizen Liberalism*, in addition, is used as a control for the health policymaking environment. Liberal citizens will support more governmental interventions in public affairs than citizens who are political more conservative. Hence, in a state

[52]To calculate the percentage measure, I use data for the total state and local health spending as the numerator. Public health spending data are drawn from the U.S. Department of Health and Human Services, Centers for Medicaid and Medicare Services Expenditure Reports. The specific expenditure report I use is *Annual Health Expenditures by State and Provider.* The denominator is State Gross Product. Annual GDP-by-state (based on all industries) statistics are drawn from the U.S. Bureau of Economic Analysis (BEA). The annual total spending data and state GDP data are adjusted into 2000 constant dollars. Data on state and local full-time equivalent employment in health and hospitals are drawn from Census Bureau Annual Survey on Government Employment and Payroll.

[53]The original data for children's health insurance coverage are collected by the American Medical Association, Chicago, IL. Data for the span of health insurance are drawn from "The Annual Social and Economic Supplement (ASEC) to the Current Population Survey (CPS)." The ASEC to CPS is a Census Bureau survey of about 78,000 households and includes detailed health insurance questions asked of the household respondent for every household resident. I access data from 1999 to 2006 from the ASEC Historical Tables (HIA Series), HIA-4"Health Insurance Coverage Status and Type of Coverage by State-All Persons: 1999 to 2008." I access data from 1990 to 1999 from the ASEC Historical Tables (Original Series), "Health Insurance Coverage Status and Type of Coverage by State-All Persons: 1987 to 2005." All data are accessed from the webpage: http://www.census.gov/hhes/www/hlthins/data/historical/index.html.

where the majority of citizens hold a liberal political stand, there might be more policy interventions in healthcare in general.

Socioeconomic Variables. Based on the public health literature, socioeconomic conditions are associated with population health (LaVeist 2005). I control for three socioeconomic variables in the empirical models: (1) *Poverty Rate*, measured by the percentage of residential population who are under the 100% federal poverty line; (2) *Unemployment Rate*, measured by the percentage of residential population who are unemployed; and (3) *Population Education Attainment*, measured by the percentage of the population who have a high school diploma and above.[54]

Health Risk. I include two variables to reflect the health risk of being obese. *Overweight Infant Rate* is included as a control for weight conditions in infancy and is used as an objective measure of the health risk of childhood obesity. I also included students' risk perception as a subjective measure of health risk.[55] The objective measure of health risk is included in models for childhood obesity prevalence rates. In addition to the overweight infant rate, the subjective risk measure is included in models for weight-control activities, because perception

[54]Data for poverty and education attainment are drawn are drawn from the Census Bureau American Community Survey (ACS). Data for unemployment are drawn from U.S. Bureau of Labor Statistics, "Geographic Profile of Employment and Unemployment", 1990-2009.

[55]Data calculating the overweight infant rate are drawn from the CDC Vital Statistics, the Birth Data. Overweight infant rate is measured as the number of infants, whose weight is higher than 4,000 grams, per 1,000 live births. I use the CDC YRBSS data on students' self-perceived weight status as a proxy of their risk perception of being obese. The survey item used is % students who think themselves to be overweight and obese.

of overweight is a key determinant of children's dietary habits and weight management activities (Brener et al. 2004).[56]

Method

The focus of the empirical assessment in the research is to evaluate the links between social capital, public health policies, and policy outcomes both gender groups. Empirical analyses are designed to compare if social capital, combined with public health interventions, affect the two gender groups differently. To assess the overall effects of obesity policy and social capital on gender-based policy outcomes, I implement a system of equations for female and male health outcomes using the one-way random effect estimation of seemingly-unrelated regressions (SUR) in a panel data set. SURE (seemingly-unrelated regression estimation) produces two sets of slope coefficients, one for each gender group. Using SURE, I can compare the relative policy effects across the two groups. When some unmeasured factors that affect the health outcomes for one gender group may also affect the other group, SURE produces unbiased and more efficient estimation than estimating the two equations separately (e.g. Ordinary Least Square or Generalized Least Square estimation) (Martin and Smith 2005; Zellner 1962).

[56]I did not include the perception measure in models for obesity prevalence rates, because studies show that the correlations between children's perception of overweight and their actual BMI scores are very low (Brener et al. 2004). Based on the panel data for this research, the correlation between female perception on overweight and the % female students who are overweight or obese is -0.273, and the correlation between male perception on overweight and the % male students who are overweight or obese is 0.180. Figure 18 in the Appendix presents the sample distributions of male and female perceptions of overweight. Comparing Figure 18 with Figure 9, misperceptions of overweight are found for both gender groups. Overall, more female students describe themselves to be overweight than male students, yet the actual female obesity prevalence rates are lower than the male prevalence rates.

State-level panel data, furthermore, are used for the empirical analysis. Panel data combine information of both spatial and temporal dimensions, which allow researchers to use repeated observations of the same units and can increase both quantity and quality of the empirical information. However, panel data may introduce challenges to obtaining consistent and efficient estimation due to features of data variations along the spatial and temporal dimensions. Based on post-regression diagnostic analysis and comparison between data variations along both spatial and temporal dimensions, I implement a one-way random-effects estimation of SUR in the panel data framework (Biorn 2004; Nguyen and Nguyen 2010). Specific considerations on model specification are as follows.

Firstly, I include 19 years of data for 43 states, thus it is necessary to assess panel unit-root for all the dependent variables. Levin, Lin, and Chu (2002) and Baltagi (2008) point out that, if the dependent variable is panel non-stationary, regression analysis based on pooling cross-section time series data will generate spurious estimation. I perform both the Augmented Dicky-Fuller Test and the Phillips-Perron Test for all the dependent variables (Maddala and Wu 1999). Test results show that the series for childhood obesity prevalence rates, the female index of physical inactiveness, and the male index of risky weight control activity are panel stationary. Panel unit-root is discovered for the index of female

risky weight control activity and the male index of physical inactiveness.[57] A one-period lag of the dependent variable is included in each empirical model because of the detection of panel unit-root. Inclusion of lagged dependent variables, moreover, also allow an assessment on long-run effects of health policies and social capital on childhood obesity outcomes.[58]

Secondly, a combination of fixed-effects by spatial units and a lagged dependent variable can be problematic, especially when more data variations are generated by the spatial dimension than the temporal dimension. If data vary much less along the temporal dimension than along the spatial dimension, spatial unit-dummies will absorb cross-sectional variations and lead to results that favor null findings (Plumper, Troeger and Manow 2005). After estimate a base model (OLS) for the panel data, I find that the between-unit R^2 (cross-sectional

[57]Test statistics based on the Augmented Dicky-Fuller Test are as follows: (1) for the female obesity prevalence rate, $\chi^2(86) = 122.109$ ($p = 0.006$); (2) for the male obesity prevalence rate, $\chi^2(86)=121.639$ ($p=0.069$); (3) for the female index of physical inactiveness, $\chi^2(86) = 590.177$ ($p = 0.000$); (4) for the male index of physical inactiveness, $\chi^2(86) = 123.651$ ($p = 0.000$); (5) for the female index of risky weight control activity, $\chi^2(86) = 90.390$ ($p = 0.352$); and (6) for the male index of risky weight control activity, $\chi^2(86) = 114.6035$ ($p = 0.021$). Test statistics for the Phillips-Perron Test with lag=1 are as follows: (1) for the female prevalence rate, $\chi^2(86)=127.771$ ($p=0.002$); (2) for the male prevalence rate, $\chi^2(86)=179.539$ ($p=0.000$); (3) for the female index for physical inactiveness, $\chi^2(86)=195.830$ ($p=0.000$); (4) for the male index of physical inactiveness, $\chi^2(86)=63.786$ ($p=0.965$); (5) for the female index for risky weight control activity, $\chi^2(86)= 66.579$ ($p=0.000$); and (6) for the male index for risky weight control activity, $\chi^2(86)=126.710$ ($p=0.000$). Both tests assume that all series are non-stationary under the null hypothesis against the alternative that at least one series in the panel is stationary. Hence, insignificant Chi-square statistics indicate the presence of unit-root.

[58]In addition to including the lagged dependent variables, I also take a one-year lag for the obesity policy index in all empirical models, because the goal is to assess how policy changes at time t influences health outcomes at a future time. The two variables measuring public healthcare resources (public health spending and public health employment) are also lagged by one-year, because budgetary decisions on government spending and hiring are made based on fiscal year cycles. Also, I take a first-order difference for the variable of the unemployment rate, because this variable is tested to be panel non-stationary.

variance) is much larger than the with-in unit (time-series variance) R^2. Hence, random-effects estimation is favored than including state fixed-effects dummies.[59]

Thirdly, three potential threats to inefficient estimation need to be considered: (1) autocorrelation along the time and cross-sectional dimensions, and (2) non-constant variance caused by heterogeneity across states; and (3) non-constant variance caused by extreme-value observations. Post-OLS diagnostic analyses detect all three problems.[60] To deal with the first two problems, I implement the SUR estimation for panel data using the STATA Module XTSUR (Nguyen and Nguyen 2010), which fits a many-equation seemingly-unrelated regression (SUR) model. The estimation procedure is based on constructing a multi-step algorithm combining Generalized Least Squares (GLS) and the Maximum Likelihood (ML) procedures, developed by Erik Biorn (2004). In general, this is a two-step method using simultaneous equations. The overall GLS estimator is obtained, and then the second step is to minimize the usual sandwich form with respect to unstable parameter estimates caused by autocorrelation and heteroskedasticity (Brion 2004).

As for the outlier cases, I perform residual analysis based on the Cook's distance. Using the 90th percentile of the Cook's distance as the threshold. Alabama, Arizona, Georgia, Louisiana, Mississippi, New Mexico, South Carolina, Texas, and Tennessee are deemed as outlier state cases. Not surprisingly, most of

[59] I perform this diagnostic analysis by estimating an OLS model for the panel data, taking the overall obesity prevalence rate as the dependent variable. With a random-effects model specification, the between-unit R^2 is 0.751 and the within-unit R^2 is 0.298.

[60] Using the overall obesity prevalence rate as the dependent variable and OLS specification as the base model, I tested for heteroskedasticity, serial autocorrelation, and evaluated model residuals for the influence of outlier states. Breusch-Pagan test is used for testing heteroskedasticity, the test statistics are $\chi^2(1)$ = 11.83 (p = 0.006), hence the Null Hypothesis of constant variance is rejected. Arellano and Bond (1991) test is used for serial auto-correlation. The test statistics are Z = 20.57 (p = 0.000), hence the Null Hypothesis of no-serial autocorrelation is rejected.

these states are southern states with extremely high childhood obesity prevalence rates. In all the reported models, I include dummy variables to control for these states.[61]

Last, both Hypothesis 2 and Hypothesis 3 inform an interactive relationship between the obesity policy index and the social capital index. To empirically assess whether social capital actually mediate the effect of policy interventions, I estimate all models with and without including an interaction term.

3.7 Empirical Findings

Table 7 presents empirical results for the models that use male and female childhood obesity prevalence rates as the dependent variables (with and without an interaction term).[62] As for specific explanatory variables, after controlling for the obesity prevalence rates in the previous year, the three socioeconomic indicators are significant predictors for both male and female obesity prevalence rates. Both poverty and average education attainment are positively associated with the male and female childhood obesity prevalence rates. The unemployment rate is positively associated with the female prevalence rates and negatively associated with the male prevalence rates.

[61]Table 17 in the Appendix reports the model for childhood prevalence rates estimated without controlling for these outlier cases. The robustness analysis shows that the aforementioned states exhibit influences on coefficients stability. Hence, empirical findings discussed in the subsequent section are all based on models controlling for these state dummy variables.

[62]The CDC conducts YRBSS biannually. I use mean interpolation to convert biannual survey data into annual data. State participation rates were not ideal in some years before 2000. In 1991, only 26 states participated in the YRBSS. 38 states participated in the 1997 survey, and 37 states participated in the 1999 survey. Trend extrapolation by state is used for filling missing values before 1999. To assess data reliability of mean-interpolation and trend extrapolation, I estimate the model only based on data from 1999 to 2009. The robustness analysis is reported in Table 18 in the Appendix. The coefficients of the policy index and social capital index are larger in both the female and male equations. Their signs, however, remain unchanged. Because I do not find substantively different results, I report models based on the full sample.

Poverty is one of the major determinants to childhood obesity prevalence rates, and have a greater effect on girls (coefficient = 0.175 in the full model) than on boys (coefficient = 0.120 in the full model). The different statistical associations between unemployment and obesity prevalence suggest that deprivation in economic resources may add more burdens on females than on males. The findings on education are opposite to what is expected, which is caused by multi-collinearity between education and access to health insurance.[63] Empirical results show that access to health insurance is negatively associated with both male and female obesity prevalence rates, but the coefficient sizes are relatively small. Meaning that providing health insurance to children may only slightly reduce childhood obesity. This is possible because health insurance is only a ticket to getting healthcare services. It may increase utilization of healthcare services, but may not always lead to significant improvement in health.

[63] After estimating the OLS base model, I checked the Variance Inflation Factor (VIF) statistics. Although the VIF statistics after-centering for education and %uninsured children are small, the un-centered VIF for these two variables are greater than 20. Dropping education or the %uninsured children from the model, the coefficient sign of the other variable is flipped. I did not exclude these two variable from the model for two reasons. First, both of them are socioeconomic indicators that are widely used in the empirical literature on childhood obesity. Second, multicollinearity does not reduce the overall predictive power or reliability of the model as a whole. Given that the coefficients of these two variables are statistically significant, I choose to include them in the empirical models.

Table 7: Obesity Policy, Social Capital, and Childhood Obesity Prevalence Rates for Female and Male Adolescents

Variable	**Coeff.**	**(Std. Err.)**	**Coeff.**	**(Std. Err.)**
1.Female Prevalence Rate				
Obesity Policy$_{t-1}$	0.362**	(0.073)	0.362**	(0.073)
Social Capital	-0.104*	(0.045)	-0.116**	(0.044)
Policy$_{t-1}\times$ Social Capital	0.097	(0.068)	–	–
Public Health Spending$_{t-1}$	-0.200	(0.123)	-0.209†	(0.124)
Public Health Exployee$_{t-1}$	0.003†	(0.002)	0.003†	(0.002)
% Uninsured Children	-0.051**	(0.009)	-0.052**	(0.009)
Education	0.032**	(0.004)	0.033**	(0.004)
Poverty	0.175**	(0.015)	0.177**	(0.015)
Δ Unemployment	0.064†	(0.035)	0.071*	(0.034)
Overweight Infant	-0.003†	(0.002)	-0.004†	(0.002)
Obesity Prevalence$_{t-1}$	0.807**	(0.014)	0.807**	(0.014)
2. Male Prevalence Rate				
Obesity Policy$_{t-1}$	0.288*	(0.138)	0.310*	(0.137)
Social Capital	-0.091	(0.077)	-0.086	(0.075)
Policy$_{t-1}\times$ Social Capital	-0.054	(0.120)	–	–
Public Health Spending$_{t-1}$	-0.299	(0.248)	-0.290	(0.246)
Public Health Employee$_{t-1}$	0.012**	(0.004)	0.012**	(0.004)
% Uninsured Children	-0.042*	(0.018)	-0.041*	(0.018)
Eudcation	0.030*	(0.013)	0.030*	(0.013)
Poverty	0.120**	(0.030)	0.119**	(0.030)
Δ Unemployment	-0.162**	(0.057)	-0.164**	(0.057)
Overweight Infant	0.002	(0.004)	0.002	(0.004)
Obesity Prevalence$_{t-1}$	0.646**	(0.029)	0.648**	(0.029)
N	807		807	

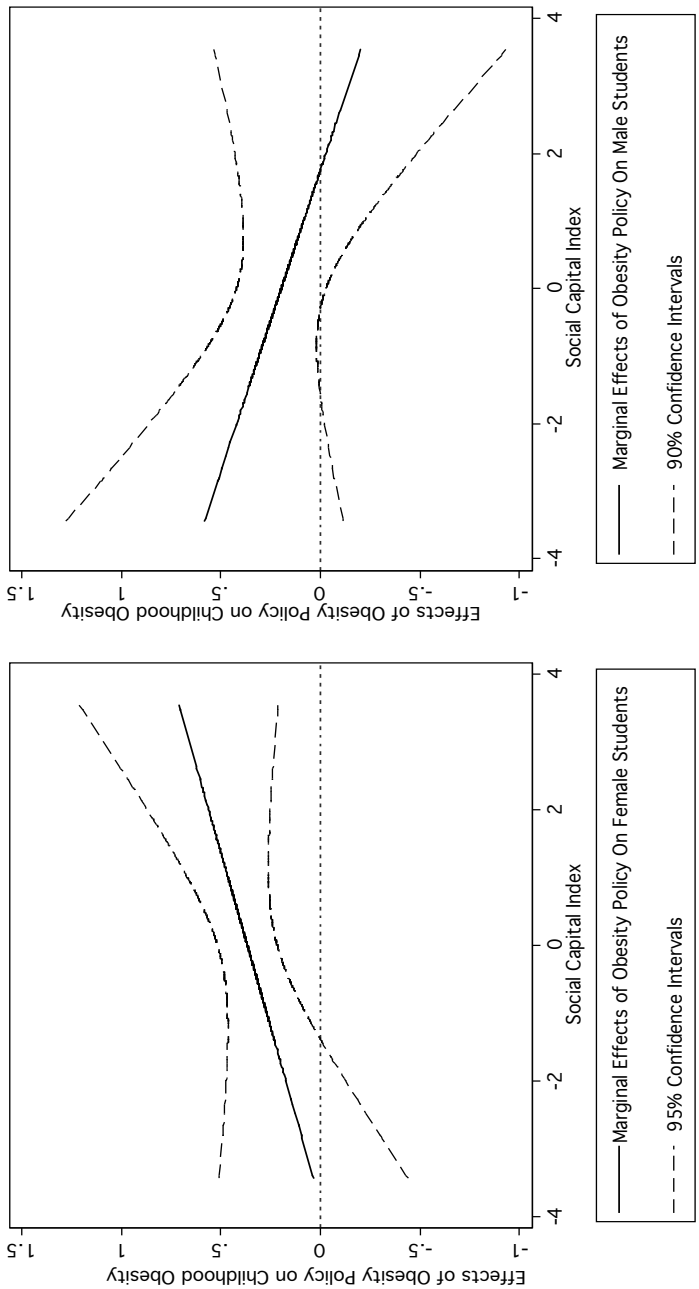
Notes:

1. Significance levels : $\dagger$: 10% $*$: 5% $**$: 1%, two-tailed t- test.
2. The dependent variables are childhood obesity prevalence rates by genders.

Turning to the findings on the key explanatory variables – social capital and obesity policy, Table 7 offers support for Hypothesis 1 that social capital may have a direct impact on childhood obesity prevalence rates. Comparing model results based on the linear equation and based on the equation with an interaction term, the coefficients of both the policy index and the social capital index do not change much from one equation to another equation. Based on the linear equation, the social capital index is negatively associated with the female obesity prevalence rate, and does not have statistically significant impact on the male prevalence rate. A one unit increase in the social capital index may lead to a decrease in the female prevalence rate by 0.116%. This coefficient, however, only reflects the short-run effect of social capital. Taking account into the long-run effects, captured in the coefficients of the lag-dependent variable (0.807), social capital has a greater long-run effect on females than on males. The long-run effect of social capital on the female obesity prevalence rate is approximately -0.601. The long-run effect is more substantively meaningful.

Figure 12 plots the marginal effects of obesity policy on male and female prevalence rates based on the values of the social capital index. As Figure 12 shows, obesity policy has different influences on boys and girls. Increased policy efforts on childhood obesity has been ineffective for reducing the male prevalence rate.

Figure 12: Obesity Policy, Social Capital, and Childhood Obesity Prevalence Rates: Gender Differences



Policy interventions, combined with more active communities, lead to increases in the female obesity prevalence rate.[64] Comparing the coefficients size when social capital is high versus when social capital is low, Figure 12 confirms findings in Table 7 that policy and social capital affect the childhood obesity prevalence rate in a direct way.

Table 8 reports how the obesity policy index and the social capital index affect children's physical inactiveness.[65]As Table 8 shows, both objective and subjective health risks affect children's physical inactiveness. The objective risk (i.e. being overweight in the infancy) is positively related to physical inactiveness in childhood. Both boys and girls tend to take more physical activities when they perceive themselves to be overweight. Table 8 also shows that deprivation in economic resources (poverty and unemployment) is negatively related to boys' physical activities. Obesity policy and social capital, moreover, interactively affect boys and girls' physical activity. In the female equation, the coefficient of obesity policy is positive and the coefficient of social capital is negative.

[64]The coefficients of the obesity policy index are positive, which are opposite to the theoretical expectation. One suspicion might be that obesity policy is an endogenous variable to childhood obesity prevalence rates. This is less likely a case with the estimation based on the XTSUR module. The one-way random-effects estimation, obtained by SUR in the XTSUR module, considers each explanatory variable as an endogenous variable in its first-step of estimation, then a multi-step estimation procedure is implemented to minimize the estimation bias by converging the ML estimator with the GLS estimator. I also checked a dynamic linear specification for each equation by treating obesity policy as an endogenous variable (including both the one-year lag and the first-order differenced measure of obesity policy as explanatory variables), both the one-year lag and first-order differenced policy measures are positively associated with childhood obesity prevalence rates. Hence, the positive coefficients of obesity policy indicate that adopted policies, so far, are ineffective in altering the increasing trends of childhood obesity.

[65]The coefficients of all the state dummy variables are not reported in Table 7 – Table 9. As for the model of male and female indexes of physical inactiveness, I also include a dummy variable to control for years after 2000. As for the model of male and female indexes of risky weight control activities, I include a dummy variable to control for years after 2003. These two year-dummy variables are included because the observed behavioral shifts based on gender comparisons (See in Figure 10).

Table 8: Obesity Policy, Social Capital, and the Indexes of Physical Inactiveness for Female and Male Adolescents

Variable	**Coeff.**	**(Std. Err.)**	**Coeff.**	**(Std. Err.)**
1.Female Index				
Obesity Policy$_{t-1}$	0.145**	(0.024)	0.150**	(0.023)
Social Capital	-0.044**	(0.013)	-0.044**	(0.013)
Policy$_{t-1}\times$ Social Capital	-0.035†	(0.021)	–	–
Public Health Spending$_{t-1}$	0.055†	(0.033)	0.068*	(0.032)
Public Health Employee$_{t-1}$	-0.002**	(0.001)	-0.002**	(0.001)
%Uninsured Children	0.006†	(0.003)	0.007*	(0.003)
Education	-0.037**	(0.003)	-0.039**	(0.003)
Poverty	0.007	(0.005)	0.002	(0.005)
Δ Unemployment	-0.006	(0.010)	-0.005	(0.010)
Overweight Infant	0.003**	(0.001)	0.003**	(0.001)
Risk Perception	-0.120**	(0.004)	-0.118**	(0.004)
Physical Inactiveness$_{t-1}$	0.414**	(0.015)	0.397**	(0.015)
2.Male Index				
Obesity Policy$_{t-1}$	-0.112**	(0.022)	-0.076**	(0.021)
Social Capital	-0.058**	(0.013)	-0.028*	(0.012)
Obesity Policy$_{t-1}\times$ Social Capital	-0.066**	(0.020)	–	–
Public Health Spending$_{t-1}$	-0.009	(0.031)	-0.050†	(0.030)
Public Health Employment$_{t-1}$	-0.002**	(0.001)	-0.001†	(0.001)
%Uninsured Children	0.005	(0.003)	0.0003	(0.003)
Education	-0.040**	(0.002)	-0.043**	(0.002)
Poverty	-0.014**	(0.005)	-0.016**	(0.005)
Δ Unemployment	-0.027**	(0.010)	-0.015	(0.009)
Overweight Infant	0.019**	(0.001)	0.021**	(0.001)
Risk Perception	-0.194**	(0.006)	-0.182**	(0.006)
Physical Inactiveness$_{t-1}$	0.332**	(0.016)	0.285**	(0.016)
N	807		807	

Notes:

1. Significance levels : $\dagger$: 10% $*$: 5% $**$: 1%, two-tailed t- test.
2. The dependent variables are the indexes of physical inactiveness by genders.

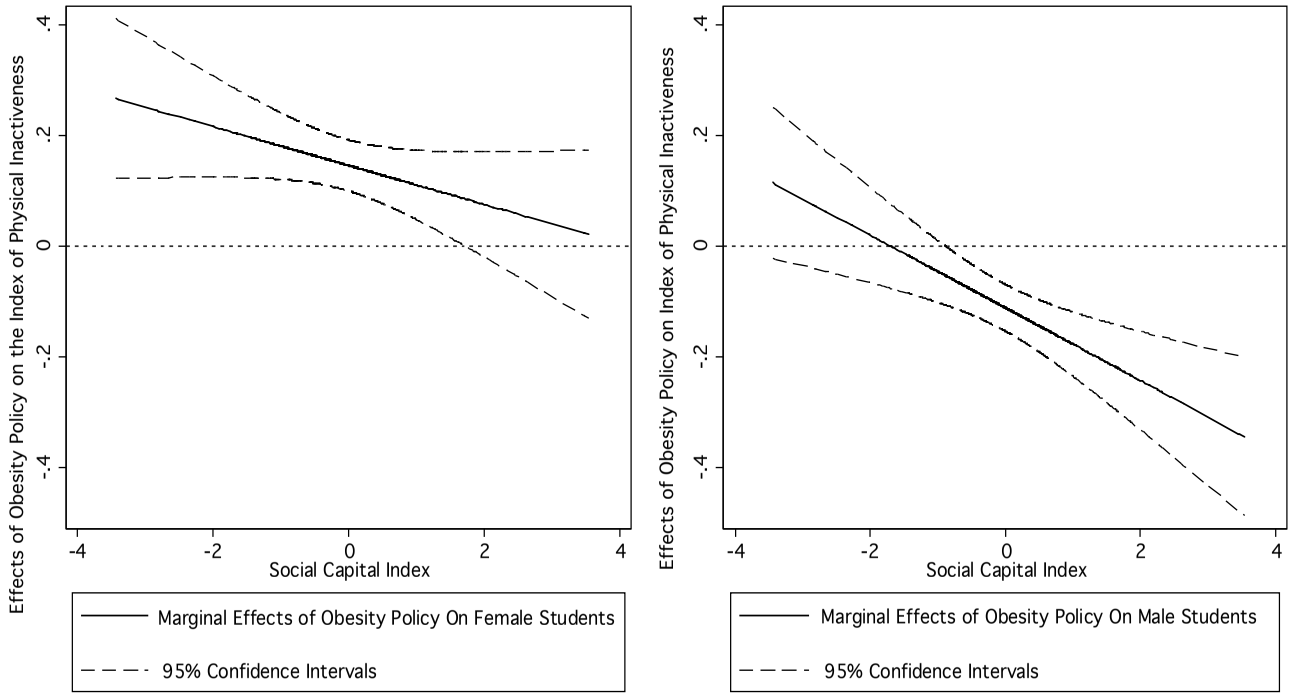
This means that when the social capital equals to 0, obesity policy increases female students' physical inactiveness. Social capital, however may mediate the positive effect of obesity policy on female students. In the male equation, the coefficients of obesity policy, social capital, and the interaction term are all negative. This means that obesity policy decreases male students' physical inactiveness and social capital reinforces the policy effects on male students.

Figure 13 further illustrates how obesity policy and social capital interactively affect children's physical activities. Firstly, the interactive effects of obesity policy and social capital are different across gender groups. Obesity policy has positive marginal effects on girls, but negative marginal effects on boys.

Because these policy interventions are designed to promote students' physical activities, the policy effects on girls are opposite to the policy goal. Social capital, furthermore, conditions the effect of policy interventions on children's physical activities. As Figure 13 shows, the obesity policy produces greater unintentional policy effects in states with less social capital, than in states with more social capital. In states, where the social capital index scores are larger than 1 (approximately), the marginal effects of the obesity policy on the female index of physical inactiveness are not differentiable from 0.[66] Substantively, this means that, social capital mediate the unintentional consequences of policy interventions for female students. In states with more social capital, policy interventions do not produce negative outcomes to female students, while in states with less social capital, policy interventions are associated with more female students who did not exercise or eat less to manage their weight.

[66]There are 106 state-year observations in the sample take social capital scores that are larger than 1.

Figure 13: Obesity Policy, Social Capital, and the Index of Physical Inactiveness: Gender Differences



The picture on how obesity policy and social capital interactively affect male students' physical activities is totally different. As Figure 13 shows, policy interventions do not have significant effects on male students in states with low social capital. As the social capital index increases, the marginal effects of policy interventions become negative and significant. Obesity policy interventions work more effectively for male students and could induce healthy behavioral change when they are implemented in more mobilized states.

Table 9 and Figure 14 present how obesity policy and social capital interactively affect children's risky weight control activities. Table 9 shows that more female students are taking risky activities for weight management in years prior to 2004 than in years from 2004 to 2009.

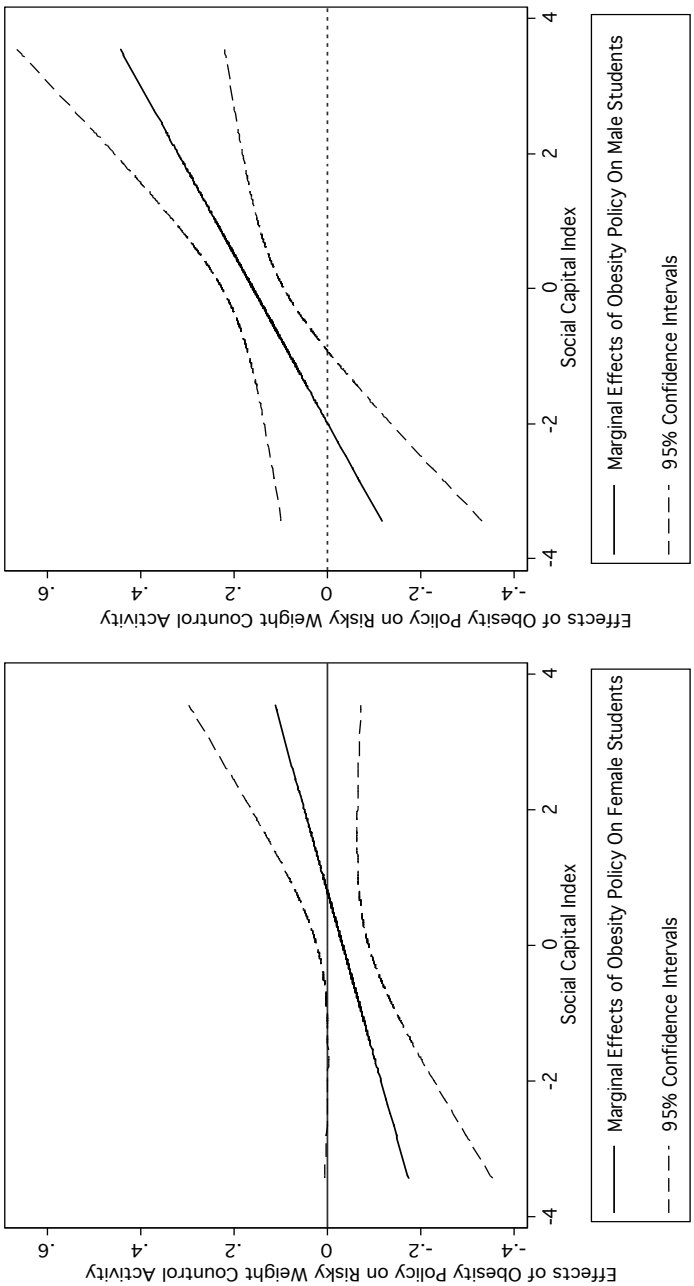
On the contrary, more male students are taking risky activities for weight management in years after 2004 than in years before 2004. Obesity policy interventions, combined with social capital, exhibit different influences on female and male students. As Figure 14 shows, policy interventions do not have significant effects on girls' risky weight control activities. Male students, however, do respond to policy interventions. The marginal effects of obesity policy interventions on male students, however, are positive. Substantively, it means that more policy interventions, combined with more social capital, are associated with a greater proportion of male students, who took risky activities to manage their weight.

Table 9: Obesity Policy, Social Capital, and the Indexes of Risky Weight Control Activities for Female and Male Adolescents

Variable	**Coeff.**	**(Std. Err.)**	**Coeff.**	**(Std. Err.)**
1. Female Index				
Obesity Policy$_{t-1}$	-0.032	(0.033)	-0.064	(0.043)
Social Capital	-0.149**	(0.021)	-0.071*	(0.028)
Policy$_{t-1}\times$ Social Capital	0.041	(0.032)	–	–
Public Health Spending$_{t-1}$	0.106†	(0.060)	0.110†	(0.063)
Public Health Employee$_{t-1}$	-0.001	(0.001)	-0.002*	(0.001)
%Uninsured Children	0.004	(0.005)	-0.002	(0.006)
Education	-0.029**	(0.003)	-0.031**	(0.006)
Poverty	0.020*	(0.008)	0.006	(0.010)
Δ Unemployment	-0.042**	(0.015)	-0.060**	(0.021)
Overweight Infant	0.002	(0.001)	0.0004	(0.002)
Risk Perception	0.046**	(0.006)	0.044**	(0.009)
Risky Activity$_{t-1}$	0.574**	(0.019)	0.595**	(0.026)
2. Male Index				
Obesity Policy$_{t-1}$	0.170**	(0.040)	0.065	(0.053)
Social Capital	-0.120**	(0.024)	-0.071*	(0.035)
Obesity Policy$_{t-1}\times$ Social Capital	0.071*	(0.036)	–	–
Public Health Spending$_{t-1}$	0.185**	(0.071)	0.215**	(0.082)
Public Health Employment$_{t-1}$	-0.001	(0.001)	-0.002†	(0.001)
%Uninsured Children	-0.005	(0.005)	-0.008	(0.007)
Education	-0.040**	(0.003)	-0.019**	(0.007)
Poverty	-0.014**	(0.009)	0.004	(0.012)
Δ Unemployment	0.020	(0.018)	-0.013	(0.026)
Overweight Infant	0.002*	(0.001)	0.002	(0.002)
Risk Perception	-0.001	(0.009)	-0.021	(0.014)
Risky Activity$_{t-1}$	0.686**	(0.020)	0.716**	(0.028)
N	807		807	

Significance levels : $\dagger$: 10% $*$: 5% $**$: 1%, two-tailed t- test.

Figure 14: Obesity Policy, Social Capital, and the Index of Risky Weight Control Activity: Gender Differences



Findings on how policy interventions and social capital interactively affect children's weight control practice help to explain why increasing obesity policy interventions are in general ineffective. The empirical results show that increasing obesity policy interventions combined with social capital are positively associated with the female childhood obesity prevalence rate and the proportion of female students who are physically inactive. One possible micro-level explanation to girls' behavioral pattern might be that adopted policies do not change female students' misperceptions on their weight status, and therefore, could not decrease their risky weight control activities. If a large proportion of female students continue to be anxious about their BMI scores and take incorrect weight management practice (e.g. using diet pills or laxative pills to control weight), then it is less likely for them to exercise more. If policy interventions fail to induce healthy and active life styles for female students, it is also likely to be a failure in reducing the obesity prevalence rate.

As for male students, policy interventions combined with social capital do produce positive policy outcomes in promoting physical activities. Males students, meanwhile, also have changed their weight management practice by taking more risky weight control activities. The mixed pattern of male weight control activities may be a reason why obesity policies cannot decrease the male childhood obesity prevalence rate.

Why has the proportion of male students, who take extreme weight control activities, increased along policy interventions and their physical activities? One possible explanation may be that, there could be a negative policy feedback that an ineffective policy intervention may increase children's awareness on their weight status, but fail to reduce their BMI scores. As a result, anxiety about being

overweight may lead to aggressive and extreme weight control activities. In their study on health behavior and pediatric psychology, Boutelle et al. (2002) find that "in comparison to non-overweight youths, overweight adolescents were less likely to eat breakfast and less likely to engage in vigorous physical activity than non-overweight youths (531)." They also point out that "higher prevalences of unhealthy weight control behaviors were evident among overweight youths (531)" and partly driven by low self-esteem and dissatisfaction with their bodies.

Another possible explanation may be that children's eating behavior may be affected by their peers. Increased unhealthy weight control activities among boys may be a spillover effect from their female peers. It a policy fails to correct female dietary behaviors, over time, it may generate some negative impact on males as well. Meyer and Gast (2008) survey boys and girls (12-16 years old) and find a strong positive correlation between peer influence and disordered eating. The policy implication of this behavior shift is that policy success for one gender group is not sufficient to induce healthy weight control activities and reduce childhood obesity from a long run. Hence, health interventions designed for large scales need to consider different gender dynamics and different group responses.

In sum, the empirical results find mixed patterns in terms of how public health interventions, combined with social capital, produce different health outcomes for gender groups. Empirical findings provide some support to Hypothesis 1 that social capital may exhibit direct impact on children's health outcomes. Social capital is negatively associated with both male and female childhood obesity prevalence rates, suggesting that in childhood obesity is less serious in states with high social capital than in states with low social capital. Hypothesis 2 is supported by models for children's weight management activities, but not by the model for

childhood obesity prevalence rates. In terms of how policies may affect children's health behaviors, social capital may mediate the effectiveness of adopted policies. Empirical findings do not have conclusive support for Hypothesis 3. Although I find that policy interventions combined with social capital generate different health returns to boys and girls, but they do not always benefit girls more than boys. Using the child obesity prevalence rate as an indicator of health, social capital has more long-run effects on females than on males in a direct manner. Using children's weight control activities to measure health outcomes, social capital and policy interventions could not induce healthy behavioral changes among females, but increase both healthy and unhealthy weight control activities among male students. Though these mixed findings confirm the theoretical conjecture that social capital may be linked to gender differences in health, they do not provide conclusive evidence for verifying both the power-resource argument and the deficit-in-return argument.

3.8 Conclusion

In this research, I use a timely policy issue – childhood obesity– to illustrate how social capital may be a source rather than a cure to group differences in health. Active communities and civic participation may not generate social benefits for all groups in a uniform manner. If social capital is associated with different policy benefits for different social groups, increasing social capital alone, may not be a cure for health inequality. In the case of childhood obesity, social capital in states are associated with different health outcomes for two gender groups. This partly explains why many of the current policy interventions are ineffective in reducing and preventing childhood obesity. Most state-level legislative initiatives and

school-based policies are proposed and implemented without fully considering the gendered nature of this policy issue. If the same set of community conditions may benefit gender groups differently, policy interventions implemented in these communities are likely to be ineffective in increasing the overall policy benefits. Intervention programs that are neutrally-designed (i.e. do not differentiate female and male risk perceptions and behavioral patterns), moreover, are likely to be ineffective, because it may incorporate wrong intervention goals for boys and girls. More effective policy designs should consider the gendered behavioral patterns and incorporate different intervention goals for boys and girls.

Findings in this research also suggest that effective policymaking for reducing health inequality may be challenging. Policy interventions are unlikely to reduce group differences in health without considering the heterogeneous policy responses from different social groups. Effective policymaking for reducing health inequality needs to balance the design of policy interventions and the community conditions, under which the policies are implemented. It is also important to be aware that active government combined with mobilized communities, may not always be a blessing for public health interventions. In the case of childhood obesity, increased government interventions in mobilized communities are associated with more female anxiety on their weight status, and in turn lead to extreme weight control practices rather than healthier life patterns. Although policy interventions induce healthy weight control activities among male students, they also produce negative spillover effects – an increase in the proportion of male students who take risky weight control activities.

Though my empirical focus is the case of childhood obesity, findings in this research may be generalized to different policy cases, whereby group differences

in outcome measures are systematic, such as gender differences in the HIV/AIDS prevalence rates, behavioral risks related to reproductive health, etc. Gender, furthermore, may not be the only group identity that can be theoretically informative to examining group differences in health. The proposed theoretical framework may also be applicable to other social identities, such as race/ethnicity and class.

Findings in this research, however, do not provide a conclusive support to the theoretically conjecture that social capital, combined with more policy interventions, will benefit the group with more access to social capital than the group with less access to social capital. In the case of childhood obesity, I find mixed findings in terms of how policy interventions and social capital affect males and females differently. Although females pay more attention to public health issues and associate themselves more with civic organizations related to public health, female students do not benefit more than male students from the current policy efforts in obesity prevention. Though in the long-run, females are better off than males in mobilized communities, social capital has more positive effects on males' weight control activities. The mixed findings suggest that, there may be some unobserved inter-group dynamics, whereby female and male students could affect each other's risk perceptions and health behaviors. Empirical analysis using state-level aggregated data is less informative to studying the inter-group dynamics. This is also a major limitation of macro-level ecological models that link community-level measures (i.e. policy interventions and social capital) to aggregated measures of health outcomes (overall health outcomes or group-based health outcomes). Future studies that use multilevel ecological models and incorporate individual-level health outcome measures could render more helpful

inferences on how policy interventions and community conditions interactively affect group difference in health.

Last, but not least, this research provides some empirical evidence to the theoretical conjecture that social capital may not be a bless to all community members in an equal manner. Although empirical findings are not conclusive, they demonstrate that it is important to advance the theory of social capital by conceptualizing it as a group asset rather than a public good. In this research, social capital is empirically measured based on state-level indicators of public participation, civic voluntarism, and network associability. The aggregated measure of social capital is likely to mask the unequal access to social capital by different social groups. Future studies that using group-specific measures for social capital may produce more consistent empirical findings that link social capital to health inequality.

4. RESPONSIBILITY FOR EQUITY: CAN THE PUBLIC SECTOR REDUCE INEQUALITY IN HEALTHCARE ACCESS?

4.1 Overview

In this essay, I explore the link between the institutional characteristics of state healthcare systems and inequality in healthcare access. I compare four institutional arrangements of the state healthcare systems: ownership of the policy implementation system, the source of financial resources, the size of public healthcare workforce, and state medicaid eligibility rules. I then discuss how these institutional characteristics may affect inequality in healthcare access. The analysis of the link between the state healthcare system and inequality in healthcare access draws on a few literatures in the field of public administration and political science, including the framework of dimensional publicness, social policy and risk privatization, as well as bureaucratic capacity.

I then empirically assess how the institutional characteristics of a state healthcare system affects its ability of reducing inequality in healthcare access. Pooling data for 50 states from 1990 to 2006, I find that the four institutional factors exhibit different impact on inequality in healthcare access. Public financial resources may reduce inequality in healthcare access depending on different spending venues. Increasing the total level of public health spending has a substantial impact on the size of the uninsured population. State responsibilities in financing Medicaid and Medicare programs also matter for reducing inequality in healthcare access. State eligibility rules exhibit moderate impact on the uninsured rates. Public ownership

and the public healthcare workforce, however, do not have statistically significant associations with the uninsured population.

4.2 Introduction

Comparisons between public and private organizations have received increasing attention in the field of public administration (Anderson and Jorgensen 1997; Bozeman and Bretschneider 1994; Frederickson 1996; Perry and Rainey 1988; Moulton 2009). While many students in public administration and public management continue to debate to what extent public and private organizations differ (Kurland and Egan 1999; Rainey 2003), a few scholars have proposed moving the theoretical discussion in a different direction: assessing and comparing the relative effectiveness, in terms of outputs and outcomes, of public and private organizations (Meier and O' Toole 2011). I commend this emphasis on public outcomes and contend that there is more to the publicness puzzle than evaluating the blurring lines between organizations. The puzzle is not simply about how we can categorize different organizations and policy systems. Instead, it is about determining to what extent our knowledge of organizations and policy systems can "lend insights to understanding and managing public outcomes (Moulton 2009, 889)."

What are desirable public outcomes? As Frederickson (1990) summarizes, both in the theory and the practice of public administration, scholars and practitioners have long emphasized management science, rationality, policy efficiency, and making economical decisions. A few decades ago, social equity "began as a challenge to the adequacy of concepts of efficiency and economy as guides for public administration (Frederickson 1990, 228)." Frederickson (1990, 228-229)

further contends that social equity, defined as "equality in government services, responsibility for decisions and program implementation for public managers, and responsiveness to the needs of citizens," is an important pillar for public organizations. The argument behind this third pillar of equity is the basis for a just and democratic society (Frederickson 2005). The american political system, however, is characterized with contradictions between democracy and social inequality. Scholars have depicted the U.S. as a separate and unequal democracy (Bartels 2008; Patel and Rushefsky 2008).

The issue area of healthcare particularly shows the devastating paradox between liberal democracy and inequality– the prevalence of health disparities are strongly linked to racial divide, gender differences, and people's income. Beside inequalities in health status and preventable health risks, "one of the major problems confronting the American healthcare system is the large number of uninsured people (Patel and Rushefsky 2008, 15)." Inequality in access to healthcare is deemed as one major cause of disparities in health outcomes (LaVeist 2005). Studies show that the lack of health insurance coverage may delay or prevent utilization of healthcare services (Smedley et al. 2003). What factors may help to reduce the social inequality in healthcare access and produce more equitable public outcomes in healthcare? Do different institutional arrangements in the healthcare system matter for reducing inequality in healthcare access?

In this research, I exam the link between the institutional characteristics of state healthcare systems and organizational effectiveness by focusing on social equity as an organizational outcome. I outline a framework for assessing how a state healthcare system is organized and how its institutional arrangements may affect its ability of reducing inequality in healthcare access. I then proceed

with an empirical analysis of main determinants of the uninsured rates in the United States. I seek to identify what institutional arrangements may help states to better incorporate the uninsured population. The empirical analysis draws on comparing the healthcare systems across fifty states from 1990 to 2006. Empirical findings demonstrate that after controlling for socioeconomic factors and race, public financial resources and generous health insurance eligibility rules have substantive influences on reducing the size of the uninsured population.

4.3 What Institutional Arrangements May Reduce Inequality? The Publicness Puzzle and Beyond

Linking Dimensional Publicness to Equity Outcomes

The traditional approach to theorizing about organizational publicness relies on assessing how organizational activities are controlled, i.e. government authority and market rules for public and private organizations, respectively (Bozeman and Bretschneider 1994).[67] Bozeman (1984, 1987) proposed a dimensional approach to publicness as an alternative to the core approach. According to his conceptualization, all organizations are to some extent public. The publicness of an organization is independent from its legal status (Bozeman 1984).

Bozeman identifies three main dimensions of organizational publicness: goal and agenda publicness, resource publicness, and communication publicness (Bozeman and Bretschneider 1994). Using this basic framework, scholars have agreed on three predominant criteria for measuring publicness and examining

[67]Bozeman and Bretschneider (1987) refer to this traditional approach as "the core approach" (200), which focuses on distinctive legal types (government-owned vs. private/market-owned) of organizations.

how levels of publicness affect organizational behaviors (Rainey and Bozeman 2000). The three criteria are: ownership (defined by some public-oriented purposes and goals), financial resources, and the model of social influence.

The dimensional approach to organizational publicness has fostered various empirical studies that compare organizational behaviors in the different publicness dimensions. Although there is consensus in the literature that public organizations have more complex goals, more red-tape rules, and more goal ambiguity (Baldwin 1987; Boyne 2002; Chubb and Moe 1988; Nutt and Backoff 1993; Solomon 1986), very few systematic studies link publicness and organizational outcomes (Anderson and Jorgensen 1997; Emmert and Crow 1988; Kurland and Egan 1999; Rainey and Bozeman 2000; Scott and Falcone 1998). Among the few studies that do explore how organizational publicness affects organizational behaviors and outcomes, the empirical focus is on how managers and organizational members behave in public versus private contexts. The existing empirical literature has not focused on outputs or whether these outputs realize some public values or serve certain public purposes.

A recent development in this literature is that a few scholars try to link publicness to policy outcomes, and they find that equity outcomes are valued more by the public sector than the private sector. For example, Amirkhanyan et al. (2008) compare how the public sector differs from the private sector in their performance of nursing home management. They use both quality and access to care as performance measures and find that public and non-profit nursing homes out-perform their for-profit counterparts in providing care to economically marginalized citizens. Defining equity outcomes based on "the extent to which service departments are distributing services to disadvantaged,

underrepresented, and hard to-reach groups (686)," Andrews and Entwistle (2010) find that public-public partnerships in the U.K. local-service delivery systems are positively related to the outreach of medicaid recipients. The public-private partnerships, however, are negatively associated with equity outcomes.

Though using data from different countries, the common theoretical implication of these empirical studies is that publicness of a service-delivery system is a key institutional factor determining how the system could incorporate marginalized social groups and address the need for citizens who are politically underrepresented. These findings also provide empirical support for considering publicness as an institutional variable for explaining social inequality.

Another theoretical implication of Bozeman's dimensional framework and these empirical studies is that public outcomes are often attached to particular values. While profits or efficiency may be primary concerns of more private organizations or systems, equity may be emphasized when organizations or open systems of networks are more public. We might see the distinctiveness of values in services and products provided by public organizations or service systems that focus on incorporating underrepresented citizens. The public-private division, therefore, is not about legal types of an organization, but about distinctive institutional arrangements, goals for producing public outcomes, and preferences on whose needs should be addressed. In sum, it is a plausible theoretical expectation that a more public-oriented service system may emphasize more on reaching socially disadvantaged groups than a service system that is for-profit and more market-oriented.

Public Responsibility vs. Privatization of Social Risks

The dimensional-publicness framework provides some theoretical support for linking organizational and institutional characteristics to equity outcomes. This framework, however, is not the only way to examine the institutional causes of social inequality. The question on how a public-oriented service system may produce equity outcomes for citizens is ultimately about to what extent the government should be responsible for managing various social risks (e.g. economic risks, health risks, etc.) for citizens and how these risks should be distributed among citizens. Inequality may rise if some citizens systematically bear more social risks than others in a society.

Creating a risk-free society by expanding the scope of government interventions is neither efficient nor realistic (Meier 1988). The institutional arrangements designed for how to counter social risks for the most vulnerable groups, however, may have profound social equity implications. Formal and informal policy institutions, according to Hacker (2004), "delimit the scope of shared risk– the degree to which potent threats to income are spread across citizens of varied circumstances (risk socialization) or left to individuals or families to cope with on their own (risk privatization) (249)." Shifting economic and social risks to individuals and families may affect low-income citizens (such as the working poor or other disadvantaged groups) more than high-income citizens. The problem of social inequality may become extremely serious when both individual sources and governmental protection are absent for socially disadvantaged citizens.

The institutional arrangements on risk-sharing could not only widen social gaps based on people's income, but also generate inequalities in access to

public services based on other social identities, such as race, gender, or people's occupations. For example, in the U.S., women's mean incomes are lower than men's, but on average, women need more healthcare services than men (Green and Pope 1999; Patchias and Waxman 2007). When the responsibilities for care are shifted more to individuals, it may lead to the result that women need to spend more of their out-of-pocket resources for healthcare than men.

Hacker (2004) observes that one major trend of managing social risks in the U.S. is the contemporary celebration of market mechanisms as best means in improving policy efficiency and shifting governmental fiscal burdens. When the privatization of social risks shifts different economic and social costs to individuals and their families, however, it may increase social gaps in access to needed services and care. As such, how to design and deliver public compensations to individuals would have profound implications of social equity. The policy institution that defines the scope of public responsibilities may affect which citizen groups are qualified for getting how much public services. It is conceivable that a more generous policy institution may be associated with less social burdens on the poor and socially disadvantaged groups than a less generous policy institution.

Can a Public System Deliver? The System Capacity of Reducing Inequality

As aforementioned, a service system with public orientations may emphasize more on equity outcomes and take more responsibilities for serving socially disadvantaged citizens than a private-oriented system. An additional factor that may affect how a public-oriented systems addresses inequality concerns is whether the public system can actually deliver public outcomes. Granted that

adopting policy goals for reducing social inequality and taking responsibilities for protecting the vulnerable groups are critical, how these values and preferences are operationalized in the practice of service delivery and policy implementation is equally indispensable. After all, social inequality will not be decreased unless public outcomes are produced for citizens who are in need.

Meier (1988) contends that bureaucratic resources should be considered as an important institutional factor, because they have greater influence on public policy when policy issues are complex and when specialized skills are needed for solving policy problems (140). Frederickson (2010) asserts that bureaucratic decision-making (especially at the street-level), "is complexly moral and contingent rather than rule-bounded and static (82)." Street-level bureaucrats make normative judgements on how policies are applied and how services are delivered. As such, "... in much of social equity, there is democratic rhetoric but aristocratic assumptions. We search still for versions of social equity that are truly bottom up (83)." The key message is that bottom-up forces such as bureaucratic knowledge and resources are likely to affect how a public system may effectively produce desirable public outcomes. Formal institutional arrangements may set distinctive goals for public services, but are not self-executing. A public system combining equity goals and high capacity in service delivery may be more effective in reducing social inequality than a system that only adopts equity goals but has low implementation capacity.

4.4 The State Healthcare System and Inequality in Healthcare Access

Provision of healthcare services is an excellent policy issue area to examine how various institutional arrangements in the healthcare system may affect inequality

in healthcare access. In many developed countries, it becomes challenging to balance efficiency and equity in the delivery of public healthcare and health services (Coulter and Ham 2000; Scott 2001). In the United States particularly, the challenge arises from concerns about both reducing healthcare costs and improving the equality of access. Among other things, the existence of a large uninsured population in the U.S. is a serious public concern linked to inequality in healthcare access.[68]

Inequality in access to healthcare has been well documented in the scholarly literature, most discussions of healthcare inequality have tended to ignore or rarely touched upon the organizational goals and characteristics of the service delivery systems. Discussions about healthcare inequality in the U.S. tend to focus on socioeconomic conditions, such as income inequality (Mellor and Milyo 2001), education (Wilkinson 1996), class, and race (Kawachi et al. 2005; LaVeist 2005). The role that system characteristics play in influencing equal access to healthcare has not received a lot of attention. While the market system and the private sector focus on improving profits, government organizations will be pressed to be more responsive to the public by having healthcare equity as a primary policy goal (Scott 2001). The complexity of healthcare arrangements means that there may be different or competing goals for healthcare provisions, such as market efficiency versus equal access to healthcare. Strategies for improving healthcare may also be different between the public and the private sector.

[68]The U.S. Census Bureau estimates that in 2009, 18.8% of Americans did not have health insurance. A lack of access to healthcare is am extremely serious problem among people who are under the poverty line. For example, in 2009, approximately 10% of children under the age of 18 did not have health insurance. The percentage of uninsured children who are below the poverty level, however, is 31.7%. Data are from the Current Population Survey's Annual Social and Economic Supplement (CPS ASEC), Health Insurance Table HIA4 and HIA8.

In the U.S., although healthcare provisions operate through a regulated-market system, whereby both private and public sector organizations take part in the provision of health insurance and service delivery, state healthcare systems differ substantially along all the aforementioned institutional dimensions. In the U.S., states have great political discretion on deciding how to allocate their resources to meet the needs of their citizens, defining what services to provide, and to whom they provide public outcomes such as equity.

Firstly, governmental involvement in the primary care systems differs across states. In some states, such as Delaware, New Hampshire, Rhode Island, and Vermont, there are no state and local government-owned hospitals. In other states, such as California and Georgia, a large proportion of community hospitals are owned and managed by state and local governments.[69] Secondly, the institutional arrangements for incorporating the uninsured people are very different. According to the Census Bureau's 2009 Current Population Survey, at the national level, about 49% of the health insurance coverages were sponsored by employers and 28% were provided through governmental programs (primarily the Medicare and Medicaid). Thirdly, states' involvement in Medicare and Medicaid varies substantially, from 16% (Utah) to 35% (West Virginia) as percentages of the total healthcare provisions. States have very different criteria for defining their risk-pools for public health insurance. As of 2011, the state income eligibility limits for working adults vary from 17% of the federal poverty level (FPL) to 215% of the FPL. All these different institutional arrangements make state-level analysis

[69] According to the American Hospital Association's (Chicago, IL) 2006 data, there were 146 community hospitals in Georgia and 54 of them were managed by state/local government. In Georgia, there were less for-profit and investor-owned hospitals than government-owned hospitals. In California, 72 hospitals (out of 361)were owned by the government (Morgen and Morgen 2006).

suitable for comparing how the characteristics of the healthcare systems affect the level of inequality in healthcare access.[70]

Institutional Determinants of Inequality in Healthcare Access

Publicness of the State Healthcare System. Although in theory, it is expected that public organizations to be concerned about equity, the ability of a state healthcare system to achieve its goal of reducing inequality also depends on how public the system is. I contend that there is a relationship between the publicness of the healthcare system and equal access to healthcare. Specifically, because public organizations include equity as a goal, the level of publicness of the healthcare system will affect equal access to health care. Starr (1993) points out that, "the politics of a health system that is 90 percent public and 10 percent private is very different from a health system that is 90 percent private and 10 percent public (23)." One difference is that the more public a system is, the higher priority would be placed on providing care and services to all citizens. It is also possible that when the majority of people's healthcare is provided by the private sector, the market system may not lead to political support from the middle and the upper classes for redistributing resources to the poor. Conversely, if more people, such as those in the middle class, are covered by public sector programs, "they are more likely to be more generous and not begrudge the poor for getting equal access to health care (Patel and Rushefsky 2008, 23)." Thus, how well a system addresses the issue of equal access to healthcare largely depends on how much

[70]Although local governments also play a critical role in service delivery and share public responsibilities in financing healthcare coverage and services, the broad institutional arrangements are less likely to be determined at the local-level. State governments, in addition, are primary authorities for licensing healthcare providers (e.g. physicians, physician assistants, nurses, etc.). Hence, state-level analysis is suitable for exploring the link between the characteristics of healthcare systems and public outcomes, which are related to health inequality.

it incorporates the poor and the middle class through public venues. Therefore, I expect public ownership to be negatively related to the inequality of healthcare access.

H1: As the public ownership of a state healthcare system increases, inequality in healthcare access will decrease.

According to Bozeman's framework, the source of financial resources matters in terms of differentiating public and private organizations. The key aspect of public finance in healthcare is how many healthcare services are funded through public venues and distributed to economically or socially disadvantaged groups. Public healthcare provisions not only include access to hospitals and care, but also include social protections through the insurance system (Davidson 1993; LaVeist 2005; Oliver and Paul-Shaheen 1997; Thorpe 1993). Both public involvement in healthcare insurance and direct spending on healthcare programs are important aspects of public finance that may reduce inequality in healthcare access. Hence, I expect that:

H2: A state healthcare system with greater public financing has lower level of healthcare inequality than a state with less public financing.

State Responsibilities in Covering Health Risks. As aforementioned, state healthcare systems vary substantially in their social policy eligibility rules. As for both the Medicare and Medicaid (including Children's Health Insurance Programs), state eligibility rules determine how generous a state healthcare system is to its citizens in need. These institutional arrangements set political definitions on who deserve publicly funded care and services, affect the scope of state responsibilities

in sharing health risks, and have profound impact on the working poor. The U.S. Department of Health and Human Services reports that in 2004, half of the uninsured people worked full time, and more than a quarter of the uninsured people had part-time jobs.[71] They do not have equal access to healthcare either because their employers do not cover their health insurance, or because they do not have private resources for covering the cost. A healthcare system with more generous social policy rules may compensate more low-income citizens with the public health insurance coverage. Thus, I expect:

H3: A state healthcare system with generous social policy eligibility rules has lower level of healthcare inequality than a state with tight eligibility rules.

The Public Healthcare Workforce. Street-level healthcare professionals, who work within a state healthcare system can carry public-oriented values of social equity. In order to reduce inequality in healthcare, policy makers may need expertise and knowledge for the effective and equitable provision of care and services. The capacity of bureaucrats to obtain more accurate information on who have no access to healthcare and whether they are medically needy is essential for making effective policies for reducing healthcare inequality.

Healthcare is an issue area in which bureaucrats and healthcare professionals have great discretionary power in the design and implementation of various public health policies. Healthcare professionals may have considerable discretion power because there are no detailed institutional policies to guide their actions in health services delivery. In her study on federal social security disability programs, Kaiser (2001) finds that street-level bureaucrats have

[71]See ASPE (Office of the Assistant Secretary for Planning and Evaluation, the U.S. HHS) Issue Brief, Understanding Estimates of the Uninsured: Putting the Differences in Context, http://www.aspe.hhs.gov/health/reports/hiestimates.htm.

substantial influences on social program enrollment due to their administrative powers. Weiner et al. (2004, 306) find that front-line professionals in healthcare organizations can act as "gate-keepers" of access to care, "caught between administrative responsibility–which includes collecting revenue– and service to the client/patient–who sometimes cannot pay." They find that when there are less detailed policy guidelines for access eligibility, front-line professionals can make decisions based on their individual values on whether the uninsured patients deserve the same care as people who can afford the service. Thus, it is arguable that provisions of public healthcare programs might be delivered more effectively in a state system with sufficient public healthcare workforce than in a state without enough bureaucratic resources.

H4: In a healthcare system with more bureaucratic resources, there will be less inequality in healthcare access.

4.5 Determinants of Inequality in Healthcare Access: An Empirical Exploration

To test the aforementioned hypotheses about the relationship between the institutional characteristics of state healthcare systems and equal access to healthcare, I employ a pooled cross-sectional design. The dataset includes state-level information about healthcare coverage, demographics, and characteristics of state health care systems for each of the 50 states from 1990 to 2006.[72]

[72]Washington D.C. is not included. There are missing data for some of the explanatory variables. For example, I include education as one of the socioeconomic controls. There are year gaps in 1995, 1997, and 2001 for this variable. I do not detect a particular selection pattern for missing data. Hence, I implement a mean-interpolation procedure to replace the missing values. Specifically, if there is a missing value for variable A at time t in state i, I use the mean between $A_{(t-1)}, i$ and $A_{(t+1)}, i$ to fill in the missing value. I do not interpolate any missing values based on cross-sectional information.

Data and Measures

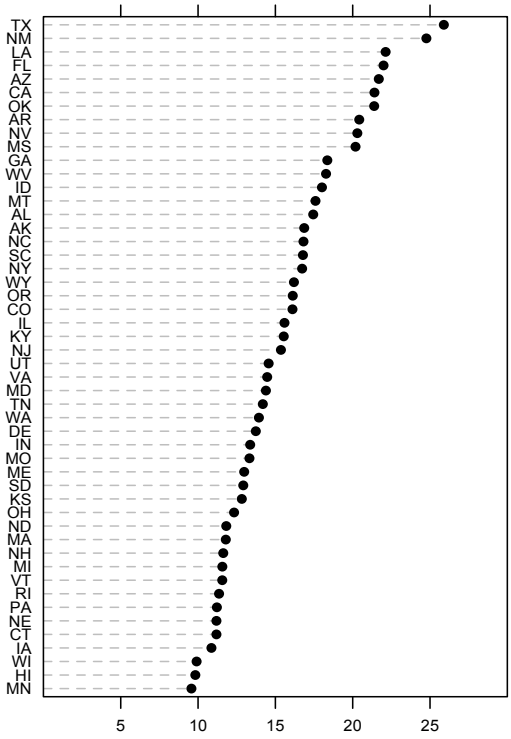
The Dependent Variable: Inequality in Healthcare Access. I measure inequality in healthcare access by gauging insurance coverage, i.e. if the existing healthcare system in a state successfully provides care to all citizens. Specifically, I measure inequality in healthcare access by the percentage of the population who are without health insurance. A state with a large uninsured population reflects a system, in which more citizens are excluded from healthcare access. Thus, such a system remains separated and unequal. Figure 15 presents each state's average percentage of uninsured population from 1990 to 2006.

As Figure 15 shows, there are variations across the fifty states in the average percentages of uninsured population. Based on the 17-year average, Texas, New Mexico, Louisiana, Florida, and Arizona rank highest among the fifty states. Conversely, Wisconsin, Minnesota, and Hawaii have the smallest percentages of uninsured population.[73]

Publicness of a State Healthcare System. Based on the aforementioned theoretical arguments, the publicness of a state's healthcare system matters for reducing inequality in healthcare because in the public sector reducing social inequality is an essential policy goal. I use three empirical measures to assess how public a state healthcare system is.

[73]Figure 15 mainly shows average uninsured rates across states. Based on the sample, the range of the dependent variable is from 6.7 (Hawaii 1992) to 28.3 (New Mexico 1995), with a standard deviation of 4.46.

Figure 15: Average Percentages of the Population without Health Insurance in the Fifty States, Annual Social and Economic (ASEC) Supplement Survey, 1990-2006



Firstly, I measure public ownership of the implementation structure by examining the characteristics of the community hospital systems in each state. At the state-level, primary care is provided through three main types of medical facilities: state and local government-owned hospitals, non-government/not-for-profit hospitals, and investor-owned (for-profit) hospitals. I measure public

ownership as the percentage of community hospitals that are owned by the government.[74]

Secondly, I use two empirical indicators to measure public financing in healthcare: (1) public finance in Medicare and Medicaid, and (2) government spending in healthcare and hospitals. The U.S. healthcare system is a two-tier system, in which neither the public or the private sector monopolizes the health insurance market and the service delivery system. Hence, I measure the state spending on Medicare and Medicaid programs as the percentages of total spending on personal healthcare. Substantively, a higher percentage represents more publicness in financial resources. Data for this empirical measure are drawn from the U.S. department of Health and Human Services, Centers for Medicaid and Medicare Services Expenditure Reports.

In addition to the span of state Medicare and Medicaid programs, I also measure total government spending in healthcare and hospitals as the second indicator of financial publicness. I calculate this measure based on total state and local spending on healthcare and hospitals as a percentage of the state GDP. Data for this measure are drawn from the U.S. Census Bureau, Annual Survey of State Government Finances.

Generosity of the State Social Policy. I use state Medicaid eligibility rules as a proxy measure of the generosity of the state health insurance provision. The specific eligibility measure is Medicaid income eligibility limits for working

[74]I use the categorization of healthcare organizations based on the American Hospital Associations standards (AHA). Community hospitals are primary healthcare facilities in state healthcare systems. They refer to all non-federal, short-term, general, and special hospitals that provide care services to the public. Because the American healthcare system is essentially a pay-for-service system, I operationalize the ownership measure by focusing on the major healthcare organizations.

adults, calculated as a percent of the federal poverty level (FPL). Eligibility rules define who are qualified to be covered by public healthcare and directly affect the size of medicaid enrollment. The state medicaid income eligibility limits also directly affect the scope of public health insurance provisions. Data for this variable are drawn from the Kaiser Family Foundation's policy report on state Medicaid eligibility rules (Heberlein et al. 2011).

Street-Level Bureaucratic Resources. I use the size of the public healthcare workforce to measure street-level bureaucratic resources. This variable is calculated by assessing the size of public healthcare workforce at two governmental levels: the state-level and the local-level. I draw data from the U.S. Census Bureaus Annual Survey on Government Employment and Payroll. This variable is computed as a health professional-to-clientele ratio based on the number of public health employees per 10,000 residential population.

Table 10 reports descriptive statistics for the four institutional variables. As Table 10 shows, overall, there is a wide range of variations in all the four institutional variables. The institutional characteristics of the state healthcare systems vary substantially based on the ownership of the healthcare provision system, source of financial resources, generosity of state social policies, as well as the size of public healthcare workforce.

Table 10: Institutional Characteristics of State Healthcare Systems: Descriptive Statistics, 1990-2006

Measures	Mean	Std. Dev.	Min	Max
Ownership				
Public Hospital	24.209	18.636	0	70.833
Source of Finance				
Public Health Insurance	15.086	3.879	5.900	32.750
Public Health Spending	1.148	0.522	0.25	3.38
Policy Generosity				
State Medicaid Eligibility	85.433	55.227	17	215
Bureaucratic Resources				
Public Health Employee	51.697	23.594	12.193	154.400

Notes:

1. *Public Hospital* is measured as the percentage of community hospitals that are owned by state and local government.
2. *Public Health Insurance* is measured as the share of state Medicare and Medicaid spending in the total personal care spending (combining government, employer, and out-of-pocket contributions).
3. *Public Health Spending* is measured by state government spending in healthcare as the percentage of state GDP.
4. *State Medicaid Eligibility* is measured by income eligibility limits for working adults at application as a percent of the federal poverty level (FPL) by scope of benefit package.
5. *Public Health Employee* is measured by the number of public employees in healthcare and hospitals per 10,000 residential population.

Controls. I include a set of control variables that may affect the decision to provide public healthcare and thus people's access to healthcare. First, I control for economic conditions that may be associated with the uninsured rates. Specifically, I control for poverty and unemployment. *Poverty* is measured by the percentage of the state population, who are under the 100% federal poverty line. *Unemployment* is measured by annual state unemployment rate. These two variables are included as controls for individuals' economic conditions. If

public insurance were not available, low-income people would have less access to healthcare and be more likely to be the uninsured. Unemployment status also matters as an important economic condition because most private health insurance provisions are employment-based programs.

I also control for the average education attainment of the population, access to physicians, the size of aged population, and the size of two minority groups (Blacks and Latinos). I construct the measure of *Education Attainment* as a percentage of the state's population who have at least a high school diploma. *Access to Physicians* is measured by the number of active physicians per 100,000 residential population. *Aged Population* is measured as a percentage of the state's population who are older than 65. Demographic variable for Blacks and Latinos are also calculated as a percentage of the state population. [75]

LaVeist (2005, 136) substantiates that socio-environmental or context theories attribute inequality in healthcare to the social, economic, and environmental context in which people live. Inequality in healthcare may be greater in states with poor socioeconomic conditions. For instance, in states with a large proportion of poor and less educated people, and in states with poor economic conditions, state governments may need to compensate large demand on public healthcare provisions, and thus there might be less money available to spend on each individual who needs public health insurance coverage.

[75]Data for *Poverty* and *Education* are drawn from the U.S. Census Bureau American Community Survey (ACS). Data for *Unemployment* are drawn from U.S. Bureau of Labor Statistics, Geographic Profile of Employment and Unemployment. I access the data for *Aged population*, *Black Population*, and *Latino Population* through the CDC's database WONDER (Wide-ranging Online Data for Epidemiologic Research). Data for *Access to Physicians* are drawn from the Census Bureau Annual Statistical Abstracts, the Section for Health and Nutrition: Healthcare Resources.

In addition, I use the Berry et al. (1998) measure of *Citizen Liberalism* as a proxy for political ideology and values that may affect governmental involvement in healthcare provisions. The decision to provide more or less healthcare through public systems is influenced by different political values. Research has shown that liberals are more likely to support the public provision of healthcare than conservatives (Wright et al. 1987; Oliver and Paul-Shaheen 1997). Liberals, moreover, are more likely to favor and use government solutions to problems like lack of access to healthcare. Conservatives, in turn, might favor a market approach. Political ideology can also generate profound social implications in inequality. In the United States, "ideology differences in economic philosophy and distributional priorities are especially striking in the realm of taxation policy (Bartels 2009, 54)." Liberal states may raise higher tax revenues and spend more on healthcare issues than conservative states. Hence, it is reasonable to expect that citizen liberalism is negatively associated with inequality in healthcare access.

Method

I estimate an empirical model for inequality in healthcare access, in which I hypothesize that the percentage of the uninsured population is decreased by the public ownership of the state healthcare systems, the span of public financing in health insurance through Medicare and Medicaid, generosity of state Medicaid eligibility rules, and the size of state healthcare workforce.

Data used to estimate the empirical model combine observations in multiple units at multiple points in time–so-called panel or cross-sectional-time-series (CSTS) data. It is essential to evaluate data variations in the two-dimensional data structure, i.e. within effects (the effects of through-time changes in unit-level

covariates) and between effects (differences in unit means) (Allison 2009; Baltagi 2008). The dependent variable varies more across states than across time. Based on the sample, the state-means range from 9.57 to 25.89, with a standard deviation of 4.03. The across-time means, however, range from 14.21 to 16.90 with a standard deviation of 0.83.

I then examine if the dependent variable is panel stationary. When testing for panel unit-root, I find the dependent variable,% *uninsured population*, to be panel stationary. Across-state heterogeneity, however, is detected due to extreme values in some of the institutional variables and the two economic variables. Firstly, as for the public ownership variable, six states take a value of 0, because all of their community hospitals are owned by non-governmental entities. These six states are: Delaware, Maryland, New Hampshire, North Dakota, Rhode Island, and Vermont. These states also have relatively small Latino populations. Secondly, Louisianan is detected to be an outlier state case due to relatively high poverty rates. Thirdly, Alaska is an outlier case because of relatively high unemployment rates. Given that the dependent variable is panel-stationary and heterogeneity is detected across states, I estimate the empirical model with panel-corrected standard errors (Beck and Katz 1995) and dummy variables for each of the aforementioned outlier states. [76]

The variables for public financial resources and the state healthcare workforce are computed based on data on government finance and payroll. Because government decisions in budgeting and hiring are made based on fiscal cycles,

[76]I also controlled for Hawaii, which is the first state that enacted state mandate on employer-based health insurance. Massachusetts initiated its health insurance reform act and introduced mandated health insurance as well. Because the Massachusetts healthcare insurance reform was introduced in 2006, I did not include a state dummy variable for Massachusetts. The uninsured rates in Massachusetts dropped from around 10% to 5% after the introduction of its health insurance reform.

I take a one-year lag for these three variables. Last, I pool data from various government archives for the empirical analysis. The data-generating process is not random. To control for variables (along the time dimension) that have not been measured, I include fixed-effects dummy variables for each year. The idea is straightforward: use each year as its own control (Allison 2009). [77]

4.6 Determinants of State Uninsured Rates: Empirical Findings

Table 11 reports main findings of the pooled panel-data analysis.[78] First of all, the two economic variables– poverty rates and unemployment rates– are strong predictors of the uninsured rates. The coefficients of these two variables are both relatively large.

As for unemployment, a one-unit increase in the unemployment rate (i.e. an increase by 1%) could lead an average increase in the uninsured rate by 0.457%. The impact of poverty on the uninsured rate is comparable. States with high poverty rates have more people who are not covered by healthcare insurance than states with low poverty rates. This finding makes empirical sense because in a pay-for-service healthcare system, people live without health insurance involuntarily either because they are not covered by their employers (due to unemployment) or because they cannot afford health insurance (due to poverty).

[77] I controlled for fixed-effects by year also because data variation is mainly driven by cross-states differences. I compare data variation across years and across states based on the base model specification for penal data, the within R^2 is 0.107 and the between R^2 is 0.810.

[78] Year dummy variables and state dummy variables for AK, DE, HI, LA, MD, NH, ND, RI and VT are not reported in the Table.

Table 11: Determinants of the % Uninsured Population in Fifty States, 1990-2006

Variable	Coefficient	(Std. Err.)
Public Ownership		
Public Hospital	0.025	(0.017)
Source of Finance		
Public Health Insurance$_{t-1}$	-0.098**	(0.037)
Public Health Spending$_{t-1}$	-1.329**	(0.433)
Public Health Employee$_{t-1}$	-0.004	(0.007)
State Medicaid Eligibilty	-0.006**	(0.002)
Control Variables		
Citizen Liberalism	-0.010	(0.007)
Access to Physicians	-0.012**	(0.003)
Unemployment	0.457**	(0.141)
Poverty	0.449**	(0.055)
Education	-0.060†	(0.034)
Aged Population	0.193**	(0.054)
Black Population	0.103**	(0.013)
Latino Population	0.261**	(0.009)
Intercept	12.220	(3.768)
N	800	
R^2	0.747	

Significance levels : † : 10% ∗ : 5% ∗∗ : 1%

State demographics also exhibit significant effects on the uninsured population. Both the sizes of Black population and Latino population are positively associated with the uninsured rates. The Latino population, however, has greater impact on the uninsured rates. This finding is consistent with the state ranks demonstrated in Figure 15. The top five states with very high uninsured rates (TX, NM, LA, FL, and AR) all have relatively large Latino population.

Turning to the institutional variables, Table 11 shows that the two indicators for public financial resources have substantive effects on reducing the uninsured rates. The publicness of state health insurance provisions (through the Medicare and Medicaid), has a negative marginal effect on the uninsured rates. The slope is -0.098, meaning that a one percent increase in the proportion of public spending in health insurance will decrease the uninsured rates by 0.098%. Total public spending in healthcare and hospitals also has a significant and negative effect on the uninsured rates. The slope is -1.329, meaning that if the total public health spending (as a percentage of state GDP) increases by 1%, the uninsured rate would decrease by 1.329%. The substantive impact of these two spending measures are relatively comparable, because they are percentage measures based on different denominators. The mean total healthcare spending (combining government, employer, and out-of-pocket contributions, i.e., the denominator for the public health insurance measure) is approximately 11% of the mean state GDP (the denominator of the total public healthcare spending measure). This suggests that similar amount of financial resources are needed for decreasing the uninsured rate through different spending venues. The total public healthcare spending, nevertheless, has slightly larger impact on the uninsured rates than the public insurance provisions through Medicare and Medicaid.[79]

Table 11 also shows that state Medicaid eligibility rules have a moderate impact on reducing the uninsured rates. States with generous eligibility rules (i.e. high income caps for defining eligible citizens) have slightly lower uninsured rates than states with tight eligibility rules (i.e. low income caps for defining

[79]The statistical correlation between these two spending measures is 0.19. When excluding the variable for public health insurance, the slope for total public healthcare spending becomes -1.141 (Std. Err.= 0.415). When excluding the variable for total public healthcare spending, the slope for public health insurance becomes -0.107 (Std. Err. = 0.036).

eligible citizens). The substantive impact, however, is smaller than the impact of public financial resources.

The empirical findings provide support for Hypothesis 2 and 3 that both the financial publicness of a state healthcare system and a generous social policy institution may increase a state's ability in providing care and services to economically marginalized citizens. Table 11, however, does not report significant statistical associations between public ownership, public healthcare workforce, and the uninsured rates. One possible explanation to the null findings might be that, both the ownership of the service delivery system and bureaucratic resources matter more for the quality of care, rather than access of care. Both the available primary care facilities (i.e. hospitals) and healthcare professionals may affect people's waiting time for getting healthcare services, and patient-doctor interactions. They might not directly affect how many low-income citizens might be covered by public health insurance.

Another possible explanation might be that, the impact of healthcare professionals may be contingent upon other factors such as their administrative discretion and available resources. Assuming that states with more street-level healthcare professionals might be able to enroll more uninsured people into social insurance programs, whether they actually enrolled more uninsured people may depend on how much administrative power they have. In states with clear and tight enrollment rules, street-level bureaucrats might not have much discretion power in deciding whether certain individuals can get public services or not. It is also possible that public healthcare employees may not have the same preferences for reducing healthcare inequality. It is likely that their own social identities might

affect how they think about the social composition of the uninsured, such as different gender, race, and age groups.

To further explore the potential links between ownership publicness, public healthcare workforce, and inequality in healthcare access, empirical data on other healthcare inequality measures are needed. It is also necessary to consider other institutional constraints such as discretion power, bureaucratic values, and representation, etc.

4.7 Conclusion

Exploring state-level healthcare provisions in the United States, I systematically show that the institutional arrangements in a state healthcare system may be lined to inequality in healthcare access. Integrating various sub-literatures in public administration and political science, I conceptualize that how a healthcare system is designed and organized may have profound implications of inequality in healthcare. I find that in a regulated-market system, where both public and private sectors provide healthcare services to citizens, increasing the span of public insurance provisions could benefit the eligible poor, who would be excluded by a pure market system due to lack of personal resources. Formal policy institutions that define the scope for government responsibilities in healthcare provision may also contribute to increase healthcare access to economically marginalized citizens.

Using a timely empirical case of healthcare provisions, I extend the theoretical focus on comparing how public and private systems differ in their organizational characteristics by linking these different institutional arrangements to public outcomes. I demonstrate that inequality in healthcare access maybe partially

caused by socioeconomic conditions and partially caused by structural factors embedded in the state healthcare systems. In a pay-for-service system, economic deprivation may add disproportionate burdens on the poor people. The public financial resources, in such circumstances, are important social compensations for individuals who have medical needs, but cannot afford healthcare.

This study also has practical implications for policymakers, healthcare proponents, and citizens concerned with health inequality. I show that public provisions exhibit a significant effect on reducing the uninsured population. How the public healthcare provisions are organized and managed through the public sector is important to achieving and sustaining healthcare equality. Systemic reform in the provision of healthcare might constitute an essential step for solving the persistent problem of unequal access to healthcare and may help to address the issue of social disparities in health status from a long-run.

In this study, however, I only use the overall uninsured population as an empirical measure of inequality in healthcare access. Although social exclusion of the poor people in the state healthcare systems is an important reflection of healthcare inequality, there are other forms of social inequality in healthcare. For example, racial and ethnic minorities may bear extra burdens because of the unequal access to healthcare insurance. Immigrants may also have less access to health insurance due to personal economic conditions and various state eligibility rules. Beyond inequalities in access to health insurance, healthcare inequality may also exists based on the quality of care and services. A nature extension of this study is to further probe a variety of empirical measures for healthcare inequality and to further examine how institutional arrangements in a state healthcare system may affect different equity outcomes.

This research, in addition, does not find statistically significant associations between the ownership publicness and inequality in health insurance access. Neither have I accounted for public-private partnerships in the analysis. In many states, healthcare insurance is financed through public-private partnerships. The delivery of healthcare services, moreover, is also managed through collaborative networks. The networking environment and different institutional designs of the public-private partnerships may also constitute important structural factors that can be linked to inequality in healthcare. How may public healthcare administrators and public managers rely on their networks to better serve underrepresented citizens? How may the non-public sectors affect social equity outcomes in healthcare? Future research needs to address these questions by expanding the theoretical scope for identifying important institutional and organizational characteristics of the state healthcare systems.

5. CONCLUSION: SICKNESS, SIN, OR STRUCTURE?

Social inequality in health has been a persistent issue in the United States. Disparities in health status, preventable health risks, and access to healthcare, all have detrimental impacts on the American democracy. The evident social gaps in health impose excessive healthcare costs to the whole population, erode cohesion in the civic society, and fundamentally challenge the legitimacy of democracy. While government agencies and scholars from various disciplines have documented extensive statistics on health disparities, systematic research investigating political causes and policy solutions is surprisingly lacking. How is that one of the most advanced democracies in the world has more than 45 million citizens unprotected from health risks? How is that in the U.S. babies born to Black mothers are more than two and half times as likely to die in infancy as those born to white mothers? How is that a more mobilized community comes along with wider waists among boys and drives girls nuts in weight management practice? Our knowledge on how health disparities look like is extensive, but our understanding on why these disparities exist needs to be enriched.

In this dissertation, I take an exploratory effort in trying to find policy and political explanations for social inequality in health. Using three studies on effective policymaking for reducing health inequalities, I examine three dimensions of social inequality: racial disparities in health status, gender differences in preventable health risks, and social exclusion in equal healthcare access. Though using different empirical cases, these three studies together, produce some general knowledge on causes of health inequality. The three empirical studies may also

help us to understand how policy and administrative accommodations could reduce health inequality, and what might be practical challenges for effective policymaking in this issue area.

5.1 Explaining Health Inequality: Implications for Theory

The community of public health policy and healthcare administration, in general, knows very little on policy and political causes of health inequality. Our mainstream scientific research focuses on people's incomes, public opinions on healthcare, and how partisan politics and political ideology shape the landscape of healthcare provision. The three studies in this dissertation demonstrate that, we could have a richer theory for explaining health inequality than the rationality of tracking the intertwinement between the median voter's position and legislative mandates.

Needless to say, public preferences on healthcare issues and governmental mandates are both critical in the American democratic system. The problem of health inequality, nevertheless, may not simply be solved by delegating powers to political representatives in a majoritarian system. In many cases, people who bear disproportionate health burdens belong to a minority camp in the majoritarian system: racial and ethnic minorities, the unemployed, the working poor, etc. Sometimes, the most vulnerable groups may not even have a say in presidential or congressional elections: babies who die in their infancy, children who are still in elementary schools, and adolescents who are not old enough to engage formal political participation. How may these people's needs be addressed? How could a democratic system mobilize people in the majority camp to support policies that benefit people in marginalized groups? The three

studies in this dissertation offer some support to conceptualize policy designs, bureaucratic resources, and administrative processes as plausible causal variables for explaining health inequality. These proposed theoretical variables, moreover, may be complementary to the theories that focus on public attention and policies produced by elected officials.

Firstly, a particular form of policy designs may be linked to group disparities in health. The first study on racial disparities in infant mortality rates shows that, when a policy fails to generate more relative gains to the at-risk group, it is less likely to be effective in reducing health inequality. The second study on gender differences in childhood obesity demonstrates that, when a policy fails to consider systematic differences in risk perceptions and health risk behaviors, it is less likely to produce desired policy outcomes. Both studies show that a neutrally-designed policy may produce differentiable social benefits across groups due to heterogeneity in policy responses.

Secondly, bureaucratic resources in policy implementation are critical. It is a cliché that separating research on policy adoption and research on policy implementation is unsatisfying. Yet, in the area of social equity research, we know little about how desired equity values are operated in the practice. Policy instruments are adopted as the means for solving the problem. No policy programs, however, are self-executing. All three studies show that implementation factors such as financial resources and human capital matter for achieving desired goals in reducing health inequality. States without sufficient healthcare funds are less likely to reduce minority infant mortality rates, childhood obesity rates, and provide more health insurance coverage to economically marginalized groups. Human resources, moreover, may condition the impact of financial capacity.

Thirdly, macro-level explanations for social inequality in health go beyond the scope of policy designs. Both the community conditions and institutional arrangements in a healthcare system are important contextual factors that may cause group differences in health. The section on social capital and childhood obesity reports counter-intuitive findings that policy interventions combined with an active community may reinforce children's misperceptions on health risks and lead to unintentional policy consequences. The section on health insurance access demonstrates that institutional characteristics of a health care system may be directly linked to how marginalized groups are incorporated into the system. Though focus on different contextual factors, both studies suggest that the link between social equity policies and equity outcomes is likely to be altered by various institutional and contextual constraints.

Findings in this dissertation, however, are far from being conclusive to explain the complex problem of health inequality. With the effort of integrating multiple sub-literatures in political science, public policy, public administration, and sociology, the three studies raise more questions than answers. The three studies, however, present some suggestive findings that might benefit future theory-building.

The most important conceptualization issue that needs to be addressed in future research is how scholars should use empirical measures of health inequality (or more broadly, social inequality) to map its multifaceted nature. Measuring inequality is all about how to identify the at-risk group and what outcome indicators we use to gauge systematic group differences. Group differences in health may also be generated by a multilevel mechanism, including individual-level factors, group-attributes, and structural or institutional variables. In this

dissertation, I use three empirical measures for assessing inequality in health by different group identities. The infant mortality rate is a population health outcome representing our classic understanding on healthcare– sickness, i.e. people's medical needs. Childhood obesity is a health outcome related to unhealthy behavior. It represents an alternative policy rhetoric – sin, namely lifestyle problems and changeable behaviors. Inequality in healthcare access, in the fourth section, is linked to structural factors embedded in the healthcare systems, i.e. the structure of risk-sharing in a society. Can we have an integrated, multilevel framework for assessing the problem of health inequality? Shall we focus more on the problem of sickness, or the problem of sin? Is health inequality ultimately caused by institutional discrimination and structural bias? These are all unanswered theoretical questions. More systematic empirical research using different equity outcomes may help to converge our theoretical knowledge on what are good empirical measures for health inequality. Future research, which employs multilevel ecologic models to connect individual, group, and societal variables, are also needed for advancing our theoretical understanding on what causes health inequality.

The second conceptualization issue that needs to be addressed in future research is how we measure social identities. In this dissertation, different social group identities are used to create empirical measures for health inequality: race, gender, and access to health insurance. It is conceivable that these group identities may not be independent of each other. A multiple identity approach that examines the intersectionality of different social identities may advance our understanding on who are the truly disadvantaged.

The third conceptualization issue that needs to be addressed in future research is how bureaucratic resources, the policy implementation environment, and the networks of service delivery systems are managed. In this dissertation, I explore several administrative variables for making effective social equity policies. The selected policy cases, nevertheless, are all wicked problems. Healthcare interventions for reducing racial disparities are challenging because of the group heterogeneity in policy responses. Reducing and preventing behavioral-related health risks, such as childhood obesity, are challenging because effective policy implementation relies on co-production and compliance. To improve equality in access to care, policymakers need to cope with multiple or conflicting group interests, regulatory rules, and different targeted populations. How relevant policy programs are managed by public health administrators and managers? Future studies should integrate the literatures on organizational theories and public management and extend the theoretical scope by studying what are effective management strategies for reducing health inequality.

5.2 Eliminating Health Inequality: Implications for Practice

The empirical focus of this dissertation is to use systematic approaches to explore what may enhance the effectiveness of public health policies, which are adopted for reducing health inequality. At both the national and state level, there are efforts to reduce health inequality. These policy efforts may fall apart unless the complex relationships among different policy and political factors are better explored. Because health inequality is a societal-level problem, defined by unnecessary and systematic differences between social groups, a system-level solution that addresses a broad range of causes is needed. This dissertation finds more policy

challenges than solutions. Findings on the social and policy barriers for reducing health inequality, however, could be valuable for improving the practice of policy design and policy implementation.

One of the key findings in this dissertation is that inequality may rise from heterogeneous policy preferences. Public healthcare provisions and health interventions that target large geographic scales are often designed and implemented in a standardized manner, such as uniformly imposed eligibility rules, broad policy programs for enhancing the capacity of state healthcare systems, monetary compensation for social risks, standardized curriculum on health and nutrition education, etc. Though designed based on scientific knowledge, these policy tools may not be effective in providing the most protection to the most damaged. The three studies in this dissertation find that these policy tools may have an impact on improving population health, but may not be very effective in closing social gaps in health. Effective policymaking for reducing social inequality in health is primarily about how to address the needs for the truly disadvantaged. Policy designs that incorporate accurate information on different targeted populations and recognize heterogeneous group responses are more likely to be successful.

The third section on childhood obesity suggests that the concept of social capital might be a mixed blessing when using it as a policy approach for reducing health inequality. Public health scholars and healthcare administrators have paid great attention to building active and supportive communities for health promotion. Community-based interventions are also viewed as effective policy designs. The empirical section on childhood obesity and social capital, nevertheless, indicates that social capital may also be a source that generates inequality. In practice, it may be linked to unintentional policy outcomes as

well. One important practical implication is that, efforts to building active communities should combine sound strategies of disseminating quality information and enhancing interactions between intervention facilitators and the targeted populations.

The three studies in this dissertation, furthermore, all conceptualize the important role of the public healthcare workforce. The first and the second studies find that access to healthcare human resources matters for reducing inequality in health. They both suggest that building the human capital in public healthcare is essential for reducing health inequality. The human capital deficits in some state health systems are likely to be a structural barrier that prevents effective policymaking in a long run. The fifty states vary substantially in their healthcare human resources. While many policy mandates and recommendations are initiated by state legislators, governors, federal agencies, the deficits in the healthcare workforce may create challenges for service delivery and policy implementation. It is also possible that the lack of minority representation in the public healthcare workforce might be a long-run structural barrier for delivering healthcare services and employing effective health interventions in racial and ethnic communities.

To conclude, no simple and quick solutions can be developed to eliminate health inequality that lies between different social groups. As state healthcare agencies, public managers, and health administrators continue the "muddling-through" business of making healthcare provisions and delivering healthcare services, they may face different hurdles for reducing health inequality. There are both possibilities and challenges for reducing health inequality. To develop systematic understandings on political and policy mechanisms that are linked to

health inequality is a much needed agenda for both the research and the practice of effective policymaking.

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APPENDIX

Table 12: Observed and Imputed Values for Variables with Missing Data

Variable	**Missing Cases**	**Observed Mean**	**(Std.D)**	**Imputed Mean**	**(Std.D)**
Infant Mortality Rates					
- Whites1	55	6.265	(0.978)	6.300	(0.976)
- Blacks1	142	14.925	(3.213)	14.782	(2.830)
- Whites2	55	6.265	(0.978)	6.316	(0.998)
- Blacks2	142	14.925	(3.213)	15.001	(3.139)
Public Health Employees					
- State-Level	152	12.432	(12.374)	12.443	(12.365)
- Local-Level	242	16.770	(20.772)	16.942	(19.965)
Physicians	100	232.659	(58.772)	229.342	(58.607)
Education	10	79.863	(7.642)	79.906	(6.718)

Notes:

1. The total number of observations= 850.
2. Standard deviations are in parentheses.
3. The two variables for infant mortality rates are imputed by using mean interpolation and the Multiple Imputation (MI) method implemented by Amelia II in R. Infant mortality rates imputed by mean interpolation are labeled as *Whites1* and *Blacks1*. Infant mortality rates imputed by the MI method are labeled as *Whites2* and *Blacks2*. As for using the MI procedure, missing values are imputed for 5 times and the descriptive statistics in the above table are average values based on the 5 imputed datasets. The MI method produces more consistent and efficient approximation for missing data than the mean interpolation method when dealing with the missing data problem in the IMR variables.
4. All other missing data are filled by using mean interpolation.

Table 13: State Healthcare Systems, Human Resources, and Disparities in White and Black Infant Mortality Rates

Variable	**HR≤150**	**HR≤140**	**HR≤130**	**HR≤120**	**HR≤100**	**HR≤90**	**HR≤80**
Public Spending$_{t-1}$	0.002**	0.003**	0.002**	0.003**	0.003**	0.003**	0.004**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Human Resource$_{t-1}$	-0.001	-0.002	-0.002	-0.0025**	-0.0025*	-0.0029*	-0.0030*
	(0.0009)	(0.0011)	(0.0011)	(0.0012)	(0.0013)	(0.0015)	(0.002)
Δ Public Spending$_{t-1}$							
$\times$ Human Resource$_{t-1}$	-0.00003**	-0.00004**	-0.00002**	-0.00003**	-0.00004*	-0.00004	-0.00008*
	(0.00002)	(0.00002)	(0.00001)	(0.00001)	(0.00002)	(0.00003)	(0.00004)
N	749	744	736	722	701	682	658
R^2	0.160	0.166	0.169	0.170	0.171	0.173	0.175
ρ	0.117	0.115	0.112	0.107	0.010	0.096	0.093

Notes:

1. * $p < .10$, two-tailed t-test. ** $p < .05$, two tailed t-test
2. The dependent variable the Black-to-white ratio of infant mortality rates. PCSEs are in parentheses. All other variables are not reported.
3. HR: Human resources in public health, measured by the number of public employees(state and local-level combined) per 10,000 residential population.
4. At each threshold, following cases are dropped:
   (a) HR≤150: ND-2000.
   (b) HR≤130: ID-1995, WY-2003, 2004, 2005, 2006.
   (c) ≤120: MS-1998, 1999, WY-1995-2002.
   (d) HR≤110: MS-1995, 1996, 1997, 2000-2006, WY-1992, 1994, 1997, 2000.
   (e) HR≤100: AL-1995-2002, 2005, 2006, GA-1992, 1993, LA-1998, 2000, MS-1994, ND-2001, SC-1997-1999, WY-1993.
   (f) HR≤ 90: AL-1992-1994, 2005, 2006, GA-2003, 2004, ID-1994, 1996, LA-1993, 2007, 2001, 2002, MS-1992, SC-1995,1996, 2000,2001.
   (g) HR≤ 80: GA-1997,1998, LA-1992, 1994, 1995, 1996, 2003-2006, MS-1993, NM-2006, NY-1992-1994, NC-2002, SC-1992, 1993, 1994, 2002-2006.

Table 14: State Healthcare Systems, Magnitudes of Health Inequality, and Disparities in Black and White Infant Mortality Rates

Variable	**Disparity≥1**	**Disparity≥1.5**	**Disparity≥2**	**Disparity≥2.5**
Public Spending$_{t-1}$	0.002**	0.002**	0.002**	0.0023**
	(0.0009)	(0.0009)	(0.0009)	(0.0009)
Human Resource$_{t-1}$	-0.001	-0.001	-0.001	-0.002*
	(0.0009)	(0.0009)	(0.0009)	(0.001)
Public Spending$_{t-1}$				
$\times$ Human Resource$_{t-1}$	-0.00002*	-0.00002*	-0.00002*	-0.0002**
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Physicians	-0.001**	-0.001**	-0.001*	-0.001
	(0.0004)	(0.004)	(0.005)	(0.001)
Health Insurance	0.008**	0.007**	0.010**	0.006
	(0.004)	(0.004)	(0.004)	(0.006)
State Initiatives	0.017	0.010	0.027	0.028
	(0.034)	(0.034)	(0.036)	(0.051)
N	745	731	627	294
R^2	0.164	0.157	0.182	0.190
ρ	0.114	0.128	0.127	0.060

Notes:

1. * $p < .10$, two-tailed t-test. ** $p < .05$, two tailed t-test
2. The dependent Variable is the Black-to-white ratio of infant mortality rates.
3. PCSEs are in parentheses. All other variables are not reported.
4. Following thresholds reflect state-year cases, whereby the disparity scores are very low:
   (a) When Disparity≥1, following cases are dropped: HI-1997, 2004, ME-1990, NH-1990, and ND-1995.
   (b) When Disparity≥1.5, following cases are dropped: AK-1997, AR-1993, HI-1998, 2000, 2005, KS-1998, ME-1995,NM-1995, 1998, OK-1994, RI-1995, 1997, WV-1994,1998.

Table 15: Partitioning the Full Sample by Years

Variable	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Public Spending$_{t-1}$	0.0028**	0.0026**	0.0025**	0.0019**	0.0020**	0.0022**	0.0021*	0.0020*
	(0.0010)	(0.0010)	(0.0011)	(0.0009)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
Human Resource$_{t-1}$	-0.0017	-0.0019	-0.0024*	-0.0024**	-0.0025**	-0.0021*	-0.0024*	-0.0018
	(0.0011)	(0.0013)	(0.0013)	(0.0012)	(0.0012)	(0.0012)	(0.0015)	(0.0015)
Public Spending$_{t-1}$								
$\times$ Human Resource$_{t-1}$	-0.00003**	-0.00003*	-0.00003**	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002
	(0.000016)	(0.000015)	(0.000015)	(0.000014)	(0.000015)	(0.000014)	(0.000016)	(0.000016)
N	700	650	600	550	500	450	400	350
R^2	0.168	0.157	0.100	0.181	0.188	0.186	0.217	0.217
ρ	0.100	0.112	0.134	0.132	0.071	0.052	0.077	0.055

Notes:

1. * $p < .10$, two-tailed t-test. ** $p < .05$, two tailed t-test
2. The dependent Variable is the Black-to-white ratio of infant mortality rates.
   (a) Each year threshold means that the model is estimated by dropping cases in all the previous years before that threshold. E.g. 1992 means that the model is estimated by including all cases when year>1992.
   (b) PCSEs are in parentheses. All other variables are not reported.

Table 16: Principal-Component Factor Analysis for Students' Weight Control Activities

Behavior Indicator	Overall Index	Female Index	Male Index
Physical Inactiveness			
% Did Not Exercise	0.857	0.934	0.978
% Did Not Eat Less	0.857	0.934	0.978
Eiganvalue	1.478	1.742	1.911
Risky Weight Control Activity			
% Fasted to Lose Weight	0.881	0.880	0.832
% Took Diet Pills	0.881	0.875	0.865
% Took Laxative Pills	0.737	0.787	0.797
Eiganvalue	2.09	2.15	2.074

Table 17: Robustness Analysis for Table 4: the Interaction Model Estimated without State-Dummy Variables

Variable	Coefficient	(Std. Err.)
Equation 1 : Female Obesity Prevalence Rate		
Obesity Policy$_{t-1}$	0.410**	(0.072)
Social Capital	-0.146**	(0.043)
Policy$_{t-1}$×Social Capital	0.041	(0.066)
Public Health Spending$_{t-1}$	-0.025	(0.094)
Public Health Employee$_{t-1}$	0.003*	(0.002)
% Uninsured Children	-0.053**	(0.009)
Education	0.030**	(0.004)
Poverty	0.177**	(0.015)
Δ Unemployment	0.064†	(0.034)
Overweight Infant	-0.003	(0.002)
Obesity Prevelance$_{t-1}$	0.814**	(0.013)
Equation 2 : Male Obesity Prevalence Rate		
Obesity Policy$_{t-1}$	0.307**	(0.092)
Social Capital	-0.111*	(0.051)
Policy$_{t-1}$×Social Capital	-0.041	(0.082)
Public Health Spending$_{t-1}$	-0.123	(0.130)
Public Health Employee$_{t-1}$	0.010**	(0.002)
% Uninsured Children	-0.049**	(0.012)
Euducation	0.019*	(0.009)
Poverty	0.110**	(0.020)
Δ Unemployment	-0.144**	(0.040)
Overweight Infant	0.000	(0.003)
Obesity Prevalence$_{t-1}$	0.641**	(0.020)
N	807	

Significance levels : † : 10% * : 5% ** : 1%

Table 18: Robustness Analysis: Linear Model Specification for Male and Female Childhood Obesity Prevalence Rates Based on Data from 1999 to 2009

Variable	**Coefficient**	**(Std. Err.)**
Equation 1: Female Obesity Prevalence Rate		
Obesity Policy$_{t-1}$	0.374**	(0.107)
Social Capital	-0.189**	(0.070)
Public Health Spending$_{t-1}$	-0.242	(0.190)
Public Health Employee$_{t-1}$	0.003	(0.003)
Education	0.049**	(0.007)
Poverty	0.171**	(0.028)
Δ Unemployment	0.003	(0.051)
Overweight Infant	-0.012**	(0.004)
% Uninsured Children	-0.117**	(0.019)
Obesity Prevalence$_{t-1}$	0.823**	(0.019)
Equation 2 : Male Obesity Prevalence Rate		
Obesity Policy$_{t-1}$	0.656**	(0.131)
Social Capital	-0.099	(0.086)
Public Health Spending$_{t-1}$	-0.399†	(0.237)
Public Health Employee$_{t-1}$	0.017**	(0.004)
Education	0.100**	(0.010)
Poverty	0.193**	(0.032)
Δ Unemployment	-0.218**	(0.062)
Overweight Infant	0.003	(0.005)
% Uninsured Children	-0.101**	(0.023)
Obesity Prevalence$_{t-1}$	0.655**	(0.025)
N	463	

Significance levels : $\dagger$: 10% $*$: 5% $**$: 1%

Figure 16: Marginal Effects of Public Health Spending on Racial Disparities in Health (Black-to-White Ratios of Infant Mortality Rates), with 95% Confidence Intervals

Figure 17: Correlations Between Putnam's Social Capital Index and the Dynamic Social Capital Index (State-Means from 1991 to 2009)

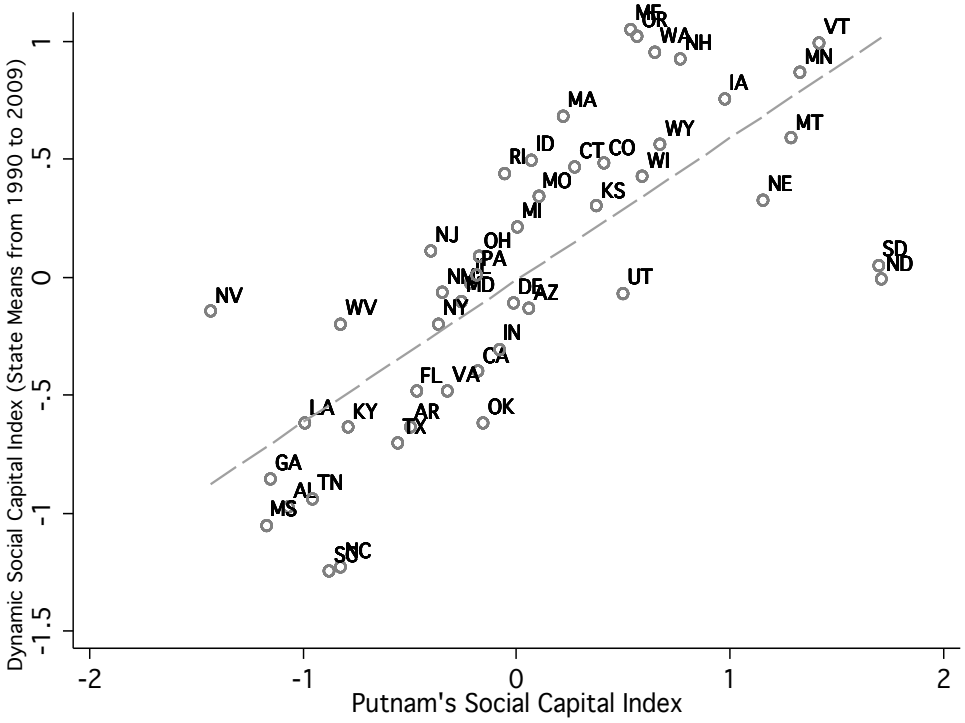


Figure 18: Distributions of Female and Male Students' Perceptions on Their Body Mass Index, CDC Youth Risk Behavior Surveillance System (1991-2009)

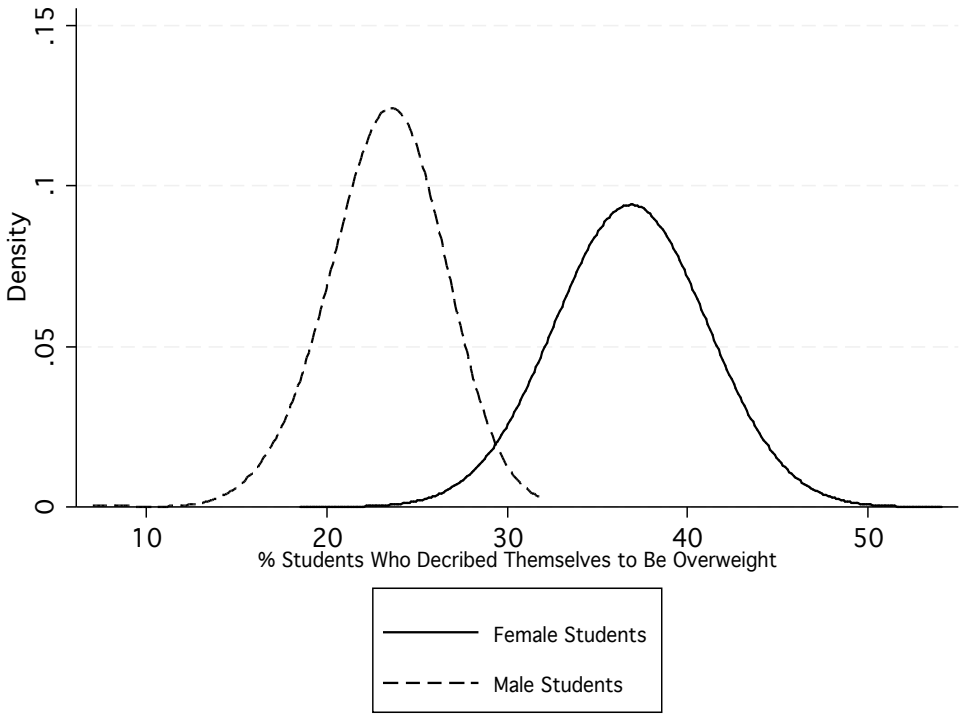
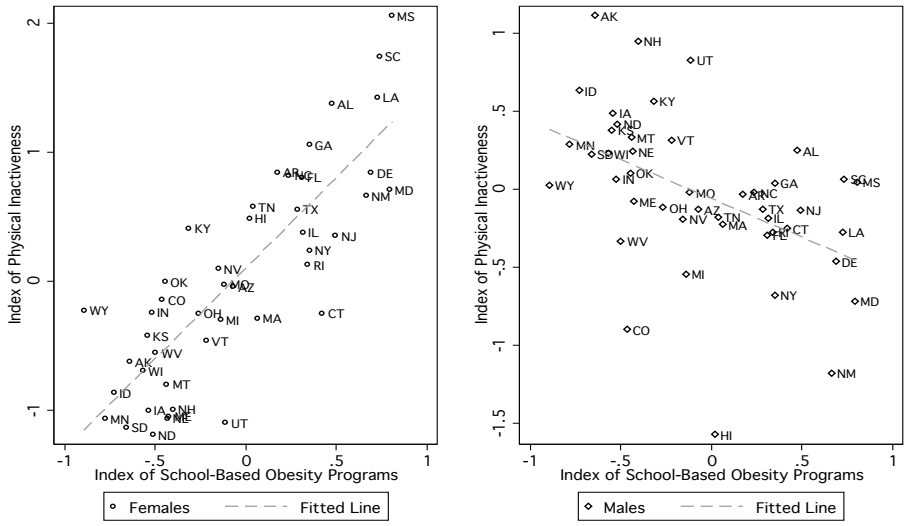
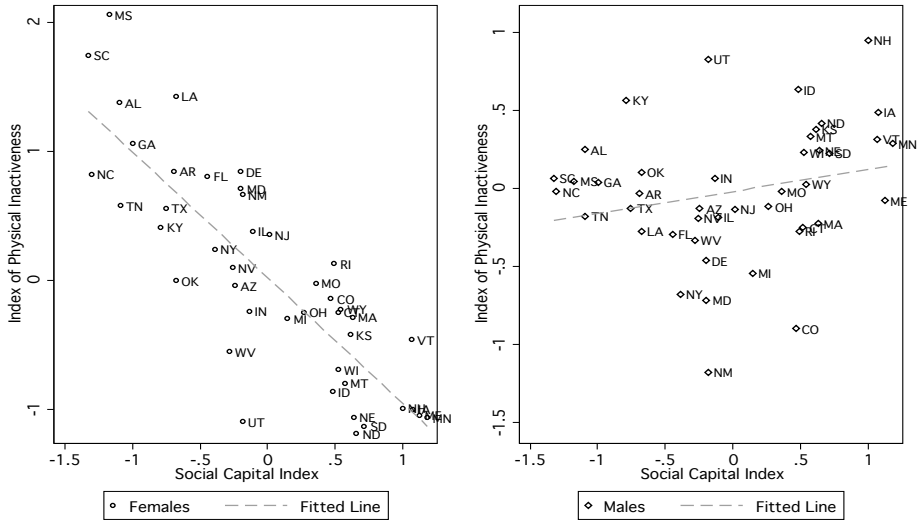


Figure 19: Correlations between Obesity Policy, Social Capital and the Index of Physical Inactiveness: Gender Differences

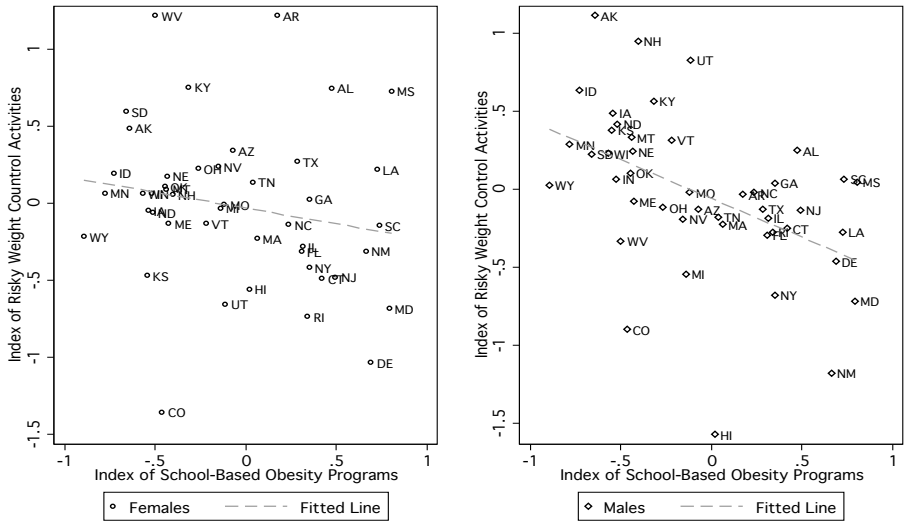


(a)

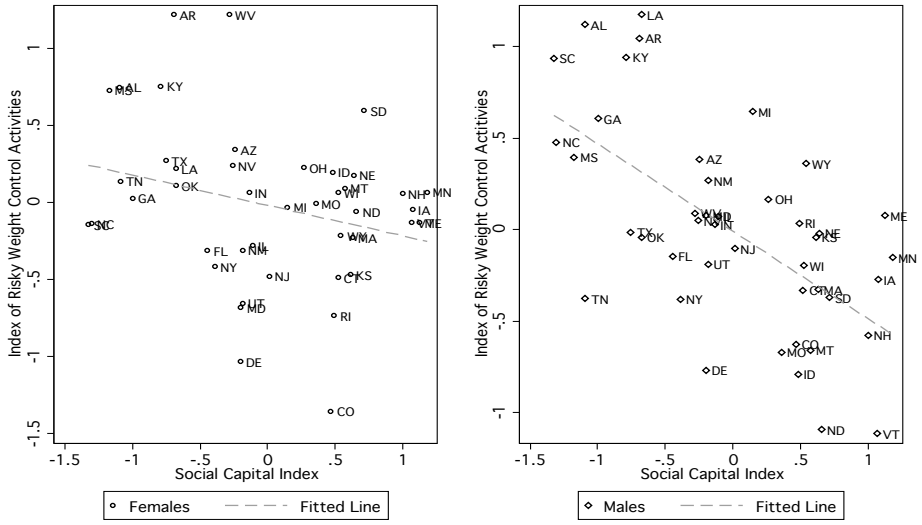


(b)

Figure 20: Correlations between Obesity Policy, Social Capital and the Index of Risky Weight Control Activity: Gender Differences

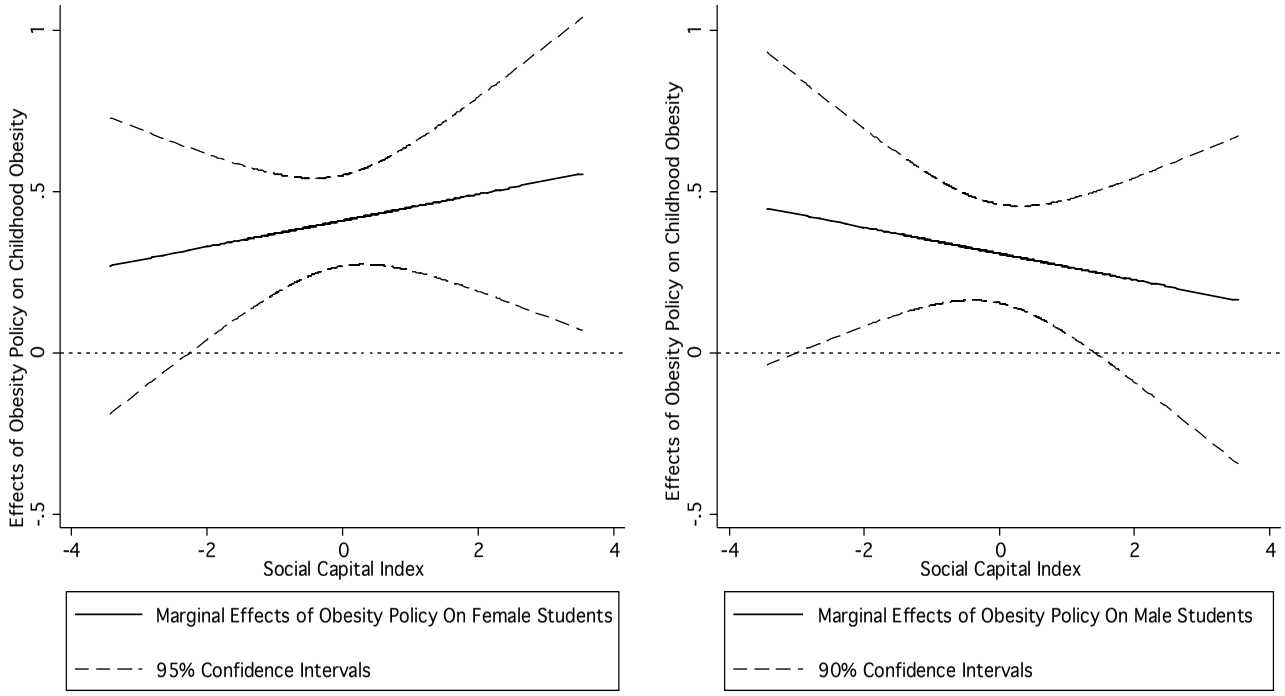


(a)



(b)

Figure 21: Robustness Check for Figure 12, Marginal Effects Calculated Based on the Model Excluding State-Dummy Variables



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