

Your Body Knows Who You Know:
Social Capital and Health Inequality

by

Lijun Song

Department of Sociology
Duke University

Date: _____

Approved:

Dr. Nan Lin, Co-Supervisor

Dr. Linda K. George, Co-Supervisor

Dr. Kenneth C. Land

Dr. Lynn Smith-Lovin

Dr. David Brady

Dissertation submitted in partial fulfillment of
the requirements for the degree of Doctor
of Philosophy in the Department of
Sociology in the Graduate School
of Duke University

2009

ABSTRACT

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Abstract

Does social capital, resources embedded in social networks, influence health? My dissertation examines whether social capital directly impacts depression, and how it interplays with other established structural risk factors linked to depression. I analyze unique data from the thematic research project “Social Capital: Its Origins and Consequences,” collected in 2004-5 in the United States. I measure social capital through one recently developed network instrument, the position generator. I use structural equation modeling to test the direct, mediating, and moderating effects of social capital on depressive symptoms. I also use the instrumental variable method to verify the causal order in the relationship between social capital and depression. Results show that social capital is associated with the level of depression in four ways. Social capital is associated with lower levels of depressive symptoms net of other variables. Part of the effect of social capital on depressive symptoms is indirect through subjective social status. Social capital mediates the associations of age, gender, being black (versus being white), marital status, education, occupation, annual family income, and social integration with depression. Social capital also interacts with gender, being black (versus being white), education, annual family income, and social integration. This research indicates that social capital is an important social antecedent of disease and illness.

Dedication

I dedicate this dissertation to my wonderful family:

to the memory of my Dad, who was my hero, strict but loving, frugal but generous, a non-sociologist but knowledgeable about society and encouraged my sociological career;

to Mom, who was my first teacher in life, convinced me of the importance of education for women, and supports my studies, local and overseas, with unconditional love;

to Brother, who is always one year older than me, always watching me closely, and always standing by my side and rooting for me;

to Sister-in-Law, who embraces me with the warmth of sisterhood;

to Nephew, who is five-year old, and sings to me over the phone.

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1. Introduction

Stratification systems are fundamental structures in human societies.

Stratification “refers to the persistence of positions in a hierarchy of inequality, either over the life time of a birth cohort of individuals or, more particularly, between generations” (Duncan 1968:681). Stratification results in unequal distribution of valuable goods. Stratification is a core concern of sociology as a discipline (Burton and Grusky 1992, Figure 1).

Social relationships are distinctive structural factors and are intertwined with stratification and its outcomes (Butter 2005). Social capital, resources embedded in social relationships, has become a popular paradigm in multidisciplinary research during the last two decades. A search of Social Sciences Citation Index for articles with “social capital” in their topics (as of December 31 2008) depicted the explosively growing trajectory from 1990s. On average per year, there were fewer than four such articles from 1956 to 1989, while the number increased to 145 in the 1990s and dramatically jumped to 580 from 2000 to 2008. Social capital has become a unique structural source of persistent inequality in status attainment in contemporary societies (Grusky [1994]2001). The concept of social capital is one of the most acknowledged contributions from sociology to other fields of social science and to public discourse during the last two decades (Portes 2000). This concept fills the conceptual gap between macro-level structures and micro-level agents in sociology (Butter 2005; Lin 2001a). As is the case with new concepts

in social sciences, social capital has triggered extensive debates (Lin 2001a, 2001b, 2006, 2008; Lin and Erickson 2008; Kawachi et al. 2004; Pevalin 2003; Portes 1998, 2000; Schuller, Baron and Field 2000; Szreter and Woolcock 2004; Turner 2004; Webber and Huxley 2004; Woolcock 1998). There is lack of consensus in its definitions, which inevitably result in controversial operationalizations, divergent measurements, disparate mechanisms, mixed empirical evidence, various implications, and arduous challenges. The key figures who popularized this concept and stimulated its theoretical development during the 1980s and the early 1990s include three sociologists Pierre Bourdieu ([1983] 1986), Nan Lin (1982, 2001a), and James S. Coleman (1988, 1990), and one political scientist Robert D. Putnam (1993a, 1993b, 1995a, 1995b, 1995c, 2000). This dissertation does not attempt to reconcile the diverse conceptualizations of social capital; instead the goal is to contribute to this burgeoning literature by investigating whether a network approach to social capital, as proposed by Lin (2001a), can explain health inequalities.

Lin's social capital theory is a fundamental structural approach to social stratification. It is grounded in the classic capital theories. It combines a resource perspective with a relational perspective at the individual level (Lin 2001a). It defines social capital as valued "resources embedded in a social structure that are accessed and/or mobilized in purposive actions" (Lin 2001a: 29). Lin also developed a theory-driven methodology for measuring social capital: the position generator (Lin and Dumin

1986; Lin, Fu and Hsung 2001). This technique has been shown to be flexible, reliable, and valid in describing actors' access to social capital in a hierarchical society (Van der Gaag, Snijders, and Flap 2008; Lin 1999a, 2001a; Lin and Erickson 2008).

Social capital theory argues that social capital deficits, as well as deficits in the returns to social capital, are independent sources of social inequality paralleling other forms of capital in a hierarchical society (Lin 2001a). Social capital differs from personal capital (i.e., personal resources). Personal capital is individual. It is resources possessed and controlled by an individual actor (e.g., economic capital, human capital and cultural capital). Social capital, in contrast, is relational. It is resources under the control of other actors, which an individual actor can access and use only through his or her social ties with other actors. Most actors do not have sufficient personal capital. They have to access and use social capital. Social capital can affect purposive actions through four mechanisms when personal capital is insufficient, including: 1) information, 2) influence, 3) social credentials, and 4) reinforced identification (Lin 2001a: 19-20). Social capital theory, therefore, contends that net of egos' individual resources, social capital is expected to positively influence ego's status achievement and mobility in a hierarchical social ladder.

Social capital theory states that social capital exerts stratification effects not only in instrumental returns such as wealth, power, and reputation but also in expressive returns such as physical health, mental health, and life satisfaction (Lin 2001b). A

substantial body of empirical research has examined the propositions and methodology of social capital theory. These studies provide strong evidence of the link between social capital and socioeconomic status attainment, across cultures and societies (for reviews, see Burt 2000; Lin 1999a; Marsden and Gorman 2001; Portes 1998). Much less is known, however, about how resources derived from alters' structural social positions reduce disease risks and protect health (for reviews, see Berkman et al. 2000; Berkman and Glass 2000; Butter 2005; Lin and Peek 1999; for three exceptions, see Acock and Hurlbert 1993; Song and Lin 2009; Webber and Huxley 2007).

Health is a valuable good and is a function of social stratification (Tuner 2004). Health inequality is an enduring topic in medical sociology (House 2001; Payne, Payne and Bond 2006). The stratification approach is one unique contribution of medical sociology to understanding social patterns of health status (Bird, Conrad and Fremont, 2000). Medical sociology uses sociological concepts and theories to explain the social nature of disease stratification; it is in contrast to medical models of disease that view diseases as caused by biological and genetic factors (Armstrong 2003; Fremont and Bird 1999; Payne et al. 2006). The links between a number of social variables and health inequalities have been well established (for reviews, see Annandale 1998; Armstrong 2003; Butter 2005; Cockerham 1998, 2007; Freund and McGuire 1995; George 1996; House 2001; Payne et al. 2006;).

Social relationships are probably one of the most important social causes in the social production of health (Wilkinson 1999:528). Investigations of the links between social relationships and health have a long history in medical sociology (Cassel 1976; Cobb 1976; Durkheim [1897] 1951; for reviews, see Berkman 1995; Cohen, Gottlieb and Underwood 2000; House 2001; House, Landis and Umberson 1988, 1990; Luke and Harris, 2007; Smith and Christakis, 2008). We trace this school of tradition back to *Suicide* ([1897] 1951) written by Emile Durkheim, one of the founders of modern sociology. In this book, Durkheim attributes variation in suicide into different degrees of social integration between individuals. A rich literature has confirmed that relationship-based factors, such as social support, social networks, social cohesion, and social integration are potentially fundamental causes of various physical and mental health outcomes (for reviews, see Aneshensel 1992; Armstrong 2003; Baum and Ziersch 2003; Berkman et al. 2000; Berkman and Glass 2000; Cockerham 1998, 2007; Cohen, Gottlieb, and Underwood 2000; Cohen and Syme 1985; Freund and McGuire 1995; Gabe, Bury and Elston 2004; George 1996; Gilchrist 2003; House 2001; Gottlieb 1981; House et al. 1988, 1990; Lin, Dean and Ensel 1986; Lin and Peek 1999; Link and Phelan 1995, 1996, 2000; Luke and Harris 2007; Pearlin 1989, 1999; Pearlin and Aneshensel 1989; Pescosolido and Levy 2002; Robert and House 2000b; Sarason, Pierce, and Sarason 1994; Smith and Christakis 2008; Stansfeld 2006; Song, Son, and Lin 2009 a; Thoits 1995; Turner 2004; Turner and Turner 1999).

As in other fields, social capital as a theoretical tool has easily gained burgeoning acceptance in the health sciences. A growing body of multidisciplinary studies on various individual and public health outcomes across time and space has been labeled as “social capital” research. For instance, another search of Social Sciences Citation Index for articles with “social capital” and “health” showed accelerating popularity from the early 1990s (see Figure 1). The number of such articles was only two in 1991, but rose to 93 in 2003, further jumps to 150 in 2006, and remains above 140 in 2007 and 2008. Edited books on social capital and health appeared in the last couple of years (Kawachi, Subramanian, and Kim 2008a; McKenzie and Harpham 2006). Many reviews have surveyed the associations of social capital with various health-related outcomes across cultures and societies (Almedom 2005; Armstrong 2003; Baum 1999, 2000; Carpiano 2006; De Silva et al. 2005; Hawe and Shiell 2000; Kawachi 1999; Kawachi et al. 2004: 688; Kawachi and Berkman 2000, 2001; Kritsotakis and Gamarnikow 2004; Shortt 2004; Lochner, Kawachi and Kennedy 1999; Lomas 1998; Lynch, Due, Muntaner and Smith 2000; Macinko and Starfield 2001; Muntaner, Lynch and Smith 2001; Robert and House 2000b; Song et al. forthcoming a; Szreter and Woolcock 2004; Turner 2003, 2004; Whitley and McKenzie 2005). Despite the substantial development of this literature, Putnam’s notion of social capital, which is based on Coleman’s works and has been used by public health researchers, has dominated the field. This perspective ignores social conflict and restricts social capital to the collective level. It also equates social capital with other well-

established relationship-based concepts such as social networks, social support, social cohesion, and social integration. The conventional equalization of these concepts has been criticized for endangering the added theoretical value of social capital (Kawachi et al. 2004; Lin 2001a, 2006, 2008; Portes 1998). The original contributions of alternative sociological theories have thus been understated.

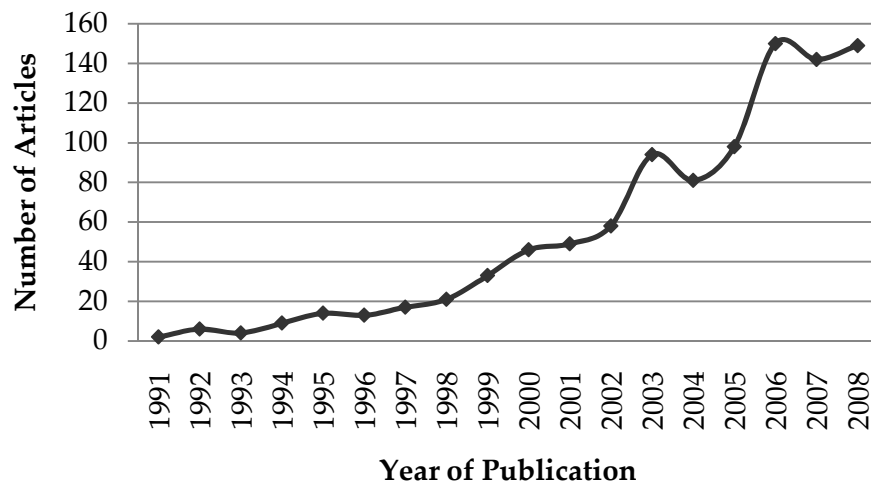


Figure 1: Articles with “Social Capital” and “Health” in Topic: Social Sciences Citation Index (As of December 31, 2008).

Can social capital, as proposed by Lin (2001a), shape individual health outcomes? The purpose of this dissertation is to theoretically and empirically answer this research question. This dissertation argues that social capital supplements established social determinants of health, including personal capital and other

relationship-based social factors (e.g., social networks, social support, and social integration). Most actors' personal capital is not sufficient to maintain and promote health. Further, previously identified relationship-based social factors are not resource-oriented, and may not reveal important health-relevant resources. In contrast, social capital captures embedded resources in social relationships. This dissertation also argues that social capital interplays with other social antecedents in the production of disease and illness. Social capital may mediate the health effects of other risk factors, and determine health indirectly through other social precursors of health. The relationship between social capital and health may also be moderated by other social factors. This dissertation will contribute to the blossoming literature on social capital in general, and to its relevance for health stratification in particular.

This dissertation is organized as follows. I begin with a summary of the diverse origins and conceptualizations of social capital. Clarifying these conceptual debates is necessary to frame the dissertation. This discussion focuses on two main themes: the divergent conceptualization of social capital, and the uncritical acceptance of Putnam's undertheorized view of social capital in the health sciences. Second, I introduce social capital theory as proposed by Lin (2001a), review empirical studies based on this theoretical framework, and identify the research gaps concerning the relationship between social capital and health. Third, I develop a conceptual model of how social capital directly and indirectly shapes health and propose related research hypotheses.

Fourth, I present the research design. I describe a unique data set based on a national sample of the US population; I describe the measurement of major variables; and I propose employing structural equation modeling as my major analytical method. After reporting empirical results and contributions of this study, I conclude with a discussion of issues and future research directions.

2. Social Capital as a Diverse Construct

Social capital is a recent popular construct in multidisciplinary theory and research. It has been recognized as a distinct form of stratification in modern societies (Grusky [1994]2001). As is the case with new concepts in the social sciences, social capital has increasingly controversial conceptualizations, contestable operationalizations, distinct measurements, and broad applications. As a result, the burgeoning social capital literature has created many confusions and debates.¹ A brief summary of the diverse origins and definitions of social capital is necessary to frame the theoretical context of this dissertation, and to justify the important gap it fills between social capital and health inequality.

An old axiom states that “it is not what you know, but who you know.” The basic idea of social capital has a long history in the social sciences. Scholars with disparate backgrounds, however, debate its intellectual origins (for reviews, see Islam et al. 2006; Macinko and Starfield 2001). Some scholars quote classic sociological predecessors in the nineteenth century, including Emile Durkheim, Karl Marx and Frederick Engels, Max Weber, and Georg Simmel, for insights about this concept

¹ It is beyond the scope of this dissertation to discuss all the critical issues surrounding social capital. I only touch on issues relevant to health. For more information, see Almedom 2005; Baron, Field and Shuller 2000; Baum 1999, 2000; Baum and Ziersch 2003; Carpiano 2006; Fine 2001; Hawe and Shiell 2000; Islam et al. 2006; Kawachi et al. 2004; Kawachi and Berkman 2000; Kritsotakis and Gamarnikow 2004; Lin 1999b, 2001a, 2001b, 2006, 2008; Lin and Erickson 2008; Lynch, Due, Muntaner and Smith 2000; Macinko and Starfield 2001; McKenzie 2003; McKenzie, Whitley and Weich 2002; Pevalin 2003; Portes and Landolt 2000; Portes 1998, 2000; Shortt 2004; Szreter and Whitley and McKenzie 2005; Webber and Huxley 2004; Woolcock 1998, 2000.

(Portes1998; Portes and Sensenbrenner 1993; Turner 2003, 2004). Some attribute this idea to the legacy of economists, such as David Hume, Edmund Burke and Adam Smith (Woolcock 1998). Some identify the philosophy of John Dewey as the original source of social capital (Farr 2004).

The pioneering formal introduction of social capital is also problematic. Several contemporary scholars from different fields have received credit for the seminal formulation of social capital theory, including James S. Coleman (Kawachi and Berkman 2000; Shortt 2004;), Glenn Loury (Coleman 1990; Kritsotakis and Gamarnikow 2004; Lin 2001a; Portes 1998; Woolcock 1998), Pierre Bourdieu (Carpiano 2006; Johnston and Percy-Smith 2003; Portes 1998; Portes and Landolt 1996; Portes and Sensenbrenner 1993; Shuller et al. 2000; Woolcock 1998), Jane Jacob (Whitley and McKenzie 2005; Woolcock1998; Putnam 1995a), Lyda Judson Hanifan (Fine 2001; Gilchrist 2003; Putnam 2000; Woolcock and Narayan 2000), Yoram Ben-Porath (Lin 2001a), Yves Dube, J.E. Howes, and D.L. McQueen (Baron et al. 2000). As Putnam documents (2000), the term “social capital” first appeared in a 1916 article by Lyda Judson Hanifan on a rural school community center (Hanifan 1916).

Despite considerable divergence over the heuristic sources of social capital, there is more consensus regarding the key scholars who popularized the concept of social capital and stimulated its theoretical development and elaboration. Among others, work by four scholars has been highly cited, including three sociologists Pierre Bourdieu

([1983] 1986), Nan Lin (1982, 2001a), James S. Coleman (1988, 1990), and one political scientist Robert D. Putnam (1993a, 2000). All four scholars agree that social capital contains resources derived from social networks and social structures, and it operates net of forms of personal capital such as economic capital, human capital, and cultural capital (Lin 2001a). However, their definitions and operationalizations diverge from each other. I distinguish two schools.² I first introduce the normative approach as Coleman and Putnam represent, and then review the network approach as Bourdieu and Lin exemplify.

2.1 The Normative Approach to Social Capital

Coleman and Putnam represent a normative approach in the sense that both of them underlined moral norms such as trust and reciprocity as forms of social capital. They emphasize the benefits of social capital as collective assets or public goods from a functionalist perspective. Their concept and operationalization of social capital mingles social capital with its sources and outcomes. One major distinction between Coleman and Putnam exists in their causal arguments on social networks. Coleman used networks as sources of social capital, while Putnam subsumed networks under the umbrella of social capital.

² The division of schools is controversial. For example, Adam and Rončević (2003) distinguish three schools: Bourdieu's approach, Lin's utilitarian network-based approach, and the normative approach of Coleman and Putnam. Moore et al. (2005) discriminate two schools: the network approach of Coleman and Bourdieu, and the communitarian approach of Putnam. Kawachi et al. (2008b) seem to classify two approaches: the social cohesion school of Coleman and Putnam, and the network school of Bourdieu and Lin.

It is Coleman's systematic examination of social capital and its role in the creation of human capital that called multidisciplinary attention to this term (Coleman 1988). Then in his masterwork on *Foundations of Social Theory* published in 1990, he devoted one chapter describing the functionalist definition of social capital, its multiple operationalizations, and structural sources at the meso- and macro-levels. He also emphasized its positive functions and returns at the collective level. Coleman conceptualizes social capital as functional "social-structural resources" derived from structures of social relations: "social capital is defined by its function. It is not a single entity, but a variety of different entities having two characteristics in common: They all consist of some aspect of a social structure, and they facilitate certain actions of individuals who are within that structure. Like other forms of capital, social capital is productive, making possible the achievement of certain ends that would not be attainable in its absence" (Coleman 1990: 302). He justifies such a broad conception by its utility in explaining multiple outcomes and bridging the micro- and macro levels.

A catch-all definition inevitably opens the door for multiple operationalizations. Coleman proposes (1990: 306-13) six forms of social capital that facilitate actions: 1) obligations, expectations of reciprocity, and trustworthiness (i.e., individuals do things for each other and trust each other to reciprocate in the future), 2) information potential from social relations, 3) norms (in particular 'a prescriptive norm...that one should forgo self-interests to act in the interests of the collectivity' (1990: 311)) and effective sanctions,

4) authority relations (i.e., transferrable rights of control between individuals) that can solve common problems, 5) appropriable social organizations (i.e., organizations whose resources benefit their participants), and 6) intentional organizations (i.e., organizations whose resources not only benefit their participants but also the public). His operationalization equalizes social capital with its sources (e.g., organizations) and returns (e.g., information) (Portes 1998). Coleman does not offer specific measurement strategies for each form. He is actually hesitant about the value of social capital as a quantifiable concept (1990: 305-306). In his work on the association of social capital with dropout rates (1988), he measures social capital within the family as the presence of parents, the size of siblings, and mother's expectation for child's education and specifies social capital in the community as religiously-based high schools and the frequency of students' religious attendance.

Coleman also discusses five macro-level structural preconditions that determine the quantity of social capital (1990: 318-321): network closure, stability of social structure, collectivist ideology, affluence, and government support. The first three conditions are positively associated with social capital, while extreme closure could damage social capital instead. The last two conditions decrease social capital, by increasing interpersonal independence and decreasing the maintenance of social relationships.

Coleman holds that social capital functions in both positive and negative directions and at both individual and collective levels. But he obviously emphasizes the positive functions of various forms of social capital for the collective, while admitting that some forms of social capital such as norms can also constrict some actions (1990: 311). Also in contrast with financial (i.e., money), physical (i.e., material objects), and human (i.e., skills and knowledge) capital that can only be privately owned, he (1990: 315-318) argues that social capital is not the private property of individual beneficiaries but a property of social structure. Because it takes the form of public goods, social capital favors not only purposive investors in a structure, but *all* the members of that structure. Coleman's empirical research focuses on the positive role of social capital in educational attainment (1988). He only briefly illuminates the importance of social capital in health care, mentioning that lack of social capital (i.e., trust) between patients and physicians increases the costs of and decreases access to medical care (1990: 303).

Putnam's work on social capital and its association with democracy first appeared in 1993. It is his 1995 article, "Bowling Alone," and its expansion into the 2000 book of the same title that popularized the term of social capital beyond the academic community and into public discourse. Drawing on Coleman's work, Putnam proposes a functionalist definition, mixed operationalizations, and a state-level social capital index. He distinguishes two types of social capital. He emphasizes positive returns of social

capital as public goods. He analyzes macro-level structural sources and returns of social capital.

In Putnam's earlier functionalist definition, social capital facilitates "features of social organization, such as trust, norms and networks that can improve the efficiency of society by facilitating coordinated actions" (1993: 167). In his later definition of social capital as "connections among individuals -- social networks and the norms of reciprocity and trustworthiness that arise from them" (2000: 19), he tends to emphasize the causal directions between different components of social capital. Formal social connections include memberships and participation in formal organizations and activities such as political, educational, recreational, religious, and professional organizations and activities, and connections in the workplace. Informal social connections refer to participation with family, friends, and neighbors in informal social and leisure activities. Networks of social connections increase the productivity of individuals and reinforce norms of reciprocity. Similar to Coleman's explanation, the norm of generalized reciprocity mean that "I'll do this for you without expecting anything specific back from you in the confident expectation that someone else will do something for me down the road" (Putnam 2000: 21). The norm of reciprocity is a community asset that increases efficiency. Honesty and social trust (i.e., trust in other people) lubricate social life. Like Coleman, Putnam equalizes social capital with networks, reciprocity, honesty, and social trust, leaving their causal relations for future

research (2000: 137). He includes other consequences of networks as well such as altruism, volunteering, and philanthropy as alternative indicators of social capital. Putnam also developed a state social capital index (2000: 291). This index contains fourteen items, covering four areas such as community organizational life, engagement in public affairs, community volunteerism, informal sociability, and social trust.

Putnam distinguishes two subtypes of social capital: bonding and bridging (2000). Bonding social capital exists in relationships connecting homogeneous individuals, while bridging social capital lies in connections linking heterogeneous persons. Also bonding social capital works for enhancing within-group reciprocity and solidarity, while bridging social capital facilitates obtaining goods from outside groups. Putnam emphasizes the positive functions of both types of social capital, while he admits that bonding social capital may lead to between-group enmity. This typology has been critiqued from a strict social network perspective, which posits that bonding and bridging are properties of social networks instead of social capital (Lin 2008).

Putnam emphasizes positive functions of social capital at two levels: individual and collective. Social capital is both a “private good” and a “public good” (2000: 20). One’s investment in social capital benefits not only oneself, but also spills over to others. Putnam recognizes that the functions of social capital are sometimes negative for those outside of a given network if social capital is used for antisocial purposes, while generally positive for those within that network.

Putnam reports an overall decline in social capital in American society based on preliminary bivariate correlation analyses. He attributes that decline to multiple macro-level factors, such as pressures of time and money, residential mobility and sprawl, electronic entertainment, and generational change (2000). He highlights the potential of small groups, social movements, and telecommunications, including the use of the internet to offset that decline. He discusses the positive associations of social capital with education and children's welfare, neighborhood safety and productivity, economic development, health and happiness, democracy, and tolerance and equality. Drawing on previous research on network-based concepts such as social integration, social cohesion, and health, Putnam argues for health returns to social capital, without explicitly distinguishing social capital from those concepts. He reports only correlations of social capital at the state level with public health and mortality, and of social connections at the individual level with happiness (2000). It is other researchers who systematically theorized and testified the health effect of social capital using advanced analysis techniques, as I summarize below.

Putnam's approach has stimulated much more empirical studies than other approaches to social capital, but also has received more critiques. Some state that Putnam's analyses contribute theoretically little to the conceptualization of social capital but undermine the value of social capital initiated by sociologists (Fine 1999; Edwards and Holey 1998). Some strongly critique Putnam's methodology "from the perspective

of rigor or analytical depth” (Durlauf 2002a). These weaknesses include conceptual vagueness (i.e., inconsistent and functionalist definitions; the biased statement of network closure or density; the mixed combination of established psychosocial concepts, trust, norm and networks; conceptual stretching such as the confounding leap of social capital from the individual level to the collective level, the transformation of social capital from being relationally and structurally rooted to being social psychological, the addition of ethnic and moral value to social capital that is originally neutral, and the idealist suppression of social conflict), obscure causality (i.e., circularities—social capital as both a cause and an effect, and missing mechanisms), controversial secondary data sources, measurement ambiguity (i.e., the limited equation of social capital with context-independent group membership, or proxies rather than theoretically nuanced measures of social capital), uninformative analysis techniques, overstatement of empirical findings, and the neglect of social capital’s negative functions (e.g., Adam and Rončević 2003; Baum 1999; Butter 2005; Carpiano 2006; Durlauf 2002a, 2002b; Edwards and Foley 1998; Foley and Edwards 1997, 1999; Goldberge, 1996; Harriss and de Renzio 1997; Johnston and Percy-Smith 2003; Levi 1996; Lin 1999b, 2001a, 2001b; Muntaner et al.2001; Paldam 2000; Portes 1998, 2000; Portes and Landolt 1996, 2000; Putzel 1997; Shortt 2004; Whiteley 2000).

2.2 The Network Approach to Social Capital

The network approach, as developed by Bourdieu and Lin, defines social capital as a relational asset available to individuals. Their approach distinguishes social capital from its antecedents and consequences for individuals from a conflict perspective (Adam and Rončević. 2003; Portes 1998). These scholars discuss the interplay between personal and social capital. They assert that networks are preconditions of social capital and exist across multiple contexts. Lin developed a methodologically rigorous instrument to measure social capital embedded in social networks—the position generator. Bourdieu does not discuss measurement, but his proposed elements of social capital (i.e., network size, personal capital of network members) are consistent with social capital indices derived from the position generator. Bourdieu and Lin differ in one important respect. Bourdieu values network closure while Lin emphasizes network bridging. Also, Lin specifies that collective assets such as trust and norms are sources instead of elements of social capital as in the work of Coleman and Putnam.

Bourdieu is the pioneer in the conceptualization of social capital. He introduced this concept in his French version of *Distinction* in 1979 (Adam and Rončević. 2003; Bourdieu 1984). His theory of social capital was originally published in French in 1983, and translated into English for the first time in 1986. He distinguished social capital from its sources and returns in the forms of other types of capital at the individual level. He also discussed its cross-context network embeddedness and its exclusive nature. He did

not explicitly discuss its operationalization and measurement, which paved the way for debates in empirical applications of his work.

Bourdieu was concerned with fundamental causes of social stratification. As he contended, it is the unequal distribution and accumulation of capital that accounts for the production and reproduction of social structure. Capital (Bourdieu [1983] 1986: 241) is “accumulated labor” allowing its possessors to “appropriate social energy in the form of reified or living labor.” It has three essential forms: economic, cultural, and social (Bourdieu [1983] 1986: 242-48). The first two forms are personally owned. Economic capital is material goods invested in mercantile relationships for monetary profits; and cultural capital consists of three subforms: the embodied state (i.e., the cultivation process), the objectified state (i.e., cultural goods), and the institutionalized state (i.e., educational credentials).

In contrast, social capital consists of exclusive resources from durable networks of social relationships. It is “the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition—or in other words, to membership in a group—which provides each of its members with the backing of the collectivity-owned capital, a ‘credential’ which entitles them to credit, in the various sense of the world” (Bourdieu [1983]1986: 248-49). The volume of social capital one has the access to depends on two elements: “the size of the network of connections he can effectively

mobilize” and “the volume of the capital (economic, culture or symbolic) possessed in his own right by each of those to whom he is connected” (Bourdieu [1983]1986: 249).

Since Bourdieu does not discuss specific measures of social capital, these two elements serve as proxy indicators of social capital in his work.

Sources and returns of social capital are other forms of capital. The foundation of capital reproduction and thus stratification reproduction is the convertibility of capital (Bourdieu [1983]1986: 249-55). Economic capital, the root of other forms of capital, creates cultural and social capital, and cultural capital brings economic capital. In turn, social capital generates economic capital (i.e., material profits such as services) and cultural capital (i.e., symbolic profits from being associated with prestigious groups). Despite such convertibility, social capital exerts its unique effects independent from other forms of capital. “These effects, in which spontaneous sociology readily perceives the work of “connections,” are particularly visible in all cases in which different individuals obtain very unequal profits from virtually equivalent (economic or cultural) capital, depending on the extent to which they can mobilize by proxy the capital of a group (a family, the alumni of an elite school, a select club, the aristocracy, etc.) that is more or less constituted as such and more or less rich in capital” (Bourdieu [1983]1986: 256).

Networks of relationships spread across multiple contexts. They are “based on indissolubly material and symbolic exchanges” and “partially irreducible to objective

relations of proximity in physical (geographical) space or even in economic and social space” ([1983]1986: 249). Networks of relationships are the consequence of purposive “investment strategies, individual or collective, consciously or unconsciously aimed at establishing or reproducing social relationships that are directly usable in the short or long term” ([1983]1986: 249). Social exclusion is one of these strategies. Social institutions legitimate and motivate within-group exchanges between homogeneous members, and exclude members whose mistakes threaten group interests (Bourdieu [1983]1986: 249-51).

Lin developed social capital theory based on his original scholarship on social resources theory (Lin 1982; Lin, Ensel and Vaughn 1981; Lin, Dayton and Greenwald 1978). He defines social resources as “resources embedded in one’s social networks. They are not possessed goods of the individual. Rather, they are resources accessible through one’s direct and indirect ties” (1982:132). After reviewing previous definitions of social capital, Lin concludes that these disparate conceptualizations of social capital share the same social relationship perspective. “They all conceive social capital as resources derived from *social relations*, and all claim that social capital is valuable for purposive actions (Lin 2001a: 24). Lin refines his social resources theory as social capital theory, and specifies social capital at the individual level as “resources embedded in a social structure that are accessed and/or mobilized in purposive actions” (2001a: 29).

Lin's social capital theory is rigorous and coherent from the perspectives of theoretical foundation, methodological rules, measurement, and empirical evidence.³ First, in contrast to Bourdieu, Coleman and Putnam, who neglect the insights of classic traditions (Edwards and Foley 1998; Lynch, Due, Muntaner and Smith 2000; Woolcock 1998), Lin grounds his framework in the structural stratification family of capital theories, including the classic theory of capital by Marx and neo-capital theories such as human capital theory and cultural capital theory (2001a, chapter 1). He argues that social capital theory lies in the neo-capitalist theory camp. Second, Lin follows the strict methodological rules of theoretical construction. He explicitly discusses assumptions that underlie social capital theory, proposes mechanisms of how social capital operates, solves Coleman's and Putnam's problem of tautology by differentiating social capital elements, sources, mobilization, and returns. He also clarifies their problem of conceptual multilevel stretching and proposes falsifiable hypotheses (Lin, 2008, 2001a). Furthermore, Lin and his colleagues contributed to measurement precision by developing the position generator, which captures social capital embedded in hierarchical social structures (Lin and Dumin 1986; Lin et al. 2001). Finally, Lin's conception and measurement of social capital has received voluminous empirical support for different outcomes across societies (for reviews, see Burt 2000; Lin 1999a; Marsden and Gorman 2001; Portes 1998).

³ The next chapter gives a detailed introduction to social capital theory as proposed by Lin.

In sum, these divergent constructions of social capital inevitably result in multilevel analysis units, inconsistent measures, elastic practices, and mixed findings (Portes 1998; Woolcock 1998). Extreme solutions to these diverse constructions are useless. It does not make sense either to “disinvest” in this concept (Foley and Edwards 1999) or to expand the universe of this concept as equal to social theory (Fine 2001). Rather, there are solutions to sustain added theoretical and empirical value to this heuristic. Lin’s stringent research approach exemplifies one promising solution to consolidate the potential contribution of social capital (Adam and Rončević 2003).⁴ This dissertation, therefore, is based on Lin’s conceptualization of social capital. I attempt to examine and extend his social capital theory in the field of health inequalities using a unique data set.

2.3 Social Capital and Health: Go Beyond the Normative Approach

As in other fields, social capital quickly gained acceptance as a theoretical tool in the health sciences. Kawachi and colleagues first applied the concept of “social capital,” as conceptualized by Putnam, to explore its association with mortality in 1997 (Moore et al. 2005). A huge multidisciplinary literature has emerged since then. As Figure 1 shows, an “exponentially” growing body of multidisciplinary studies on various health

⁴ Adam and Roncevic (2003) fear that Lin’s stringent research program excludes other approaches. They argue that problems surrounding social capital “have to be resolved coherently within a *particular* approach or research programme”. This argument overlooks how the burgeoning ambiguities have impeded dialogues across disciplines and endangered the theoretical credibility of social capital.

outcomes across time and space has labeled itself as “social capital” research (for recent reviews, see Baum 1999, 2000; Kawachi 1999; Kawachi et al. 2004; Kawachi and Berkman 2000, 2001; Hawe and Shiell 2000; Lochner et al.1999; Lynch, Due, Muntaner and Smith 2000; Macinko and Starfield 2001; Muntaner et al. 2001; Song et al. forthcoming a; Szreter and Woolcock 2004). This huge literature rests on diverse definitions and measures of social capital. A comprehensive discussion of all social-capital-like concepts that are relevant to health is beyond the scope of this dissertation (e.g., Baum and Ziersch 2003). One observation will suffice. The network approach have been understudied, and the normative approach to social capital in particular Putnam’s notion of social capital (as social networks, social integration, social cohesion, and trust) has attracted most attention in the health sciences, including epidemiology, public health, and psychiatry (Carpiano 2006; Macinko and Starfield 2001; Muntaner et al. 2001; Whitley and McKenzie 2005).

Putnam’s formulation of social capital has been developed into different dimensions: structural and cognitive (Bain and Hicks 1998). Structural social capital includes formal and informal social connections, and cognitive social capital involves trust and norms of reciprocity. Social capital has also been measured at multiple levels. Its individual-level measurement reflects individual social capital which exerts compositional effects. Higher-level measurement usually relies on the aggregation of individual responses at the community, state, and even country level and represents

ecological social capital which has contextual effects (De Silva et al. 2007; Macintyre and Ellaway 2000).

Putnam's conceptualization is the most popular but also the most strongly criticized approach for its theoretical and methodological flaws, as noted in the foregoing section. Health studies based on Putnam's work, therefore, suffer equivalent shortcomings. This school of studies generates more problems than answers in the health sciences. Among others, three of the problems that are relevant to health stratification are particularly obvious. First, Putnam's functionalist, communitarian, ideological, and psychological approach to social capital ignores social conflict and structural inequality (e.g., Butter 2005: 197; Edwards and Foley 1998; Foley and Edwards 1997, 1999; Lynch, Smith, Kaplan and House 2000; Lynch, Due, Muntaner and Smith 2000; Muntaner et al. 2001; Robert and House 2000b; Schuller et al. 2000; Shortt 2004). Using his conceptualization, social capital is excluded from the large sociological literature linking social structure to health gradients. In contrast, Lin's social capital theory (2001a) addresses the fundamental inequalities in resources allocation. It is theoretically embedded in the classic stratification framework, and is empirically embedded in a hierarchical social structure (as the next chapter discusses in detail). In addition, some critics object to viewing trust and norms of reciprocity as subjective components of social capital (Cook 2005; Foley and Edwards 1999; Lin 2001a). Social capital is neutral, objective, and rooted in social relationships, which contributes to its

unique heuristic value. Trust and norms are inherently moral and psychological, and separated from network structures and social contexts. For example, studies on the associations of trust and norms with mental health are particularly questionable in terms of causal direction, considering the fact that researchers are trying to explain the relationship between psychological concepts.

Second, some of Putnam's followers have gone too far by restricting social capital to the collective/ecological level as a public good (e.g., Kawachi et al. 2004; Shortt 2004; Lochner et al. 1999; McKenzie 2003, 2004; McKenzie et al. 2002; Szreter and Woolcock 2004; Whitley and McKenzie 2005). They justify their narrow view of social capital in two ways. One is terminological, arguing that social capital is "social", a characteristic of the collective (Kawachi and Berkman 2000). The second is practical, aiming at distinguishing social capital from other relevant established social determinants of health at the individual level, such as social support and social networks (Kawachi and Berkman 2000; Kawachi 1999; Lochner et al. 1999; McKenzie 2003;).

Deep theory and precise methodology defeat this narrow perspective (e.g., Armstrong 2003; Foley and Edwards 1998; Flora 1998; Lin 1999b, 2001a, 2001b; Lin and Erickson 2008; Lynch, Due, Muntaner, and Smith 2000; Portes and Landolt 2000; Portes 1998; Pevalin 2003; Walkup 2003; Webber and Huxley 2004). At the theoretical level, the narrow collective perspective deviates from the original appeal of social capital as Bourdieu, Coleman and Lin theorize, and rejects alternative sociological conceptions.

Social capital is rooted in the traditional stratification family of capitalist theories, all of which are grounded at the micro-level and are measured at the individual level. "Social" refers to individual level social interaction and social relationships where social capital is embedded. What's more, the equalization of social capital with population level social support/networks restricts the value and use of social capital. Social capital can be distinguished from these factors at the individual level as the next paragraphs show. Social capital as a collective trait also suffers methodologically from circular reasoning. Therefore the partial ecological view in Putnam's loose framework tends to treat social capital broadly as a substitute for collective properties, and limits the utility of social capital as a heuristic for health.⁵

Third, Putnam has been criticized for conceptual vagueness and stretching, for example, subsuming the existing idea of social networks directly under social capital. Some of his followers continue to confound social capital with related, but distinct concepts. They integrate or simply equate social capital with related social factors without discrimination, including social networks, social support, social cohesion, social integration, and others (e.g., Armstrong 2003; Baum and Ziersch 2003; Carpiano 2006; Kawachi and Berkman 2000; Szreter and Woolcock 2004; Wilkinson 1996).

⁵ It is arguable whether health should be explored in a multilevel social capital framework (e.g., Hawe and Shiell 2000; Muntaner et al. 2001; Lomas 1998; Whitley and McKenzie 2005). But Putnam's collective approach is divorced from classic capital theories and from social capital's empirical roots in social relationships. The solution for the linkage of the micro and macro level must go beyond Putnam's work. Lin (2008), for example, describes such a solution in his framework.

This practice of uncritical integration also is due to Putnam's loose framework. Thus Putnam's approach is not helpful for developing the potential of social capital for health inequality. It is like "pouring old wine into new bottles" (Kawachi et al. 2004); it is conceptually flawed (Lin 2008); it makes social capital a fashionable metaphor encompassing or subsumed under established ideas (Lynch, Due, Muntaner, and Smith 2000; Shortt 2004); it leaves the diverse construct of social capital more confusing; it puts social capital in the vicious cycle of circularity; it blurs the established literature relevant to these existing notions; and most important, it prevents discovery of the value of social capital for health (Kristotakis and Gamarnikow 2004). Note that this critical issue of uncritical integration also emerges in the limited empirical application of Coleman's and Bourdieu's ideas of social capital in health studies (Carpiano 2006; Drukker et al. 2003; Drukker et al. 2005; Sampson, Raudenbush, and Earls I. 1997; Sampson, Morenoff, and Earls 1999; van der Linden et al. 2003).

It is clear that social capital, social networks, social cohesion, social support, and social integration have something in common. All of them are based on a relationship perspective. But I concur with Almedom (2005) that these terms are not equivalent.⁶ Therefore, a rigorous and distinct definition of social capital is needed. To achieve this,

⁶ The distinctions among similar terms are under hot debate. The limited space here does not allow a detailed discussion of this issue. For reviews, see Armstrong 2003; Baum 1999; Berkman and Glass 2000; De Silva et al. 2005; George 1996; Kawachi et al. 2004; Kawachi and Berkman 2000, 2001; Lin and Peek 1999; McKenzie et al. 2002; McKenzie 2004; Szreter and Woolcock 2004; Thoits 1995; Turner and Turner 1999; Webber and Huxley 2004; Whitley and McKenzie 2005.

scholars have attempted to distinguish their definitions from each other's (Berkman et al., 2000; George 1996; House et al., 1988; House and Kahn 1985). We have made careful efforts to differentiate them elsewhere (Song and Lin 2009). We argue that Lin's definition of social capital provides an opportunity to clarify the social antecedents of health at the individual level.

To begin, social network is "a specific set of linkages among a defined set of persons, with the additional property that the characteristics of these linkages as a whole may be used to interpret the social behavior of the persons involved" (Mitchell 1969:2). Its simplest form is a dyadic social tie. Social network is not a theory but a perspective (Mitchell 1974). It provides guides to explore various network properties, their causes, and consequences. Network properties may be objective, including attributes such as tie strength and relational contents; structural attributes such as network size; and compositional attributes such as network members' characteristics. They may also be subjective, such as network norms. Specific theories such as social cohesion, social integration, social capital, and social support are derived from the network perspective (Berkman et al., 2000; Lin and Peek, 1999; Pescosolido 2007). Social cohesion is the degree of social bonds and social equality within social networks, indicated by trust, norms of reciprocity, and the lack of social conflict (Kawachi and Berkman 2000). Social integration is the extent of participation in social networks, indicated by active engagement in social roles and social activities, and cognitive identification with

network members (Brissette, Cohen, and Seeman 2000). We trace this idea to the 1897 book on suicide by the founder of modern sociology, Emile Durkheim ([1897] 1951) (Turner 2003). Social capital is resources embedded in social networks, measured as structural positions of one's network members (Lin 1999a). Social support is a specific relational content, and is the benefit—the supply of tangible or intangible resources—individuals gain from their network members (Berkman 1984; House 1981; Song et al. forthcoming b). We credit Cassel and Cobb for their seminal works on social support in 1976 (Cassel 1976; Cobb 1976). By comparison, social capital comes from a resource dimension. It uniquely captures structural positions possessed by individuals' network members, which differs from individuals' own social participation; their network members' assistance; and equality, trust, and reciprocity between them and their network members. It is true that certain properties of social networks (e.g., extensity, closure), social cohesion, and social integration can facilitate better health, because human beings are intrinsically social and need others to share and understand. I argue that social capital provides additional value to the explanatory power of social factors. Social cohesion, social support, social integration, and other network properties may not be helpful or useful, if relevant social relations do not have the necessary or right kind of resources to prevent illness or solve health problems.

Thus conceived (see Figure 2), social capital is separate from other relevant but distinct relationship-based health risk factors. Social cohesion as norms is more

upstream in the causal chain, and may regulate properties of other network-based factors. Social integration is positively associated with the quality and quantity of social capital and social support by maintaining old relationships and establishing new ones. Social capital is a source of social support since network members' resources are drawn for various supportive purposes. Social support may therefore be conceived as a downstream factor subsequent to the operation of social cohesion, social integration, social capital, and other network features. The relationships among these network-based factors are indeed reciprocal and dynamic from a longitudinal perspective. For example, the activation of social support, either satisfying and effective or unsatisfying and ineffective, may alter the degree and form of social integration, reconstruct the availability of social capital, and finally reshape the strength of social cohesion. Each of these network-based concepts must be independently measured, and their causal sequence must be systematically investigated. Based on the data set used in this dissertation (see Chapter 5), one of my major goals in this dissertation is limited. I will only be able to examine the relationships among social integration, social capital, and health (see Chapter 4).

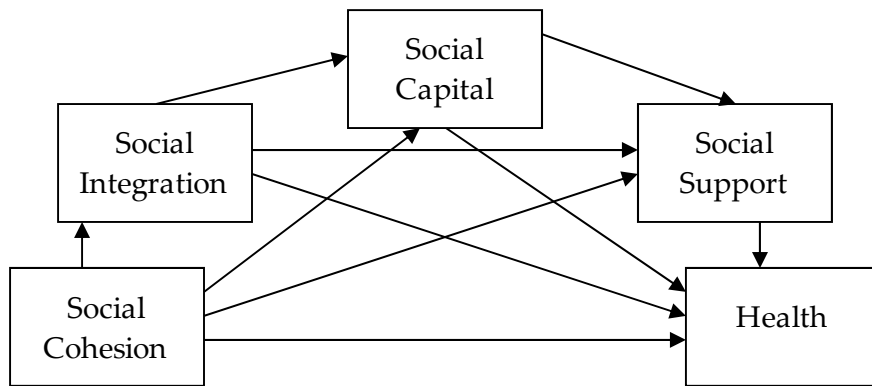


Figure 2: A Conceptual Model of Network-Based Factors and Health

In sum, Putnam’s normative approach to social capital dominates the health literature. This domination constrains the heuristic quality of social capital and has been appropriately criticized. As Lin defines it (2001a), however, social capital has sound theoretical roots in social stratification. It is distinct from related concepts often used in the health sciences. Health research will benefit from a network-based conceptualization of social capital. This dissertation aims to apply this construct to health outcomes. In the next section, Lin’s theory of social capital is described in detail.

3. Social Capital as a Network Resources Theory

3.1 Theory and Methodology

Definition. Lin's book on social capital appeared in 2001 providing a fully developed theoretical scheme (2001a). His theory builds upon social resources theory he and colleagues gradually developed in the late 1970s and the early 1980s (Lin 1982; Lin et al.1981; Lin et al.1978). Lin defines social capital as "resources embedded in a social structure that are accessed and/or mobilized in purposive actions" with expected returns (2001a: 29), where resources refer to material or symbolic goods (Lin 1982, 2001a). Social capital as embedded resources differs from personal capital (i.e., personal resources) (Lin 2001a:41-45). Personal capital is possessed and controlled by an individual actor (e.g., economic capital, human capital and cultural capital). Social capital, in contrast, is relational. It is under the control of other actors, which an individual actor can access and use only through his or her social ties with other actors. Most actors do not have sufficient personal capital to meet their needs. They have to access and use social capital. The classic status attainment model (Belau and Duncan 1967) is only concerned with the importance of parental resources and individual resources for one's achieved structural social location. Obtained structural social location, however, is an outcome of multi-dimensional scarce resources beyond one's own resources and those of one's parents. Therefore, social capital deficit as well as return deficit are independent social precursors of structural inequality, paralleling personal capital (Lin 2001a).

Social capital thus conceptualized contains two levels of constructs, theoretical and empirical. At the theoretical level, the concept is deeply grounded in the classic tradition of capital theories (Lin 2001a, chapter 1), where capital is “investment of resources with expected returns in the marketplace” (Lin 2001a:3). This tradition originates from Marx’s masterly capital theory, and can now be observed in three neo-capital theories (human capital theory, cultural capital theory, and social capital theory), all of which are measured at the individual level. This tradition represents a systematic and coherent approach to social stratification. At the empirical level, social capital is located in a hierarchical and network macro-structure, where individuals are motivated to take purposive action and interaction to maintain and gain valuable resources (Lin 2001a, chapter 3 and 4). Social capital thus defined has sound theoretical, structural and action underpinnings. It fills in “the conceptual gap in the understanding of the macro-micro linkage between structure and individuals” (Lin 2001a: 3). It contributes novel power to and could be integrated with traditional stratification scholarship in sociology.

Typology. Social capital includes two types of resources (Lin 2001a, 2001b). One type, network resources, is static, and consists of resources that alters (i.e., ego-network members) possess and ego can potentially access through his or her connections with those alters. The other type, contact resources, is dynamic, and consists of resources that alters possess and ego also actually used for his or her own purposive actions. This

dissertation focuses on network resources because data about relevant contact resources are not available.

Measurement methodology. Testing social capital theory requires accurate measurement of social capital. One type of social capital, contact resources, can be directly measured as resources (e.g., socioeconomic attributes) of contacts that individuals used in purposive actions. The other type of social capital, network resources, requires a theory-driven network instrument. Lin and his colleagues developed the position generator to measure network resources (Lin et al. 2001; Lin and Dumin 1986). The position generator operationalizes social capital as alters' structural social locations, which are specifically indicated by their occupational prestige scores. Hierarchical occupational position as a synthesizing measure of structural stratification has a long tradition in modern sociology (for a review, see Duncan 1968: 689-90; Grusky 2001: 7; Grusky and Sørensen, 1998, 2001; Hauser and Featherman 1977: 4; Parkin 1971: 18; Parsons 1954, 326-29). Occupations are central to the stratification system in developed societies (Grusky 2001). The hierarchical ranking of occupations captures relative socioeconomic advantages of occupants in the stratification system. Much of the scholarly literature on stratification and mobility has been built on analysis of the hierarchical structure of occupations and its effects on individual life chances.

The position generator maps positional networks. It lists a representative sample of ordered occupational positions salient in a society and asks respondents to identify

contacts (usually relatives, friends, and acquaintances), if any, in each position.¹ If respondents know several people in that type of position, they are usually asked to name the one who occurs to them first. Social capital is indicated by the distribution of accessed positions. This method should catch ego's access to resource locations in the hierarchical structure in a society. It captures networks minimally constrained by strong ties, locations, contents, and homogeneity (Lin et al. 2001; Lin and Erickson 2008). Also, it focuses on the structural positions network members occupy, and catches the core meaning of social capital—resources embedded in social networks.

Network resources can also be derived from two other network instruments: the name generator and the resource generator. The name generator maps personal networks (Fischer et al. 1977; McCallister and Fischer 1978). It asks respondents to name a fixed number of contacts (usually five) with whom they discuss important matters (Burt 1984). Similar to the position generator, it may calculate social capital, for example, based on socioeconomic attributes of named contacts. The name generator captures networks characterized by strong ties (i.e., high-intimacy relationships), small size, higher socioeconomic homogeneity, and bounded contents and locations (Bailey and Marsden 1999; Campbell and Lee 1991; Granovetter 1973; Marsden 1987). New forms of the name generator are more open-ended and elicit rich information about social

¹ Parental status is conceptualized as a source of social capital in the theory, while parental resources are viewed as components of social capital in the position generator. Future studies need to explore the extent to which this overlap influences empirical results, and then decide whether the theory or the methodology should be refined.

networks and social capital, but with high cost (Lin and Erickson 2008). Further, the name generator focuses on individuals rather than structural positions, and fails to capture the full range of resources embedded in social networks (Lin 2006). The resource generator (Snijders 1999; Van der Gaag and Snijders 2004, 2005) directly maps resource networks. It asks respondents to identify contacts associated with a fixed list of useful and concrete social resources across multiple life domains. It measures social capital as the sum score of access to all different resources. The position generator proves to be generalized across societies due to its association with occupational structure common in modern societies, and be more flexible, useful, and efficient in describing access to social capital than the name generator and the resource generator (Lin 1999; Song and Lin 2009; Van der Gaag, Snijders, and Flap 2008).

Assumptions. Social capital theory rests on explicit assumptions about the macro-, meso-, and micro-structures of society (Lin 2001a: 56-59). At the macro level, it presupposes a hierarchical social structure in the shape of a pyramid, where hierarchical positions determine resource allocation. At the meso- and micro levels, it follows the principle of homophilous interaction, and recognizes that that principle applies more to expressive actions than to instrumental actions.

Mechanisms. "Personal resources for most individual actors are very limited. More likely, individual actors access resources through social ties" (Lin 2001a:43). Social capital operates through four pathways to improve successful purposive actions when

personal capital is insufficient (Lin 2001a). First, social capital exerts influences that benefits ego. Second, social capital offers ego information that is otherwise not available to make efficient transactions. Third, social capital works as a social credential representing ego's utility apart from his or her individual resources. Finally, the capability of accessing social capital reinforces ego's confidence and self-esteem and brings emotional support.

Sources. Social capital has two sources, structural and networking (Lin 2001a: 63-77). Structural sources include ego's earlier hierarchical positions, both ascribed (e.g., gender, race, family origins) and achieved (e.g., prior socioeconomic status). Networking sources consist of tie strength (weak ties and strong ties), and network location (closeness to the social bridge in a network). Weak ties and increased closeness to the social bridge in social networks creates more social capital (Burt 1992, Granovetter 1973). Lin criticizes Bourdieu's and Coleman's argument about exclusive or closed networks because it ignores these networking properties (2001a).

Returns. Social capital involves two kinds of purposive actions distinguished by motive, instrumental actions and expressive actions (Lin 2001a: 45-46, see Table 4.1). Instrumental actions are intended to obtain resources and are primarily associated with heterophilous interactions. Expressive actions, in contrast, aim at maintaining resources and are primarily related to homophilous ties. Correspondingly, instrumental returns include wealth, power and reputation, and expressive returns include physical health,

mental health and life satisfaction (Lin 2001b).² The theory recognizes the reciprocal effect between instrumental and expressive actions in that instrumental returns and expressive returns fortify each other. To date, social capital analyses primarily focus on instrumental actions.

Propositions. Social capital theory proposes seven hypotheses about the causal links between social capital with its sources and returns (Lin 2001a: 59-77). One hypothesis regards the return to social capital. It states that social capital increases the success of action. Six hypotheses are concerned with accessing social capital. The strength-of-position proposition claims that ego's earlier hierarchical position is positively associated with access and use of social capital. The strength-of-strong-tie proposition argues that the strength of strong ties is positively associated with accessed social capital for expressive actions, and the strength-of-weak-tie proposition maintains that the strength of strong ties is negatively associated with accessed social capital for instrumental actions. The strength-of-location proposition holds that the closeness of individuals to a bridge in a network is positively associated with accessed social capital for instrumental actions. The location-by-position proposition hypothesizes that the effect of the closeness of individuals to a bridge on accessed social capital for instrumental actions depends on the resource differential across the bridge. Finally, the

² In the last chapter, I would argue that health status is an outcome of both instrumental and expressive actions.

structural contingency proposition asserts that the strength-of-strong-tie proposition, the strength-of-weak-tie proposition, and the strength-of-location proposition have strongest effects for actors placed near or at the two ends of the hierarchy.

Social capital at multiple levels. Lin's initial efforts were mostly geared toward the individual level analysis. Recently, he (2008) extended his original theory to the macro level. He defines two forms of social capital for a collectivity. Internal social capital consists of resources provided by members within a collectivity (i.e., associations, organizations, communities, regions, or nation-states), and external social capital refers to resources accessible from other collectivities with which the focal collectivity is networked.

3.2 Applications and Findings

Social capital theory has guided extensive research for the past three decades. A substantial body of empirical research has examined the propositions and methodology of social capital theory across cultures and societies (for reviews, see Burt 2000; Marsden and Gorman 2001; Lin 1999a; Portes 1998). These studies provide substantial evidence for social sources of social capital as network resources, including parental status, prior achieved socioeconomic status, and tie strength. They also provide strong support for the economic return to social capital as network resources and contact resources in the job market.

In their original studies of working males, Lin and colleagues (Lin, Ensel, and Vaughn 1981; Lin, Vaughn, and Ensel 1981) demonstrate that father's status and job seekers' education is positively associated with the status of contacts used in the job search process and that contact status is positively associated with attained status. Lin and Dumin (1986) use the original form of the position generator, and report that father's occupational status and weaker ties offer better network resources. Campbell, and colleagues (Campbell, Marsden, and Hurlbert 1986) measure network resources as network range and composition through the name generator, and report a positive association between network resources and ego's education, occupational prestige and family income. Marsden and Hurlbert (1988) measure contact resources using multiple indicators. As they find, education and prior prestige are positively associated with contact's prestige; prior core sector is positively associated with using a contact at a core sector and with using a contact connected to the current firm. Contact's prestige is positively related to current occupational prestige; using a contact at the core industrial sector is positively associated with employment at the core industrial sector and with employment at more closely supervised positions. Green and colleagues (Green, Tigges, and Browne 1995) find that network resources indicated by the number of the employed in close networks is positively associated with annual income. Lai and colleagues (Lai, Lin, and Leung 1998) measure network resources using the position generator, and find positive associations between prior attained status (i.e., education and first job status)

and network resources (i.e., a factor score derived from extensity, upper reachability, and range), between network resources and contact resources (i.e., contact's job status), and between contact resources and current job status. Recently Lin and Ao (2008) find that age, being white (versus being black), prior job experience, and social participation is positively associate with network resources (i.e., a factor score derived from extensity, upper reachability, and range) individuals had access to when they started their current or last job; and network resources are positively associated with the receipt of routine job information, supervision, annual income, and high wage.

Researchers also explore sources and returns of social capital in non-US societies. In Germany (Wegener 1991), contact's prestige are positively associated with the prestige of the found job. In Netherlands, contact's prestige are positively associated with the prestige of current job (De Graaf and Flap 1988), and network resources (i.e., a factor score derived from work contacts and memberships in elite and professional associations) are positively associated with income (Boxman, De Graaf and Flap 1991). In urban China, a most recent study (Lin, Ao, and Song 2009) demonstrates that age, being male, education, job experience, the location of work units in state-administered cities (versus the location of work units in other cities), and social participation are positively associated with network resources (i.e., a factor score derived from extensity, upper reachability, and range) respondents had access to when they started their current

or last job, and that network resources is positively associated with supervision and annual income.

The application of social capital theory to the job search process has raised one major criticism regarding causality (Mouw 2003, 2006).³ According to this critique, the positive associations between network resources, contact resources, and respondent's achieved status are spurious, reflecting not a social capital effect but rather a homophily effect (i.e., people tend to interact with others who have similar characteristics). This methodological critique challenges the value of social capital theory, highlighting the need for future studies on the measurement of social capital and on the specific mechanisms by which social capital exerts its effect.

Proponents of social capital theory responded to this critique through both theoretical arguments and empirical studies. First, this critique ignores social capital theory's focus on timing. Social capital theory hypothesizes that accessed network resources and contact resources used before the respondent achieved his or her current status contribute to the respondent's current status net of the respondent's prior status (Lin 2008). Longitudinal retrospective studies across societies empirically support this hypothesis (Lin et al. 2009; Ao 2007). Second, this critique overlooks the "invisible hand" of social capital (Lin 2000). Social capital can affect the job attainment of searchers and

³ It is necessary to review this issue here because it can also be raised in the application of social capital theory to health outcomes. The corresponding responses from social capital theory help to support my later argument on the link between social capital and health.

non-searchers (i.e., actors not actively searching for jobs) by providing information and influence, an issue not addressed in traditional job search surveys. Qualitative and quantitative studies using both cross-sectional and retrospective longitudinal data have demonstrated unsolicited information return to social capital in the job market (Lin and Ao 2008; Lin 2003; McDonald and Elder 2006; McDonald 2005).

Despite the substantial applications of social capital theory to indicators of economic wellbeing and its potential implications for maintaining and promoting physical and mental well-being, there is a lack of research on the contribution of social capital to physical and mental health. Little is known about how social capital may protect health (for a review, see Berkman et al. 2000; Berkman and Glass 2000; Butter 2005; Lin and Peek 1999; Song et al. forthcoming a). There are only four exceptional quantitative studies, primarily because network instruments are not available in most secondary data. All these four studies were based on cross-sectional data. Three of the four document health returns to social capital as Lin defines it, and all of them report supportive evidence (Acock and Hurlbert 1993; Song and Lin 2009; Webber and Huxley 2007). Acock and Hurlbert (1993) applied Lin's original social resources theory (1981) to health outcomes. They analyzed 1985 General Social Survey data. The name generator was used to calculate the mean educational level of named contacts to indicate social capital. They demonstrated the importance of social capital in that social capital enhances ego's life satisfaction and suppresses ego's anomia. This study has two

limitations. One shortcoming concerns the use of the name generator. As discussed earlier, the name generator is not as efficient and accurate as the position generator to map social capital. The second weakness of this study is the use of education as an indicator of alters-possessed resources. Education is a major mediator in the process of resource attainment and status achievement. It has different stratification implications for health status from other socioeconomic indicators such as occupation (Adler and Newman 2002). Rather than education, an advantage of the position generator is that it captures social capital based on alters' occupation.

Webber and Huxley (2007) adapted the resource generator originally developed in the Netherlands, and constructed a 27-item resource generator, which was used for U.K. respondents. These items form one scale, and also reflect four subscales including domestic resources, expert advice, personal skills, and problem solving resources. That scale, as well as two of the other subscales (i.e., domestic resources and personal skills) were negatively associated with mental disorder.

Song and Lin (2009) use the 1997 Taiwan Social Change Survey data, obtained from an island-wide stratified probability sample of adults in Taiwan. They measure social capital using two name generators and one position generator. One name generator asked respondents to name at most five contacts with whom they had communicated in the last year to discuss worries and personal problems; the other asked respondents to name at most five contacts from whom they solicited actual help or

information in the last year when encountering difficulties in life. The position generator listed a sample of fifteen ordered occupational positions salient in Taiwan, ranging from housemaids/cleaning workers up to physicians. Social capital (a factor score derived from extensity, upper reachability, and range) measured through the position generator instead of the name generators is significantly negatively associated with depression and positively associated with enhanced self-reported health net of social support and personal capital. Also social capital interacts with education. Its negative effect on depression is stronger for those with less education.

The fourth study (Grimm and Brewster 2002) is praiseworthy for its linking social capital theory to health. Its conceptual model, however, diverges from Lin's formulation of social capital. Grimm and Brewster (2002) construct a health-related social capital model. In their study, network resources are defined as "access to and use of interpersonal health-related resources available in networks of family and friends as well as others such as neighbors or fellow workers." This form of social capital is operationalized as the sum of "in-home caring during the last year for a member of the immediate family or someone outside the immediate family for longer than two weeks (=1), asking friends for medical advice (=1), giving money to family members' health funds (=1), talking to clergy about health problems (=1), having a physical impediments that prevents visiting friends or relatives (=1), and having no physical impairments preventing church or meeting attendance (=1)". Contact resources are defined as "the

range of providers available to and used by household members,” and operationalized as the sum of “receiving home health care treatment (=1), seeing an alternative provider (chiropractor, acupuncturist, massage therapist, or herbalist) (=1), seeing a physical or occupational therapist (=1), seeing a physician for a general physical exam (=1), seeing a physician to have a prostate check (=1), seeing a physician to have a mammogram (=1), seeing a physician to have blood pressure screened (=1), seeing a physician for a cholesterol screening (=1), having an eye exam (=1), and attending a wellness seminar (=1)”. Results show that network resources thus defined protect physical functioning, but network resources and contact resources do not improve life satisfaction or suppress stress.

Obviously the conceptual model in this study is different from Lin’s original conceptualization of social capital. This research borrows two notations from social capital theory (network resources and contact resources), and then equates them with other social precursors of health, such as social support, social integration, health care utilization, and health limitations. Nor does this study use the position generator method or other network instrument to measure social capital. Therefore the adaptation of Lin’s social capital theory to health requires additional efforts.

In sum, Lin’s social capital framework consists of both grounded theory and precise methodology. Its hypotheses have received broad empirical support in the area of socioeconomic status attainment across societies. However, its theoretical attention to

health returns from social capital is incomplete, and lacks empirical research. It is not clear, whether social capital as measured by the position generator affects health in the U.S. population. It is also not clear how social capital thus conceived and measured interplays with other established health risk factors. I will explore these two research questions using a unique data set from a national sample of the U.S. adults (aged twenty-one to sixty-four, currently or previously employed). This data set contains information on positional networks captured through the position generator. Based on this data set, I propose research hypotheses in the next chapter.

4. Social Capital Matters to Health: Research Hypotheses

Social capital can shape health status in multiple ways. As Figure 3 shows, this dissertation explores four types of health effects social capital may exert: direct effect, mediating effect, indirect effect, and moderating effect. Due to the limits of available data, this dissertation considers only four groups of established health risk factors as control variables when examining the direct health effect of social capital: four demographic factors (i.e., age, gender, race/ethnicity, marital status), three objective social status indicators (i.e., education, occupational status, and income), social integration, and subjective social status. The direct effect of social capital net of these control variables is represented by Path a in Figure 3. If social capital does have a direct health effect, I will further explore whether social capital mediates the health effect of demographic factors, objective social status, and social integration, represented by Path b in Figure 3. I will also analyze whether social capital determines health indirectly through subjective social status, represented by Path c in Figure 3. Finally, I will verify whether social capital interacts with each of the four groups of well-documented social antecedents of health, represented by Path d. Next, I propose four groups of hypotheses in detail, which include ten research propositions in total.

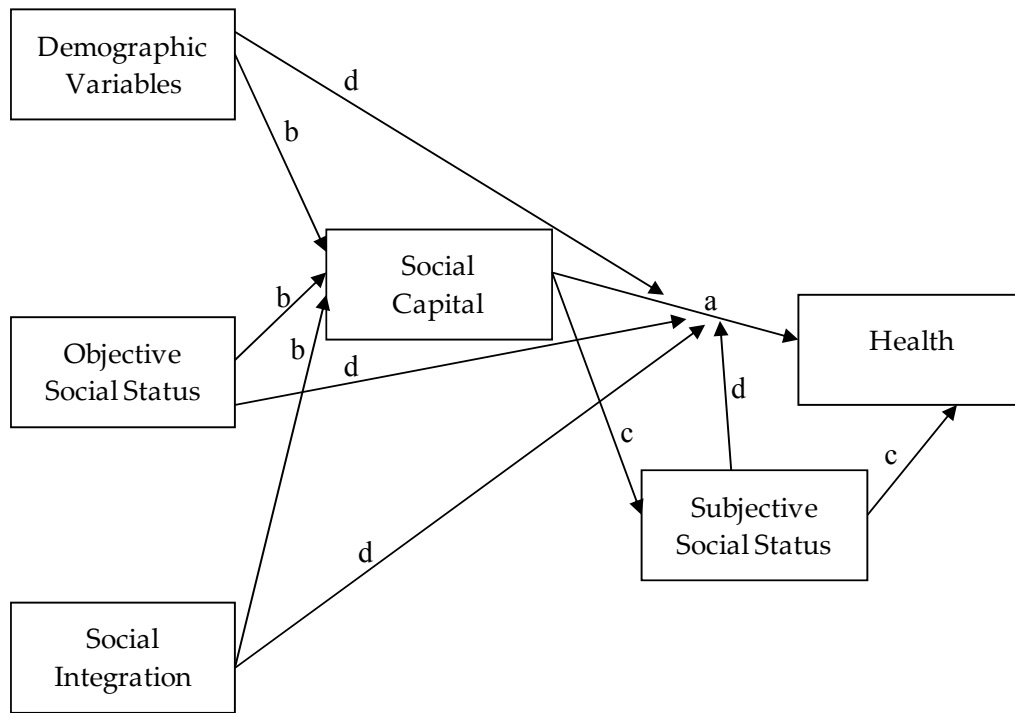


Figure 3: Structural Equation Modeling of Social Capital, Demographic Variables, Objective Social Status, Social Integration, Subjective Social Status, and Health (Theoretical)

4.1 Direct Effect

To understand the rationale for why social capital shapes health directly, it is a necessary to take into account the well-documented literature on the social distribution of health by personal capital. Social capital consists of resources embedded in one's social networks, in other words, the personal capital of one's network members. Personal capital can become social capital as long as it flows through social relationships, that is, as long as it is transmitted from one person to the other. The

fundamental cause theory of disease and illness (Link and Phelan 1995, 1996, 2000), one of the most established approaches in medical sociology, can help us understand the direct role of social capital in the social organization of health in comparison with personal capital.

The fundamental cause theory of disease and illness is an important structural approach to health inequality (Robert and House 2000a). It argues that certain social conditions are fundamental causes of health inequality (Link and Phelan 1995, 1996, 2000). It has four central premises. First, it states that the persistent association between social conditions and disease is not an artifact, rather, it represents a major causal force. Second, it claims that this association is not a function of natural selection driven by pre-existing biological factors and personality. Third, it contends that this association is not a function of social selection driven by the previous health status. Additionally, it argues that cultural and behavioral factors could not account for the association between social conditions and disease. Thus, its central argument is that these persistent associations have roots in the causal effect of social conditions on disease and illness rather than vice versa.

The fundamental cause approach also has five key propositions about the features of fundamental causes (Link and Phelan 1995). In brief, the fundamental cause approach posits a dynamic, persistent and predictable association between social conditions as resource locators and multiple outcomes of disease and illness through

multiple risk mechanisms. One's own social location or personal capital as a "resource locator," primarily indicated by socioeconomic status (SES), has proved to be a fundamental cause of health stratification (Link and Phelan 1995, 1996, 2000).

Therefore, the fundamental cause theory of disease can explain the direct effect of social capital on health status. The fundamental cause theory of disease argues that SES, a resource locator at the individual level, is a fundamental cause of illness. Social capital, measured through the SES of one's network members, provides resources that are non-redundant with personal capital. Therefore, social capital could serve as a relational resource locator and could be another fundamental cause of disease. Thus both personal capital, indicated by SES, and social capital have independent effects on health.

The previous two chapters provided the underlying theoretical rationale for the potential added value of social capital for understanding the social antecedents of health. Social capital supplements established social determinants of health, including personal capital and other relationship-based social factors (e.g., social networks, social cohesion, social support, and social integration). Most actors' personal capital, I argue, is not sufficient to maintain and promote health. Further, previously identified relationship-based social factors are not resource-oriented, and may not provide health-relevant resources in need. In contrast, social capital uniquely captures resources

embedded in social relationships. Therefore, I propose the direct-effect proposition, represented by Path a in Figure 3:

H1: Social capital has a direct positive effect on health net of other variables.

4.2 Mediating Effect

Social capital is an endogenous social factor. If it proves to exert a direct effect on health, it may also mediate the health effects of its social antecedents. To explain the rationale for the mediating effects of social capital in the social production of disease and illness, it is necessary to draw on literature on the social production of social capital. Due to the limits of available data, I consider only three types of sources of social capital: four demographic factors (i.e., age, gender, race/ethnicity, and marital status), objective social status, and social integration.

Current social capital theory, as I reviewed in Chapter 3, does not predict the relationship of age with social capital. From a life course perspective, I speculate that individuals take part in more social interaction and develop more social skills over time, and thus establish more new ties and maintain more old ties more successfully over time. Individuals, therefore, accumulate more social capital from their expanding social networks over time. Some may argue that individuals' social networks and social capital will decrease after they retire from their work. Available data, as I describe in the next

chapter, collected information from adults aged twenty-one to sixty-four in the United States, while the normal retirement age in the United States is sixty-five. Thus, I propose a positive association between age and social capital based on the age range of the analytic sample. Whether the relationship between age and social capital is linear or nonlinear is beyond the scope of this dissertation.

H2: Age influences health indirectly by increasing social capital.

Current social capital theory proposes that ego's ascribed hierarchical positions are associated with ego's access to social capital (Lin 2001a). The distribution of social capital differs across ascribed social categories. Women and nonwhites, in comparison with men and white, are disadvantaged in obtaining quality social networks and quality social capital (for a review, see Lin 2000). Thus I propose that social capital can mediate the health effect of gender and race/ethnicity.

H3: Being male influences health indirectly by increasing social capital.

H4: Being white (versus being black or Latino) influences health indirectly by increasing social capital.

Current social capital theory does not explicitly speculate about the relationship between marital status and access to social capital. Marital status may influence accumulated social capital in either a positive or a negative direction. On the one hand, marriage can increase the quantity and quality of social capital. Spouses introduce each other to their social circles and network members, and have each other's network size and diversity enlarged, resulting in increased social capital. On the other hand, marriage can decrease the richness and volume of social capital. Marriage as a social institution constrains discretionary time and other resources within families. It helps maintain and enhance former strong ties with family, and decreases the chances to establish new weak ties. Social capital is positively associated with the strength of weak ties. As a result, marriage can decrease married individuals' social capital. I propose two hypotheses to determine which possibility is more likely (H5a and H5b). Considering the fact that the majority of marriages are homogamous in terms of age, race/ethnicity, religion, socioeconomic status, and very likely social networks and social capital. I argue that the second hypothesis (H5b) is more likely than the first one (H5a). Note that it is possible that the association of social capital with marital status may be reciprocal. People with more social capital may have greater chances to find a mate and get married. Due to the limits of cross-sectional data, the causal direction in the relationship of social capital with marital status is beyond the scope of this dissertation.

H5a: Being married influences health indirectly by increasing social capital.

H5b: Being married influences health indirectly by decreasing social capital.

Current social capital theory proposes that ego's prior achieved hierarchical positions are positively associated with ego's social capital (Lin 2001a). Empirical studies show that individuals perceive high-status people as having high levels of valuable resources (Thye 2000) and prefer to interact closely with those of higher status than those of comparable status (Laumann 1965, 1966; Laumann and Senter 1976; Thye 2000). Obtaining social capital through social interaction with high-status people involves investment of various resources. Individuals with higher objective social status possess more personal capital, and are more able to make such investments and are more likely to succeed in attaining social capital. It is likely that objective social status impacts health indirectly through social capital (H6). Note that it is possible that the association of social capital with objective social status may be reciprocal. People with more social capital can achieve higher socioeconomic status in the job market. Due to the limits of cross-sectional data, the causal direction in the relationship of social capital with objective social status is beyond the scope of this dissertation.

H6: Objective social status influences health indirectly by increasing social capital.

Finally, social capital can be a product of another network-based factor, social integration. As explicated in Chapter 2 (see Figure 2), social integration generates opportunity structures for creating social capital. It increases the probability of finding and recruiting more weak ties, maintaining existing social relationships, and increasing network resources (Lin and Ao 2008). Therefore, social integration is expected to affect health indirectly through its contribution to the quality and quantity of social capital (H7). Note that it is possible that the association of social capital with social integration may be reciprocal. People with more social capital may be more likely to be recruited by voluntary organizations, or be more willing to participate in voluntary activities, or be more able to afford the cost of voluntary participation. Thus they may have a higher level of social integration. Due to the limits of cross-sectional data, the causal direction in the relationship of social capital with social integration is beyond the scope of this dissertation.

H7: Social integration influences health indirectly by increasing social capital.

4.3 Indirect Effect

Social capital can affect health status indirectly through multiple mechanisms. Current social capital theory, as described in Chapter 3, proposes four mechanisms by which social capital influences purposive actions: 1) influence, 2) information, 3) social credentials, and 4) reinforced self-esteem and emotional support (Lin 2001a). These four mechanisms can apply to health outcomes. Apart from the four pathways, I also propose another five mechanisms relating social capital to health: 5) material support, 6) healthy norms and behaviors, 7) stressors, 8) health services use, and 9) enhanced subjective social status. Note that I am only elaborating how social capital can affect health indirectly. Available data do not have information on health influence, health information, social credential, psychological attributes such as self-esteem, material support, healthy norms and behaviors, stressors or undesirable life events, or health services use. The limits of available data, thus, do not allow me to directly test these proposed mechanisms except for the ninth subjective social status.

First, social capital can provide health influence that is otherwise not available. Health influence has two levels. Its macro level corresponds to health policies and its micro level corresponds to sense of control. Both levels exert direct effect on individual health status. At the macro level, higher-status groups have greater power in a hierarchical society, and thus dominate health policy-making and the social allocation of health benefits and services (Adler et al. 1994; Williams and Collins 1995). At the micro

level, higher-status individuals have a greater sense of personal control that promotes health, especially mental health (Adler et al. 1994; Butter 2005, chap. 11; Link, Lennon and Dohrenwend 1993; McLeod and Nonnemaker 1999; Ross and Wu 1995). Both levels of health influence can be transmitted through social ties. Therefore, actors with more social capital, that is, actors with higher-power network members, are more likely to benefit from both macro-level and micro-level health influence than those with less social capital.

Second, social capital embedded in social ties located in critical hierarchical positions, can provide valuable and updated health information otherwise not available. Health information includes knowledge about health risks, health lifestyles and behaviors, medical care, health insurance, public health programs, health services and so on. Such knowledge could exert direct salutary effects on health. Individuals with more personal capital are more likely than those with low levels of personal capital to be exposed to, be aware of, control, access, and utilize high quality and new health information (Adler et al. 1994; Link and Phelan 1995; Williams and Collins 1995). Information is also transmitted through social networks. Therefore actors with more social capital, that is, actors with higher-status network members, are more likely to obtain valuable health information than those with less social capital.

Third, social capital can be conceived as social credentials that provide access to health resources. Social credentials could promote health directly, for example, through

intervention in the medical care process. A qualitative study provides a good case in point. “Marie Jones, a 50-year-old church member, described a time when she was hospitalized and near death from an IUD infection. She told the nurse that her ex-husband, a physician, would be calling to consult, but the nurses thought she was hallucinating, not believing that Sister Jones, a black woman, could be married to a doctor. Her care changed dramatically when her ex-husband, a physician, advocated for her” (Abrums 2000:101).

Fourth, social capital could reinforce psychological resources such as self-esteem and confidence. There is evidence for the direct effect of personal socioeconomic resources on psychological resources (e.g., House et al. 1994; Murrell, Salsman and Meeks 2003;). Social capital as a relational resource locator is independent of personal capital, and may also help maintain and create psychological resources. Promoting psychological resources serves as emotional support and directly enhances one’s mental health (Lin 2001a).

In addition, there is a material rationale for the linkage of social capital to health. Material conditions (i.e., income and wealth), primarily determined by occupational position, influence health in that they control access to health care and insurance, nutrition, housing, schooling, and recreation; minimize the exposure to undesirable financial life events; and enhance financial coping resources (Adler and Newman 2002; Adler et al. 1993; Macintyre 1997; McLeod and Kessler 1990; Ross and Wu 1995;

Williams 2002; Williams and Collins 1995). Material resources can be transmitted through social networks, for example, in the form of financial transfers. Social capital could offer material support otherwise not available for maintaining and promoting health. Therefore actors with more social capital, that is, actors with high-income network members, are more likely to be able to afford good health insurance, quality health care, and other material conditions, and are less likely to experience financial problems than those with less social capital.

Furthermore, social capital can influence health through healthy norms and healthy behaviors. The cultural/behavioral model (Macintyre 1997) proposes health behavior as one mediator of SES differences in health. It argues that individuals with higher SES are less likely to engage in risky behaviors and lifestyles (e.g., smoking, alcohol, poor diet, lack of sleep, physical inactivity, overweight), probably because they have greater access to information about healthy behaviors and can afford healthy lifestyles (e.g., Adler and Newman. 2002; Adler et al. 1994; Adler et al. 1993; House et al. 1994; Lantz et al. 1998; Marmot et al. 1997; Macintyre 1997; Mulatu and Schooler 2002; Ross and Wu 1995; Williams and Collins 1995). Again social capital increases health-relevant information, influence and material resources otherwise not available. Actors with more social capital are less likely to engage in risky behaviors and lifestyles than those with less social capital. Thus social capital could shape health through this behavioral mediator.

Additionally, social capital can influence health through stressors. The established stress paradigm (Pearlin et al. 1981) provides the framework for linking social capital to health. Social capital could influence. Stress research shows that economic related life events (i.e., involuntary job disruptions) and the resultant economic strains can increase depressive symptoms. As the social capital literature shows, earlier socioeconomic status increases access to social capital, and social capital has positive effects on later socioeconomic status. Thus social capital may serve as a mediator of the relationship between economic stressors and health, and may have an indirect health effect by decreasing economic stressors.

Besides, social capital can impact health through the use of health services. The behavioral model of health services use has experienced four phases of development since it was first proposed in the 1960s by Anderson (Andersen 1995). In its most recent version, one major component is population characteristics, including predisposing characteristics, enabling resources and need. Predisposing characteristics include social structural location (e.g., education and occupation) and health beliefs (e.g., health knowledge). Enabling resources include income and health insurance. Again social capital increases health information and material resources otherwise not available, and contributes to personal economic status. Thus, social capital influences predisposing characteristics and enabling resources. Also social capital provides non-redundant

resources compared with personal SES. Therefore, social capital can fit into this behavioral model as one of population characteristics.

Finally, social capital can influence health through subjective social status.

Subjective social status, namely subjective class identification, is "*a feeling on his part of belongingness to something; an identification with something larger than himself*" (Centers 1961 [1949]: 27). The contribution of social capital to subjective social status rests on the principle of maximizing subjective status. According to Collins, "Every individual maximizes his subjective status according to the resources available to him and to his rivals...people hold the keys to each other's identities...men live in self-constructed subjective worlds; ...others pull many of the strings that control one's subjective experience" (1975:59-60). The maximization principle implies a relational perspective on subjective social status. As this perspective argues, the formation of subjective social status goes beyond the effect of one's own objective characteristics; social interaction and social relationships also play a crucial role in subjective class assignment. Pioneering scholars of this approach contend that "multiple group membership" (Parsons 1940; Rosenberg 1953); "group life" with social contacts (Gordon 1949), "social relationships and participation" (Kornhauser 1950), and "mediated relations" with network members (Wright 1989) blur and break the class boundaries that are marked by individuals' own status characteristics alone, and therefore shape their perception of class position in contemporary heterogeneous and hierarchical societies. Hodge and Treiman (1968)

contend that “a person’s class identification depends as much on who he knows as on where he is in the class structure.”

Hodge and Treiman (1968), for example, used a national area-probability sample, and measured high status contacts and low status contacts with a three-point scale, based on whether respondents had friends, neighbors, and relatives who have high-status occupations (professionals or businessmen) or low-status occupations (factory or unskilled workers). They found that “the net effects of low and high status contacts on class identification are greater than those of education and family income and as large as that of main earner’s occupational SES” (1968: 546-47). A recent study (Song and Lin 2006) shows that respondents’ social capital at the time they started their current or last job has a direct positive effect on respondents’ current subjective class identification. Thus social capital is expected to be positively associated with subjective social status. The positive health effect of subjective social status has been well documented (for a review, see Schnittker and McLeod 2005; for a recent study see Singh-Manoux, Adler, and Marmot 2003). Thus I expect subjective social status to mediate the health effect of social capital (H8). Note that it is possible that the relationship between social capital and subjective social status is reciprocal. People who identify with higher class positions may be more likely to interact with people with higher social status and accumulate more social capital. Due to the limits of cross-sectional data, the causal direction in the

association of social capital with subjective social status is beyond the scope of this dissertation.

H8: Social capital influences health indirectly by increasing subjective social status.

4.4 Moderating Effect

I am also interested in the interaction of social capital with other health risk factors. Current social capital theory does not predict moderating relationships. From a conflict perspective, I propose two alternative hypotheses to determine which moderating process is empirically observed. One hypothesis is the “compensation effect proposition.” People in disadvantaged social status are more motivated to resort to social capital for health resources. Thus their health is likely to benefit more from social capital than that of those in advantaged social status (H9). The alternative hypothesis is the “cumulative advantage proposition.” People in advantaged social status are able to invest more resources in mobilizing social capital, and to obtain health resources from their network members more successfully and more efficiently. Thus their health is likely to benefit more from social capital than that of those in disadvantaged social status (H10).

Younger individuals are disadvantaged in that they tend to have less experience and accumulate fewer personal resources than older individuals. Women and nonwhites are disadvantaged and achieve fewer resources than men and whites. The single are disadvantaged in that the married share personal resources with their spouses. Individuals with lower objective and subjective social status are disadvantaged in that they possess fewer resources, physically or psychologically. Individuals with lower level of social integration are disadvantaged in terms of their small social networks and fewer social contacts.

H9: Social capital exerts a stronger health effect for younger individuals, women, nonwhites, the single, individuals with lower objective social status, individuals with lower levels of social integration, and individuals with lower level of subjective social status than for older individuals, men, whites, the married, individuals with higher objective social status, individuals with higher level of social integration, and individuals with higher subjective social status.

H10: Social capital exerts a stronger health effect for older individuals, men, whites, the married, individuals with higher objective social status, individuals with higher levels of social integration, and individuals with higher subjective social status than for younger individuals, women, nonwhites, the single, individuals with lower

objective social status, individuals with lower levels of social integration, and individuals with lower subjective social status.

5. Research Design

5.1 Data

Data were drawn from the thematic research project “Social Capital: Its Origins and Consequences,” sponsored by Academia Sinica, Taiwan, through its Research Center for Humanities and Social Sciences, and the Institute of Sociology. They are two-wave, three-society panel data collected simultaneously in the U.S., China and Taiwan. I will use the U.S. data, which were collected from a national sample of adults aged twenty-one to sixty-four, currently or previously employed. The first wave was collected in November 2004 – April 2005 using a random-digit dialing telephone survey. A CATI system was utilized to conduct the interviews.¹ During the survey process, another sampling criterion was used to aggressively recruit more qualified minorities (especially African Americans and Latinos) so that the sample approximates the census ethnic distribution. A dummy variable, *quota*, was created to identify respondents sampled after the recruitment change (*value=1*). All analyses in this dissertation will control for this variable. The response rate among those who were qualified and agreed to

¹ For more information on data collection, see Lin and Ao (2008). “The fieldwork was conducted from November 2004 to April 2005. When they were connected by phone, the interviewer asked for the person who fit the screening requirements. If multiple persons were qualified, the person whose birthrate was closest to July 1 was sought. If the qualified person was not available, a follow-up call was made. The interview took thirty-four minutes on average. About 30 percent of those contacted were qualified and agreed to participate; this was slightly less than but close to the rate obtained in typical telephone community surveys, about 35 percent. The response rate among those who were qualified and agreed to participate was 43 percent. Fieldwork was typically conducted from 5:30 – 8:45 p.m., Monday–Friday and Saturdays. On Sundays dialing was conducted from 10 a.m. to 2 p.m. (all local times).”

participate was 43 percent. The final sample consists of 3000 respondents. The second wave was collected in January-June 2007. Only 941 respondents were successfully followed. The attrition rate from the first wave to the second wave (2007) is substantial-- over 68 percent. Considering that substantial attrition rate, I use only the first wave data in my empirical analysis.

Listwise deletion of cases with missing values on the variables of interest would incur a loss of 19 percent of the total sample. To correct the missing data bias, I employed a multiple imputation method for missing values in the independent variables. Before the operation of multiple imputations, I excluded sixty-one respondents from the analysis sample who knew no one in each of the listed twenty-two occupational positions (described below) in the measurement of social capital, because, for them, I could not derive meaningful values on the social capital indices. I generated an imputed version of the raw data based on ten imputations using one Stata user-written program, *Ice* (Royston 2004, 2005a, 2005b), and created ten imputed data sets. Each data set includes 2,939 respondents. My multivariate analyses using *Mplus* were based on those ten imputed data sets. Parameter estimates were averaged across those ten data sets.

A summary of sample characteristics is shown in Table 1. I report means or percents of most variables based on the first out of ten imputed data sets using Stata. The measurement of each variable is described in the next section.

Table 1: Summary of Sample Characteristics

	Mean or Percent	SD
Health Outcome		
Summed depressive symptoms	6.18	5.66
Demographic Variables		
Age (mean)	37.48	10.53
Gender (1=Female)	50.47	
Race/ethnicity		
White	69.31	
Black	11.77	
Latino	13.20	
Others	5.72	
Quota	43.52	
Married	64.04	
Objective Social Status		
Education		
High school or less	39.16	
Associate degree	20.93	
College degree	25.14	
Master degree or above	14.77	
Occupational prestige score (last/current job) (mean)	45.70	13.99
Annual Family Income (1= 90,000 or more) (USD)	23.99	
Subjective Social Status		
Lower class	5.75	
Middle-lower class	16.13	
Middle class	58.05	
Upper-middle class	17.73	
Upper class	2.35	
Social Integration (voluntary participation)	74.45	
Household size	3.22	2.01
Number of observations	2,939	

5.2 Measures and Descriptive Analyses

Depression is the health outcome examined in this dissertation. It is measured by 13 items from the CES-D scale (the Center for Epidemiological Studies Depression Scale) (Radloff 1977). Each respondent was asked, "please tell me how often you have felt this way during the past week." The 13 items are: "I did not feel like eating; my appetite was poor," "I felt like everything I did was an effort," "My sleep was restless," "I felt depressed," "I felt lonely," "People are unfriendly," "I felt sad," "I could not get going," "I was bothered by things that usually do not bother me," "I felt I could not shake off the blues even with the help of my family/friends," "I felt fearful," "I had crying spells," and "I felt that people disliked me." ²These indicators are rated on a four-point scale (0=rarely or none of the time: less than one day in the past week; 1=some or little of the time: 1-2 days in the past week; 2=occasionally or moderate amount of time: 3-4 days in the past week; 3=most or all of the time: 5-7 days in the past week). To determine the reliability of this scale, I used Stata to compute Cronbach's alpha (Cronbach 1951). The reliability coefficient of the scale is .85, indicating acceptable internal consistency. I calculated the summed total score of these thirteen items, which ranges from 0 to 39. Higher values indicate more depressive symptoms. This total score has a mean of 6.18 and a standard deviation of 5.66. I also examined the normality of the distribution of this total score. As Figure 4 shows, this total score has a rightly skewed distribution. Tukey's

² The positive items in the original CES-D scale were not used, due to their lower reliability and confounding with response set (e.g., Stansbury, Rield, and Vellozo 2006; Lin 1989).

ladder of power transformations (Tukey 1977) suggests that I apply a logarithmic transformation to normalize this variable. I first added one to this variable and then took the natural logarithm. Thus, the health outcome in the analyses here is the natural logarithm of summed depressive symptoms plus one (see Figure 5).

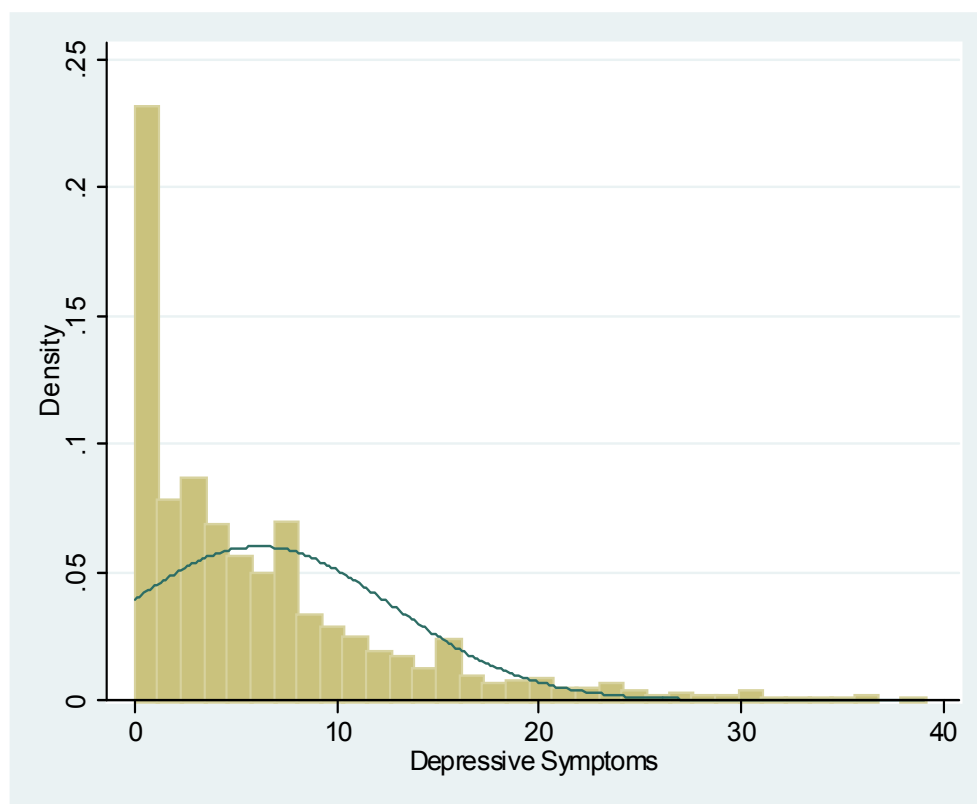


Figure 4: Distribution of Depressive Symptoms

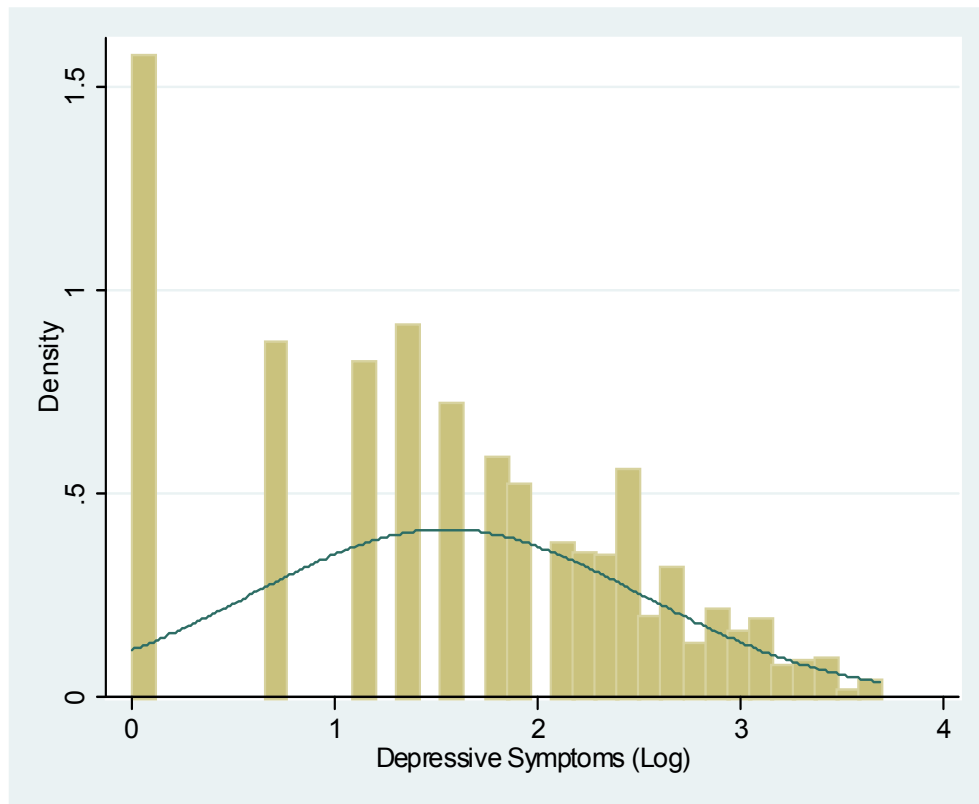


Figure 5: Distribution of Normalized Depressive Symptoms

Social capital is measured using the position generator (Lin and Dumin 1986; Lin et al. 2001). This method samples and assesses occupational prestige of one’s social contacts in a hierarchical society. Each respondent was asked, “Next, I am going to ask some general questions about jobs some people you know may **now** have. These people include your relatives, friends and acquaintances (acquaintances are people who know each other by face and name). If there are several people you know who have that kind of job, please tell me the one that occurs to you first.” Table 2 shows the distribution of occupational positions in the position generator and descriptive statistics for the social

capital index. As the first column shows, a list of twenty-two jobs salient in the United States was presented to respondents. I used the Standard International Occupational Prestige Scale (SIOPS) (Ganzeboom and Treiman 1996) to code the occupational prestige of each job. The occupational prestige scores for the listed jobs range from 20 (hotel bell boy) to 78 (professor). As the second column in Table 2 shows, more than seventy percent of respondents knew a nurse; more than sixty percent of them knew a hairdresser; and more than half of them knew a lawyer and a policeman. In contrast, less than nine percent of them knew a taxi driver and less than three percent of them knew a hotel bell boy.

Table 2: Distribution of Occupational Positions in the Position Generator and Social Capital Index

Position (SIOPS)	Respondent Accessing (Percent)
Professor (78)	37.12
Lawyer (73)	55.39
CEO (70)	20.11
Congressman (64)	12.08
Production manager (63)	16.94
Middle school teacher (60)	48.89
Personnel manager (60)	33.04
Writer (58)	21.67
Nurse (54)	70.26
Computer programmer (51)	48.96
Administrative assistant (49)	31.51
Accountant (49)	31.27
Policeman (40)	50.49
Farmer (38)	42.60
Receptionist (38)	38.86
Operator in a factory (34)	25.55
Hair dresser (32)	60.26
Taxi driver (31)	8.81
Security guard (30)	24.57
Housemaid (23)	27.15
Janitor (21)	28.72
Hotel bell boy (20)	2.72
Social Capital Index	
Average accessed prestige	
Mean	48.66
S. D.	6.60
Range of scores	21-78
Number of observations	2,939

From the twenty-two jobs, I generated one index to indicate the average quality of social capital: average accessed prestige (Campbell, Marsden, and Hurlbert 1986).

According to Vander Gaag et al. (2008), theoretically this index approximates “the best

resource accessed through social ties" (Lin 2001b:62), and statistically it also has the strength of a less-skewed distribution. I took three steps to calculate the value for this index. First, I counted the total number of occupations in which respondents identified one contact. The values of this total number range from 1 (i.e., respondents knew one contact in only one of the twenty-two listed positions) to 21 (i.e., respondents knew one contact in twenty-one of the twenty-two listed positions). Then I summed the prestige scores of these identified occupations. The values of the summed scores range from 21 (i.e., respondents knew one contact in only one of the twenty-two listed positions: janitor) to 1016 (i.e., respondents knew one contact in all listed positions except for hotel bell boy). Thus average accessed prestige will equal the summed prestige scores divided by the total number of accessed occupations. The values of average accessed prestige range from twenty-one (i.e., respondents knew one contact in only one of the twenty-two listed positions: janitor) to seventy-eight (i.e., respondents knew one contact in only one of the twenty-two listed positions: professor). This index has a mean of 48.66 and a standard deviation of 6.60.

Objective social status has three socioeconomic indicators: education, occupational prestige, and annual family income. Education is an ordinal variable with four categories: 1) high school or less, 2) associate program and degree (one or two years in college), 3) college degree (three or four years in college), and 4) master's degree or beyond. A dummy variable is created for each category. The first category, high-school

or less, is the reference group in data analyses. As Table 1 shows, less than forty percent of respondents only received a high school education or less, more than twenty percent obtained an associate degree, more than twenty-five percent attained a college degree, and less than fifteen percent achieved a master degree or more. Occupational status of the current or the last job is a continuous variable, based on the NORC/GSS Occupational Prestige scores for the 1980 Occupational Classification (Nakao, Hodge and Treas 1990; Nakao and Treas 1990). It has a mean of 45.70 with a standard deviation of 13.99. Annual family income has 28 ordinal ranges from “fewer than \$1000” to “\$190,000 or over.” I created a dummy variable to indicate high annual family income (1=\$90,000 or over).³ Around twenty-four percent of respondents came from families whose annual income was 90,000 dollars or more.

Subjective social status is indicated by self-reported class, an ordinal variable. Each respondent was asked, “If the society is divided into upper class, upper-middle class, middle class, middle-lower class, and lower class, which one do you think you belong to?” Possible responses were (1) Upper class, (2) Upper-middle class, (3) Middle class, (4) Middle-lower class and (5) Lower class. I reversed the order of these five responses so that the higher the score, the higher the respondent’s subjective social

³ As reported in Chapter 6, annual family income as a dummy variable interacts with social capital in the prediction of depressive symptoms. In supplemental analyses, I measured annual family income as a continuous variable by calculating medians of all 28 ranges, and then took their natural logs to create a normal distribution of income. I did not find a significant interaction between this continuous variable and social capital.

status. Around six percent of respondents thought that they belonged to lower class; about sixteen percent of them identified with middle-lower class; more than fifty-eight percent of them placed themselves in the middle class; less than eighteen percent of them located themselves at the upper-middle class; and less than three percent of them perceived themselves to be in the upper class (see Table 1).

Social integration is indicated by voluntary organization participation. Each respondent was asked, “Now I would like to know something about the groups or organizations to which individuals belong. Here is a list of various organizations. Could you tell me whether or not you are a member of each type?” A list of ten types of voluntary associations salient in the United States was presented to respondents: 1) political parties; 2) labor unions; 3) religious groups; 4) leisure, sports, or culture groups; 5) professional organizations; 6) charities; 7) neighborhood organizations; 8) school and PTA; 9) ethnic or civil rights organizations; and 10) other voluntary organizations. I created one dummy variable to indicate social integration (1=respondents are members of at least one listed type of voluntary organizations).⁴ More than seventy-four percent of respondents had memberships in listed voluntary associations (see Table 1).

Demographic variables are controlled in all statistical analyses. Gender is a dummy variable (1=female). Age is a continuous variable. Race/ethnicity has four

⁴ As reported in Chapter 6, social integration as a dummy variable interacts with social capital in the prediction of depressive symptoms. In supplemental analyses, I measured social integration as a continuous variable by counting the total number of memberships in voluntary organizations. I did not find a significant interaction between this continuous variable and social capital.

categories: 1) white, 2) black, 3) Latino, and 4) other race. A dummy variable was created for each category. White is used as the reference group. Marital status is a dummy variable (1= married). As Table 1 shows, the sample was approximately evenly distributed between men (49.53 percent) and women (50.47 percent). The average age was around 37 with a standard deviation of 10.53. About 70 percent of respondents were non-Latino white; about 12 percent were African American; about 13 percent were Latinos; and around 5 percent identified themselves with other unlisted racial/ethnic groups. About 64 percent of respondents were married. I also control for “quota.” Recall that this is a dummy variable indicating whether the interview was conducted after a quota for recruiting more minorities was imposed during the survey process.

5.3 Methods

The central research hypotheses of this dissertation focus on the direct, mediating, indirect, and moderating effects of social capital on depressive symptoms. I use structural equation modeling to test these hypotheses (Kline 2005; Hoyle 1995; Bolin 1989). This approach allows me to conduct path analyses through which I can draw a path diagram representing simultaneous equations and examine the relative strength of direct and indirect relationships between variables. To test my hypotheses, I need to construct two groups of structural equation models. I use the first group, as shown in Figure 6, to examine the direct, mediating, and indirect effect of social capital, and the second group, as shown in Figures 7, 8, 9, and 10, to explore the moderating effects of

social capital. Four models in the second group are nested in the model of the first group.

Figure 6 shows the first structural equation model. There are three endogenous variables in this model: social capital (Y_1), subjective social status (Y_2), and depressive symptoms (Y_3). As Equation 1 shows, I regress social capital on all the other exogenous variables, including demographic variables (X_1) (i.e., age, gender, race/ethnicity, marital status, and quota), objective social status (X_2) (i.e., education, occupational prestige of the last or current job, and annual family income), and social integration (X_3). As Equation 2 shows, I predict subjective social status using social capital, and all exogenous variables (see Equation 2). As Equation 3 shows, I explain depressive symptoms using social capital, subjective social status, and all exogenous variables.

$$Y_1=f(X_1+X_2+X_3) \quad (1)$$

$$Y_2=f(X_1+X_2+X_3+Y_1) \quad (2)$$

$$Y_3=f(X_1+X_2+X_3+Y_1+Y_2) \quad (3)$$

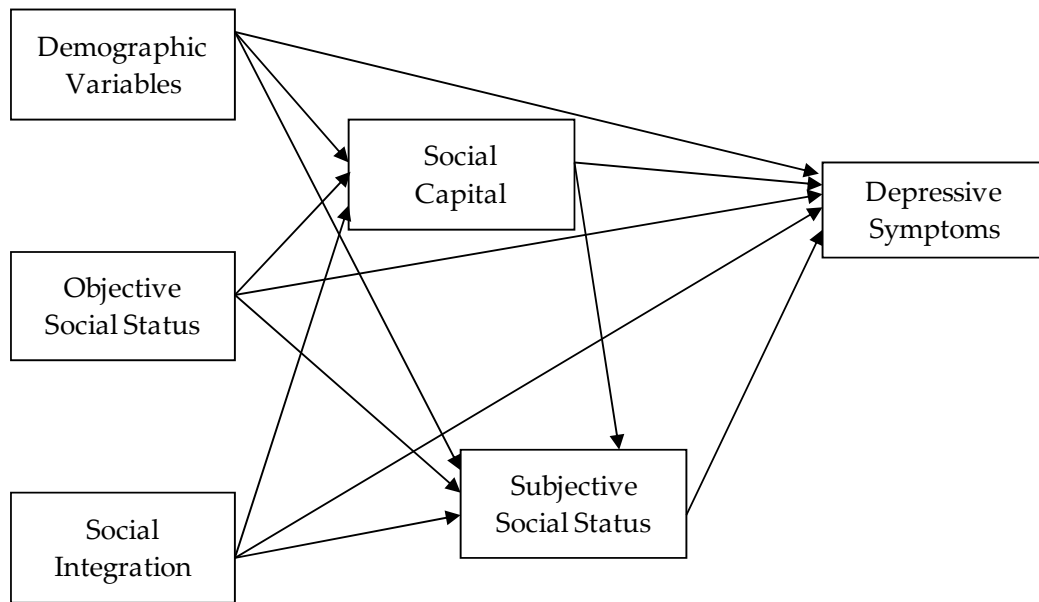


Figure 6: Structural Equation Modeling of Social Capital, Demographic Variables, Objective Social Status, Social Integration, Subjective Social Status, and Depressive Symptoms

As shown in Figure 6, the path from social capital to depressive symptoms represents the direct health influence of social capital; all the paths linking exogenous variables to social capital plus the foregoing path from social capital to depressive symptoms indicate the mediating effects of social capital; and the two paths, one linking social capital to subjective social status and the other linking subjective social status to depressive symptoms, reflect the indirect effect of social capital. In the following statistical analyses, I will examine whether these paths have significant coefficients, and determine whether social capital predicts the level of depression and in which way.

Figures 7, 8, 9, and 10 display four structural equation models for testing the moderating hypotheses. Equations 1 and 2 in Figure 6 still remain in Figures 7, 8, 9, and

10, but Equation 3 in Figure 6 is replaced respectively with Equations 4, 5, 6, and 7 in these four figures. In comparison with Equation 3, Equation 4 adds the product terms of social capital separately with each of the demographic variables to predict depressive symptoms; Equation 5 adds the product terms of social capital separately with each of the objective social status indicators; Equation 6 adds the product term of social capital with social integration; and Equation 7 adds the product term of social capital with subjective social status. If any of these added terms—take the product term of social capital with gender as an example—has a significant coefficient in the following statistical analyses, it will suggest that the relationship between social capital and depressive symptoms is moderated by gender. In other words, it will indicate that the direct influence of social capital on depressive symptoms varies across gender groups.

$$Y_3=f(X_1+X_2+X_3+Y_1+Y_2+Y_1*X_1) \quad (4)$$

$$Y_3=f(X_1+X_2+X_3+Y_1+Y_2+Y_1*X_2) \quad (5)$$

$$Y_3=f(X_1+X_2+X_3+Y_1+Y_2+Y_1*X_3) \quad (6)$$

$$Y_3=f(X_1+X_2+X_3+Y_1+Y_2+Y_1*Y_2) \quad (7)$$

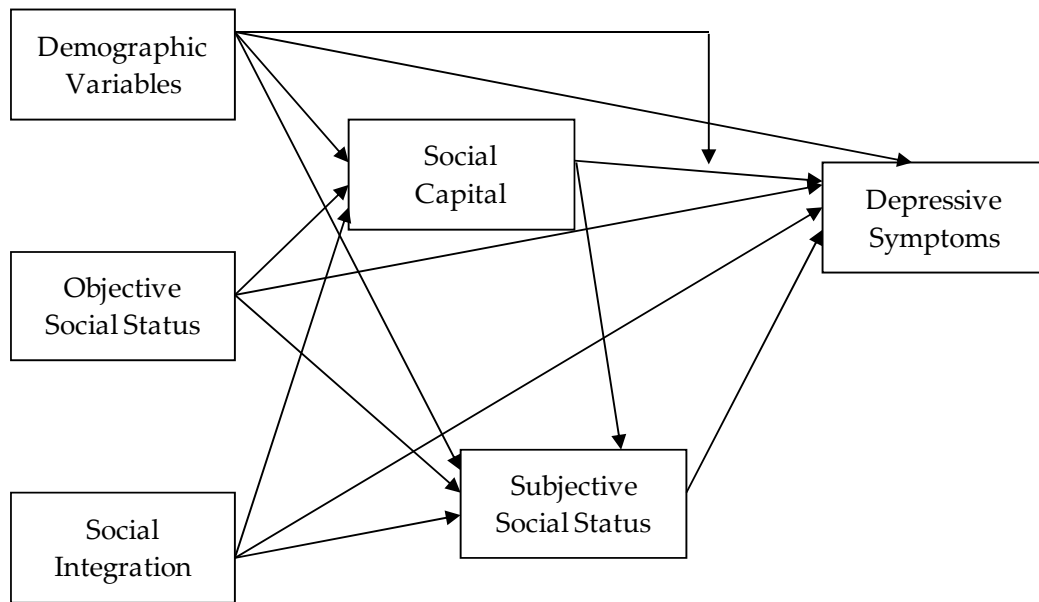


Figure 7: Structural Equation Modeling of Social Capital, the Interaction fo Social Capital with Demographic Variables, Demographic Variables, Objective Social Status, Social Integration, Subjective Social Status, and Depressive Symptoms

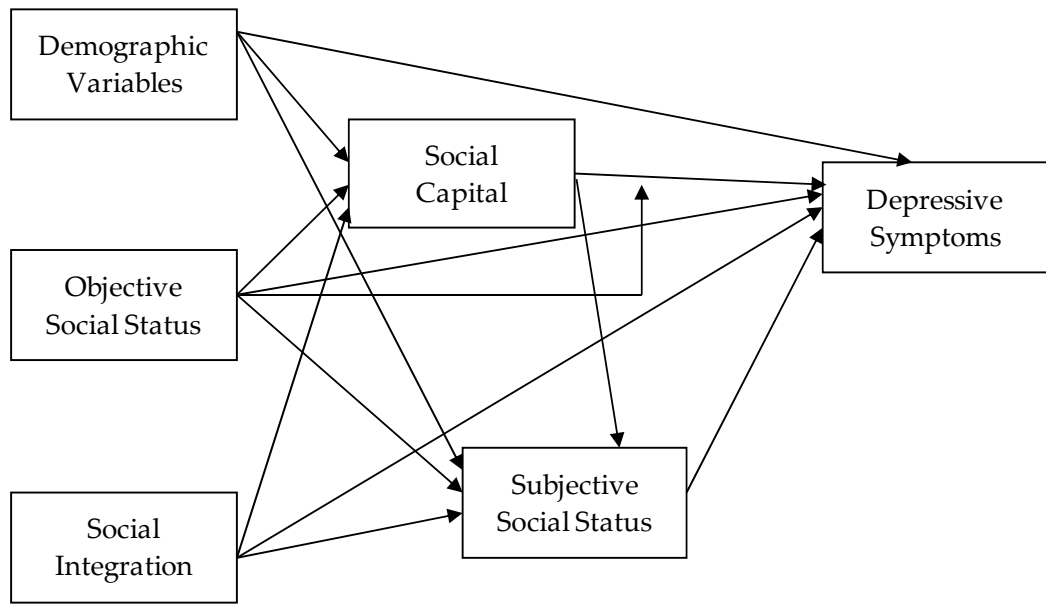


Figure 8: Structural Equation Modeling of Social Capital, the Interaction of Social Capital with Objective Social Status, Demographic Variables, Objective Social Status, Social Integration, Subjective Social Status, and Depressive Symptoms

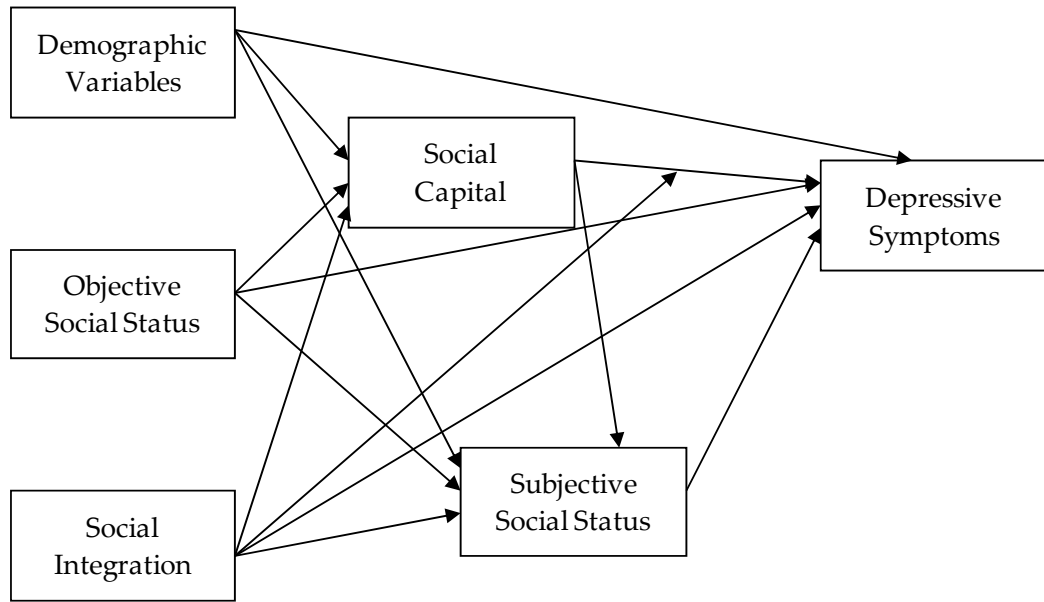


Figure 9: Structural Equation Modeling of Social Capital, the Interaction of Social Capital with Social Integration, Demographic Variables, Objective Social Status, Social Integration, Subjective Social Status, and Depressive Symptoms

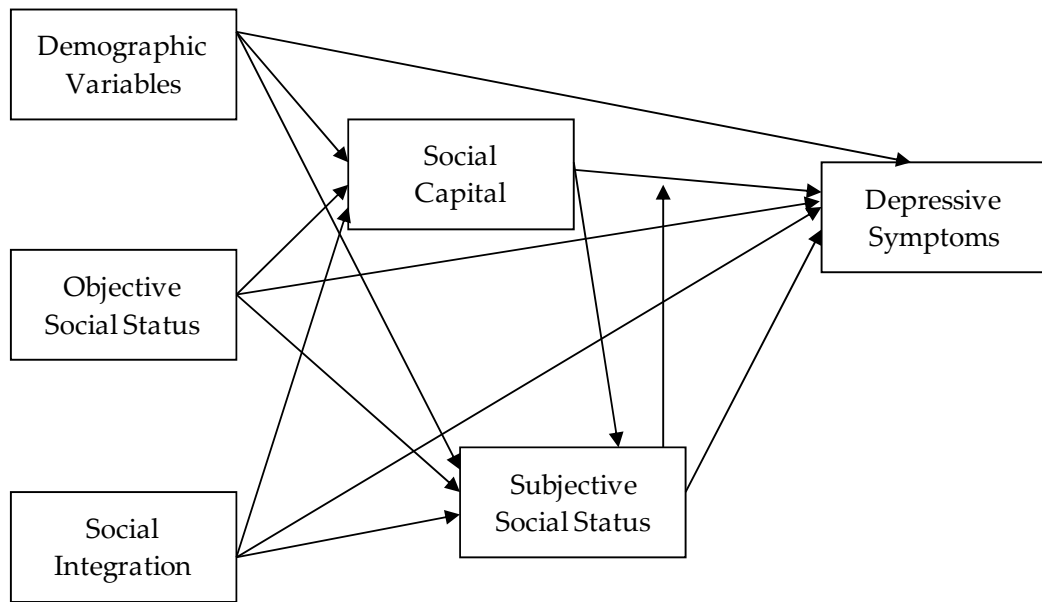


Figure 10: Structural Equation Modeling of Social Capital, the Interaction of Social Capital with Subjective Social Status, Demographic Variables, Objective Social Status, Social Integration, Subjective Social Status, and Depressive Symptoms

To estimate these two groups of structural equation models using ten imputed data sets, I use the Mplus software program (Muthén and Muthén: 1998-2007). This program reports only the averaged raw parameter estimates across imputed data sets and their standard errors when analyzing imputed data sets. I use two traditional model fit indices to evaluate how well a mode fits the data and explains the relationships among variables: the comparative fit index (CFI), and the Root Mean Square Error of Approximation (RMSEA). I accept a model in which the value of CFI is greater than .90 (Hair et al. 2006), and the value of RMSEA is smaller than .08 (Hu and Bentler 1999).

Besides, my multivariate analyses of structural equation models are based on a cross-sectional data set. I will apply the instrumental variables method to verify the causal order between social capital and depressive symptoms, based on the first of the ten imputed data sets (for a discussion of instrumental variables, see Wooldridge 2003). To estimate an instrumental variables model, the first step is to identify instrumental variables. Theoretically and statistically, instrumental variables are expected to directly determine the endogenous explanatory variable which is social capital in this dissertation, and indirectly influence the endogenous dependent variable, which is depressive symptoms in this dissertation, only through social capital. Instrumental variables estimates are often derived from the two-stage least-squares estimator. In the first stage, the endogenous explanatory variable is predicted by instrumental variables and other exogenous variables. In the second stage, the dependent variable is regressed on the predicted value of the explanatory variable from the first stage model and other exogenous variables. If the OLS regression estimates and instrumental variables regression estimates are equal, I will be able to argue that the relationship between the endogenous explanatory variable and the dependent variable is not an artifact of reverse causation or incidental association (Hausman 1978).

6. Empirical Results

6.1 Correlation Analyses

I empirically examine my research hypotheses in three steps. I first analyzed the bivariate correlations between variables of interests, then estimated structural equation models, and finally verified the causal order in the relationship between social capital and depressive symptoms using the instrumental variable method. My proposed structural equation models (see Figure 3) include three endogenous variables: social capital, subjective social status, and depressive symptoms. Using the first of the ten imputed data sets, I calculated zero-order correlations between these three variables and other control variables. As Table 3 showed, social capital was significantly positively associated with age, being a man, being white, educational level, occupational prestige, annual family income, and social integration, and there is no significant association between social capital and marital status. Subjective social status was significantly positively related to age, being white, being married, educational degree, occupational prestige, annual family income, social integration, and social capital; depressive symptoms (log) were significantly positively correlated with being a woman and being black, and negatively correlated with age, being white, being married, educational level, occupational prestige, annual family income, social integration, social capital, and subjective social status. The directions or signs of these correlation coefficients are generally consistent with previous research literature, and support some of my research

hypotheses: social capital 1) has a direct effect on depression; 2) mediates the effect of age, gender, race/ethnicity, objective social status, and social integration on depression, and 3) has an indirect effect on depressive symptoms through subjective social status. Next, I examined my research hypotheses more directly and accurately using a series of multivariate structural equation models based on the ten imputed data sets.

Table 3: Zero-Order Correlations

	Social Capital	Subjective Social Status	Depressive Symptoms (log)
Age	.086***	.071***	-.072***
Gender (1=Female)	-.071***	.027	.067***
Race/ethnicity			
White	.056**	.145***	-.028
Black	-.065***	-.078***	.060***
Latino	-.042*	-.133***	-.015
Others	.039*	.014	-.006
Quota	-.000	-.049**	-.018
Married	.005	.162***	-.139***
Education			
High school or less	-.243***	-.217***	.103***
Associate degree	-.034†	-.011	-.001
College degree	.163***	.120***	-.054**
Master degree or above	.174***	.165***	-.074***
Occupational prestige score (last/current job)	.166***	.244***	-.090***
Annual family income (1=90,000 or more)(USD)	.153***	.336***	-.099***
Social integration	.130***	.152***	-.034†
Social capital	1	.152***	-.127***
Subjective social Status		1	-.162***

Note: † $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

6.2 Structural Equation Analyses

I analyzed six structural equation models in total (see Figure 11, 12, 13, 14, 15, 16). I used the first model to examine the direct, mediating, and indirect effects of social capital on depressive symptoms, and the other five models to test the moderating effects of social capital on depressive symptoms. All six structural equation models contain three endogenous variables: social capital, subjective social status, and depressive symptoms (log), and nine exogenous variables: age, gender, race/ethnicity, quota, marital status, education, occupational prestige, annual family income, and social integration. In the first structural equation model, I predicted social capital using all exogenous variables, subjective social status using social capital and all exogenous variables, and finally depressive symptoms using social capital, subjective social status, and all exogenous variables. Table 4 showed the raw parameter estimates and standard errors of this model. This model fit the ten imputed data sets quite well. The mean of CFI was 1.000. As the second column in Table 4 showed, older, male, single, and white respondents had more social capital than younger, female, married, and black respondents; respondents with a high school degree or less, lower occupational prestige, and annual family income of less than 90,000 reported less social capital than those with advanced degrees, higher occupational prestige, and annual family income of 90,000 or more; respondents who participated in voluntary organizations had more social capital than those who did not. As the third column shows, older, female, white, and married

respondents identified with higher social classes than younger, male, Latino, and single respondents; respondents with a high school degree or less, lower occupational prestige, and annual family income of less than 90,000 reported lower perceived class positions than those with advanced degrees, higher occupational prestige, and annual family income of 90,000 or more; respondents who participated in voluntary organizations placed themselves in higher social class than those who did not; respondents with more social capital thought of themselves as belonging to higher social classes than those with less social capital. As the last column shows, younger, female, white, and single respondents reported more depressive symptoms (log) than older, male, Latino, and married respondents; respondents with a college degree had fewer depressive symptoms (log) than those with a high school degree or less; respondents who achieved more social capital reported lower levels of depression; respondents who identified themselves with higher social classes endorsed fewer depressive symptoms.

Table 4: Parameter Estimates and Standard Errors of the Structural Equation Model of Social Capital, Subjective Social Status, and Depressive Symptoms

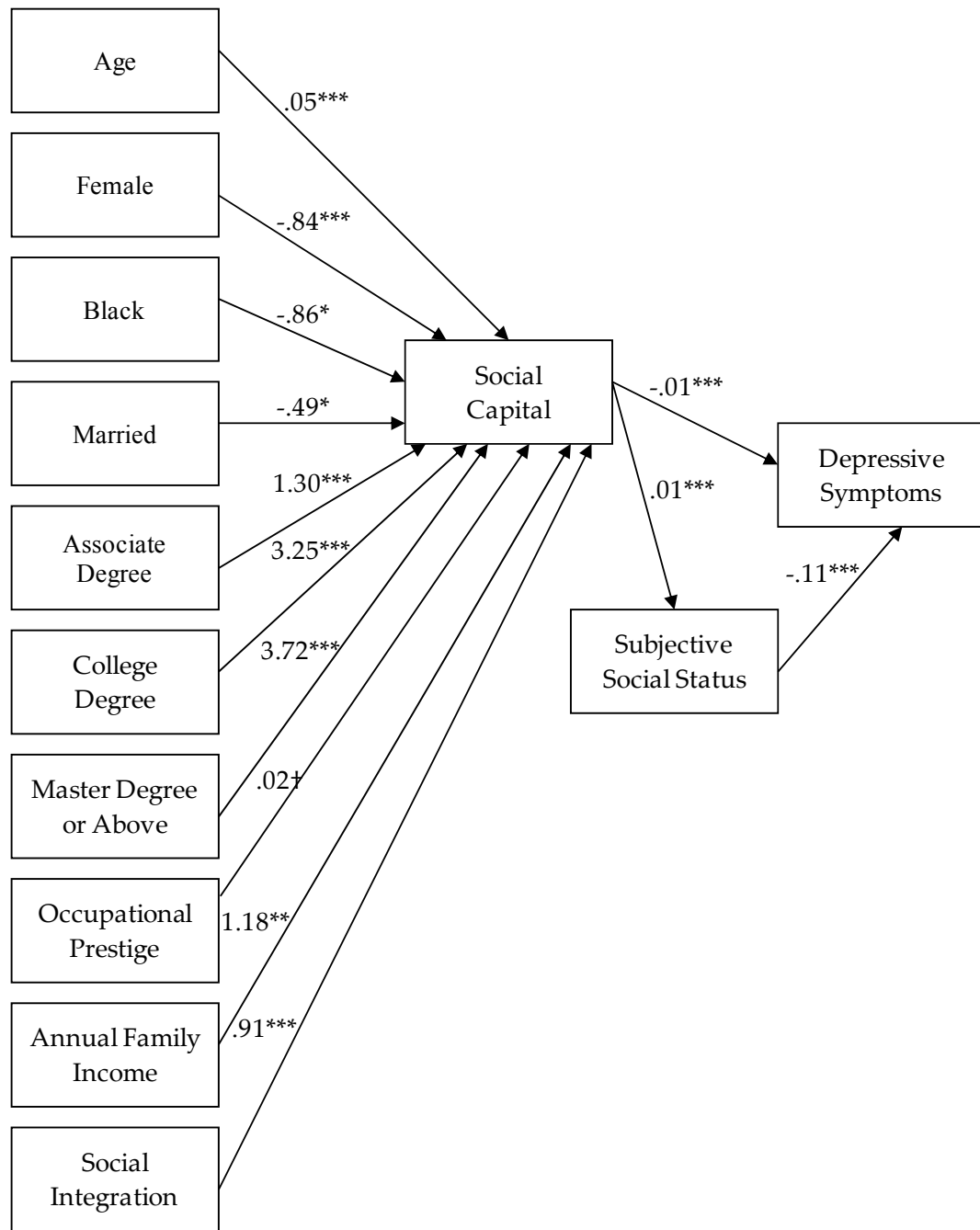
Independent Variables	Dependent Variables		
	Social Capital	Subjective Social Status	Depressive Symptoms (log)
Age	.05 (.01)***	.00 (.00)*	-.01 (.00)**
Gender (1=Female)	-.84 (.24)***	.08 (.04)†	.14 (.04)***
Race/ethnicity (Reference: white)			
Black	-.86 (.41)*	-.16 (.06)*	.04 (.06)
Latino	.46 (.36)	-.22 (.07)***	-.14 (.06)*
Others	.55 (.42)	-.07 (.09)	-.01 (.08)
Quota	.21 (.26)	-.01 (.05)	-.02 (.04)
Married	-.49 (.25)*	.20 (.05)***	-.23 (.04)***
Education (Reference: high school or less)			
Associate degree	1.30 (.32)***	.14 (.06)*	-.08 (.05)†
College degree	3.25 (.35)***	.23 (.06)***	-.12 (.05)*
Master degree or above	3.72 (.43)***	.29 (.08)***	-.10 (.06)*
Occupational prestige score (last/current job)	.02 (.01)†	.01 (.00)***	-.00 (.00)
Annual family income	1.18 (.37)**	.76 (.06)***	-.01 (.05)
Social integration	.91 (.26)***	.10 (.05)*	.04 (.04)
Social capital		.01 (.00)***	-.01 (.00)***
Subjective social Status			-.11 (.02)***
Number of observations	2,939		
CFI	1.000		
R-Squared	.107	.214	.065

Note: Numbers in parentheses are standard errors; † $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$ (two-tailed test).

The focus of this dissertation is whether and how social capital influences depressive symptoms. For purpose of simplicity and understanding, Figure 11 was based on results from Table 4 and included only paths that had significant parameter

estimates and involved social capital. Figure 11 clearly showed support for some of my research hypotheses. First, social capital exerted a direct negative effect ($-.01, p < .001$) on depressive symptoms (log). Second, social capital mediated the effects of ten variables on depressive symptoms (log). Three of them – being a female ($-.84, p \leq .001$), being black (versus being white) ($-.86, p \leq .05$), and being married ($-.49, p \leq .05$) – exerted their indirect effects by decreasing social capital. The other seven enhanced social capital: age ($.05, p \leq .001$), having an associate degree (versus having a high school degree or less) ($1.30, p \leq .001$), having a college degree (versus having a high school degree or less) ($3.25, p \leq .001$), having a master degree or above (versus having a high school degree or less) ($3.72, p \leq .001$), occupational prestige ($.02, p \leq .10$), annual family income ($1.18, p \leq .01$), and social integration ($.91, p \leq .001$). Furthermore, social capital had an indirect effect on depressive symptoms through subjective social status. Social capital contributed to subjective social status ($.01, p \leq .001$), which was associated with lower levels of depressive symptoms ($-.11, p \leq .001$).

Other results do not support my hypotheses. Social capital did not mediate the associations of depressive symptoms with two racial/ethnic variables: being Latino (versus being white), and being other race/ethnicity (versus being white). Among those two variables, being Latino had a direct effect on depressive symptoms (log). Latino respondents reported fewer depressive symptoms than white respondents.



† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$ (two-tailed test)

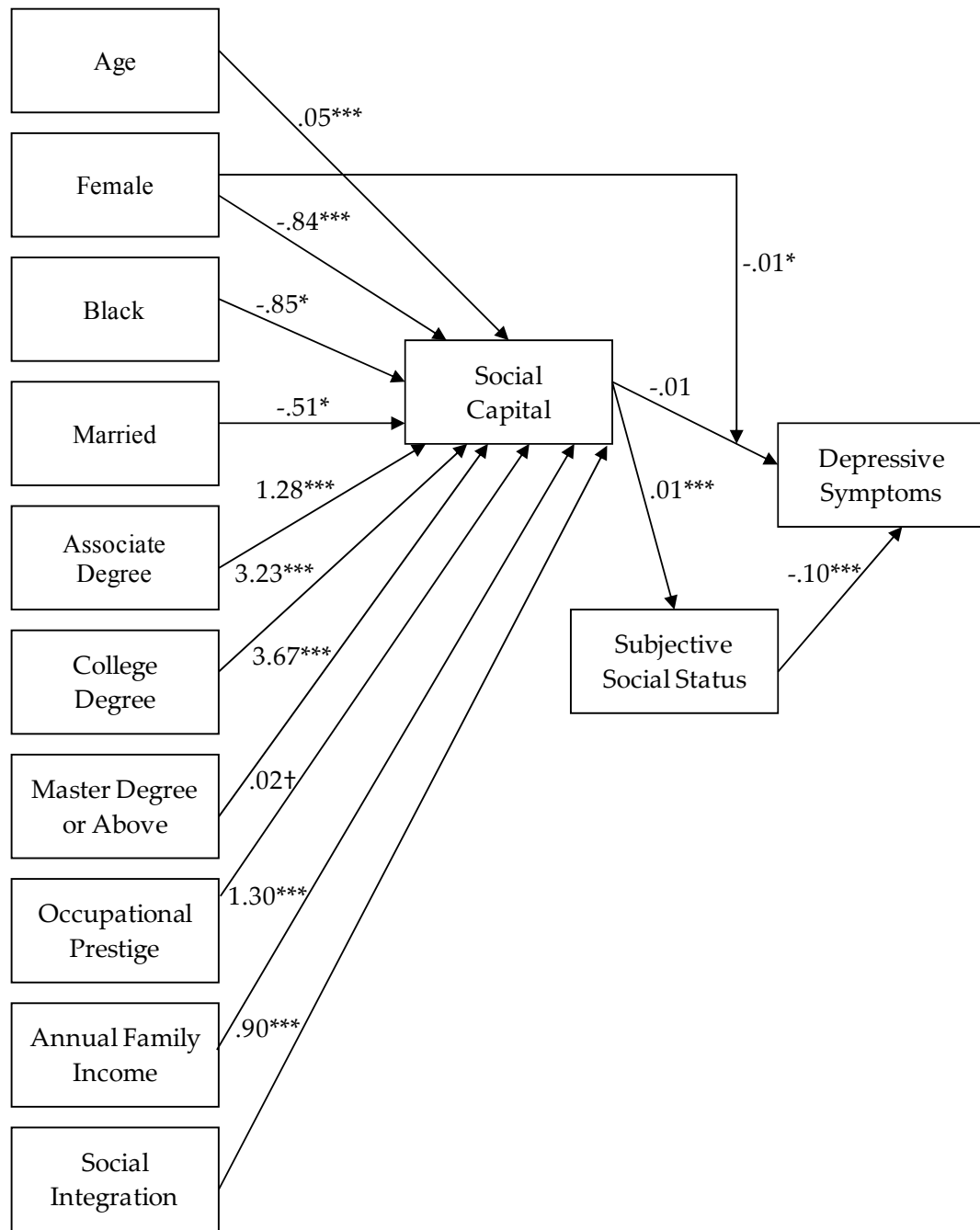
Figure 11: Structural Equation Modeling of Social Capital, Demographic Variables, Objective Social Status, Social Integration, Subjective Social Status, and Depressive Symptoms (Main Results)

Next, I examined the moderating effects of other variables on the relationship between social capital and depressive symptoms. I constructed interaction terms of mean-centered social capital separately with subjective social status and all the other exogenous variables, among which all continuous variables, such as age and occupational prestige are also mean-centered. I entered product interaction terms separately into the first structural equation model. Social capital significantly interacted with gender, being black (versus being white), education, annual family income, and social integration. Table 5 showed the parameter estimates and standard errors of the structural equation model with the interaction term of social capital with gender, and Figure 12 displayed paths that had significant parameter estimates and involved social capital. This model fit the data very well. The mean of CFI was 0.966, and the mean of RMSEA was 0.049. Social capital interacted with being a woman in a negative direction. The coefficient for this interaction was significant ($-.01, p \leq .05$). The negative effect of social capital on depressive symptoms was stronger for female respondents than for male respondents. This supported the compensation effect hypothesis instead of the cumulative advantage effect hypothesis.

Table 5: Parameter Estimates and Standard Errors of the Structural Equation Model of Social Capital, the Interaction Term of Social Capital with Gender, Subjective Social Status, Depressive Symptom

Independent Variables	Dependent Variables		
	Social Capital	Subjective Social Status	Depressive Symptoms (log)
Age	.05 (.01)***	.00 (.00)*	-.01 (.00)**
Gender (1=Female)	-.84 (.24)***	.08 (.04)*	.14 (.04)**
Race/ethnicity (Reference: white)			
Black	-.85 (.41)*	-.17 (.07)*	.05 (.06)
Latino	.48 (.36)	-.22 (.07)***	-.15 (.06)*
Others	.55 (.42)	-.09 (.09)	-.01 (.08)
Quota	.21 (.26)	-.01 (.05)	-.02 (.04)
Married	-.51 (.25)*	.20 (.04)***	-.23 (.04)***
Education (Reference: high school or less)			
Associate degree	1.28 (.32)***	.14 (.06)*	-.09 (.05)†
College degree	3.23 (.35)***	.23 (.06)***	-.13 (.05)**
Master degree or above	3.67 (.43)***	.29 (.08)***	-.15 (.07)*
Occupational prestige score (last/current job)	.02 (.01)†	.01 (.00)***	-.00 (.00)
Annual family income	1.30 (.34)***	.77 (.06)***	-.01 (.05)
Social integration	.90 (.26)***	.10 (.05)***	.03 (.04)
Social capital (centered)		.01 (.00)***	-.01 (.00)
Subjective social Status			-.10 (.02)***
Social capital * female			-.01 (.01)*
Number of observations	2,939		
CFI	.966		
RMSEA	.049		
R-Squared	.107	.215	.067

Note: Numbers in parentheses are standard errors; † $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$ (two-tailed test).



† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$ (two-tailed test)

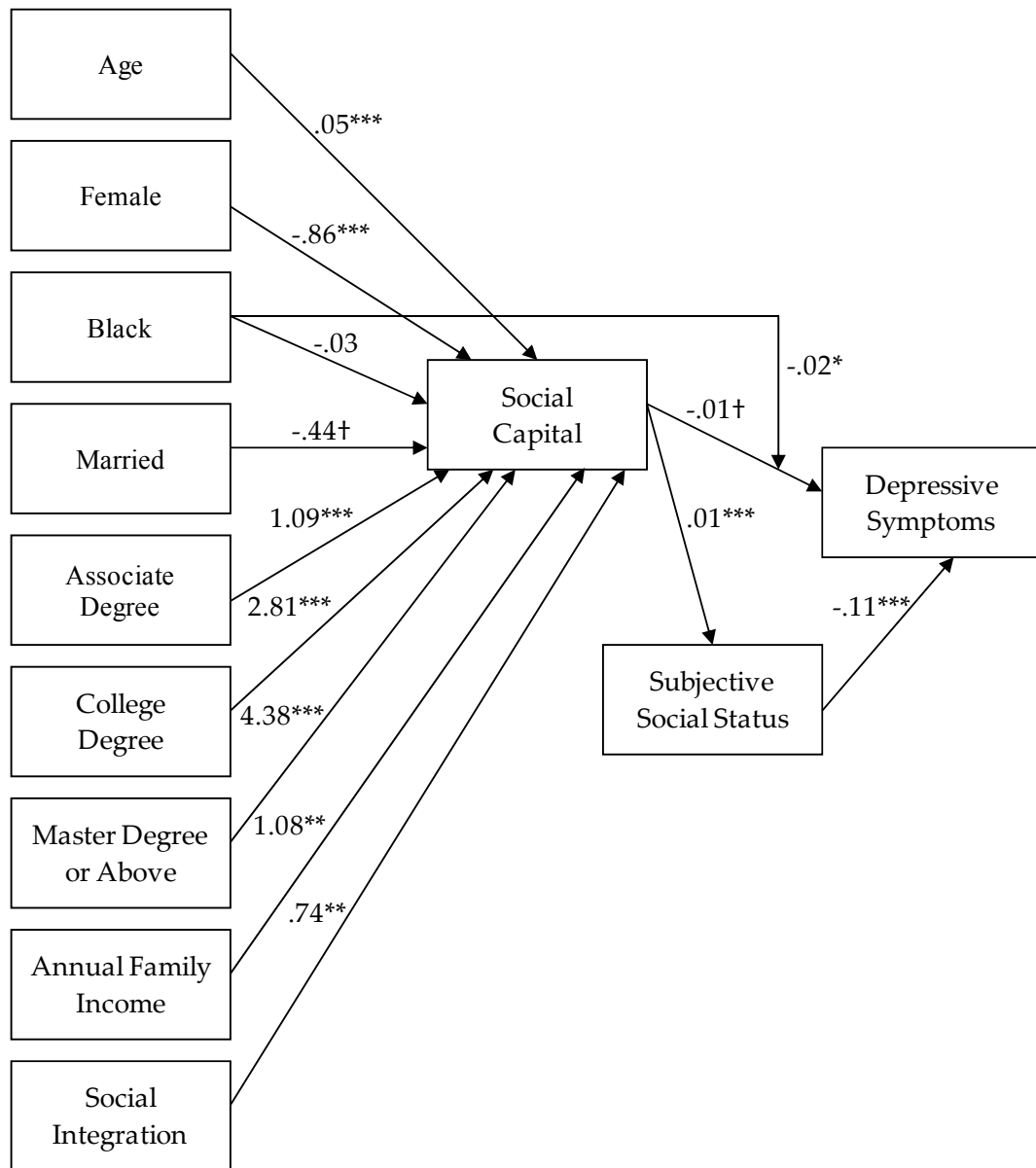
Figure 12: Structural Equation Modeling of Social Capital, the Interaction of Social Capital with Gender, Demographic Variables, Objective Social Status, Social Integration, Subjective Social Status, and Depressive Symptoms (Main Results)

Social capital also interacted with race/ethnicity. Table 6 showed the parameter estimates and standard errors of the structural equation model with the interaction of social capital with three racial/ethnic categories, and Figure 13 displayed paths that had significant parameter estimates and involved social capital. This model fit the data quite well. The mean of CFI was 0.986, and the mean of RMSEA was 0.021. Social capital significantly interacted with one of the three racial/ethnic categories in a negative direction. The negative effect of social capital on depressive symptoms was stronger for black respondents than for white respondents (-.02, $p \leq .05$). This supported the compensation effect hypothesis instead of the cumulative advantage effect hypothesis.

Table 6: Parameter Estimates and Standard Errors of the Structural Equation Model of Social Capital, the Interaction Term of Social Capital with Race/Ethnicity, Subjective Social Status, Depressive Symptom

Independent Variables	Dependent Variables		
	Social Capital	Subjective Social Status	Depressive Symptoms (log)
Age	.05 (.01)***	.00 (.00)*	-.00 (.00)**
Gender (1=Female)	-.86 (.23)***	.08 (.04)†	.14 (.04)***
Race/ethnicity (Reference: white)			
Black	-.03 (1.18)	-.17 (.07)*	.03 (.06)
Latino	.19 (.33)	-.22 (.07)***	-.14 (.06)*
Others	.51 (.38)	-.07 (.09)	-.01 (.08)
Quota	.36 (.25)	-.00 (.05)	-.01 (.04)
Married	-.44 (.24)†	.20 (.05)***	-.23 (.04)***
Education (Reference: high school or less)			
Associate degree	1.09 (.32)***	.15 (.06)**	-.08 (.05)†
College degree	2.81 (.33)***	.24 (.06)***	-.11 (.05)*
Master degree or above	4.38 (.41)***	.30 (.08)***	-.12 (.06)†
Occupational prestige score (last/current job)	.01 (.01)	.01 (.00)***	-.00 (.00)
Annual family income	1.08 (.35)**	.76 (.06)***	-.01 (.05)
Social integration	.74 (.24)**	.11 (.05)*	.04 (.04)
Social capital (centered)		.01 (.00)**	-.01 (.00)†
Subjective social Status			-.11 (.02)***
Social capital * black			-.02 (.01)*
Social capital * Latino			.01 (.01)
Social capital * others			.01 (.01)
Number of observations	2,939		
CFI	.986		
RMSEA	.021		
R-Squared	.092	.214	.066

Note: Numbers in parentheses are standard errors; † $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$ (two-tailed test).



† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$ (two-tailed test)

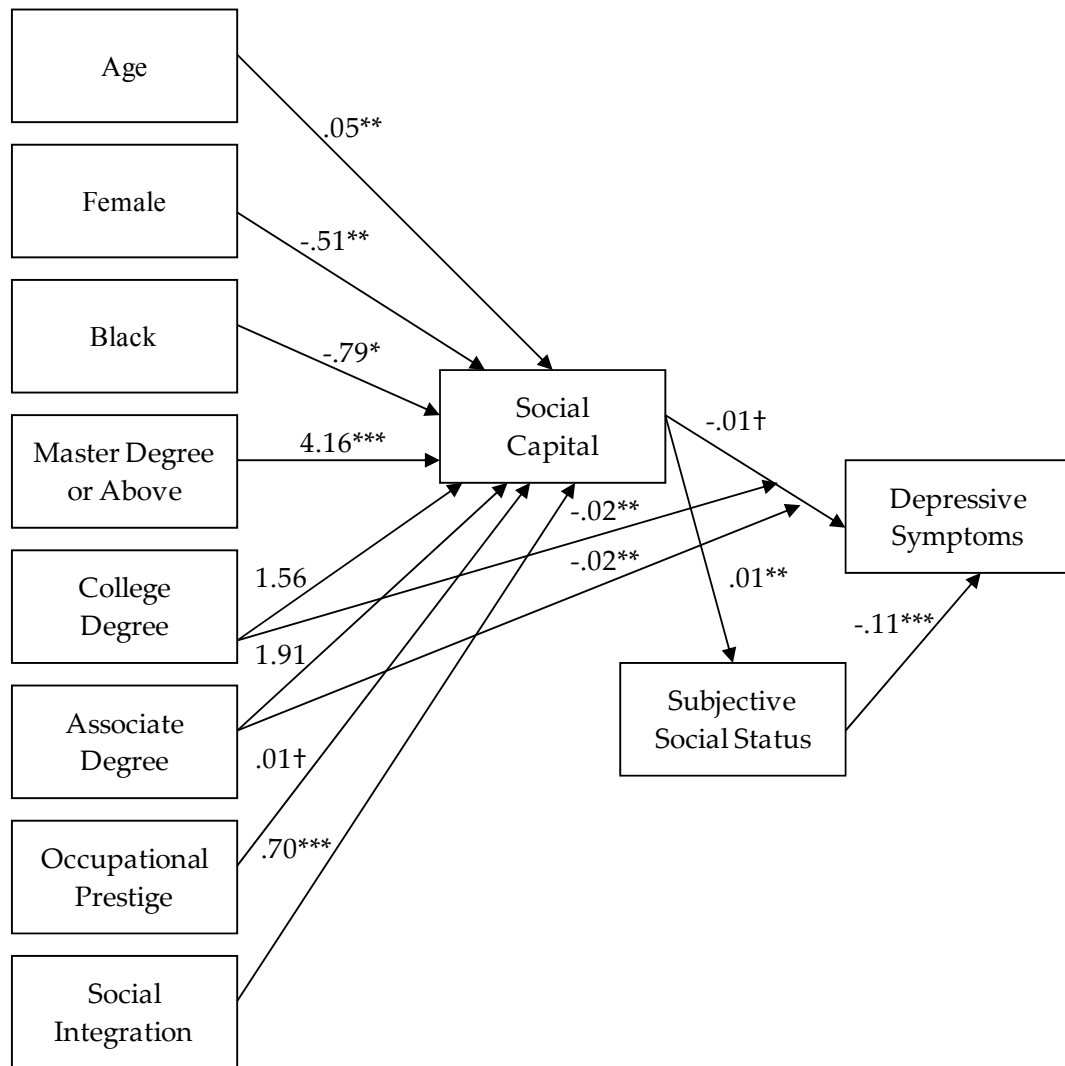
Figure 13: Structural Equation Modeling of Social Capital, the Interaction of Social Capital with Race/Ethnicity, Demographic Variables, Objective Social Status, Social Integration, Subjective Social Status, and Depressive Symptoms (Main Results)

Furthermore, social capital interacted with education. Table 7 showed the parameter estimates and standard errors of the structural equation model with the interaction of social capital with three educational categories, and Figure 14 displayed paths that had significant parameter estimates and involved social capital. This model fit the data quite well. The mean of CFI was 0.985, and the mean of RMSEA was 0.032. Social capital significantly interacted with two of the three educational categories in a negative direction. The negative effect of social capital on depressive symptoms was stronger for respondents with an associate degree ($-.02, p \leq .001$) and a college degree ($-.02, p \leq .01$) than for those with a high school degree or less. This supported the cumulative advantage effect hypothesis instead of the compensation effect hypothesis.

Table 7: Parameter Estimates and Standard Errors of the Structural Equation Model of Social Capital, the Interaction Terms of Social Capital with Education, Subjective Social Status, and Depressive Symptom

Independent Variables	Dependent Variables		
	Social Capital	Subjective Social Status	Depressive Symptoms (log)
Age	.05 (.01)**	.00 (.00)*	-.00 (.00)**
Gender (1=Female)	-.51 (.19)**	.09 (.04)*	.14 (.04)***
Race/ethnicity (Reference: white)			
Black	-.79 (.36)*	-.16 (.07)*	.04 (.06)
Latino	.37 (.26)	-.22 (.07)***	-.14 (.06)*
Others	.52 (.33)	-.07 (.09)	-.01 (.08)
Quota	.16 (.22)	.00 (.05)	-.02 (.04)
Married	-.29 (.20)	.20 (.05)***	-.23 (.04)***
Education (Reference: high school or less)			
Associate degree	1.91 (1.53)	.14 (.06)*	-.10 (.05)†
College degree	1.56 (1.62)	.23 (.06)***	-.11 (.05)†
Master degree or above	4.16 (.30)***	.29 (.08)***	-.15 (.07)*
Occupational prestige score (last/current job)	.01 (.01)†	.01 (.00)***	-.00 (.00)
Annual family income	-.37 (.31)	.76 (.06)***	-.01 (.05)
Social integration	.70 (.20)***	.10 (.05)*	.04 (.04)
Social capital (centered)		.01 (.00)**	-.01 (.00)†
Subjective social Status			-.11 (.02)***
Social capital * associate degree			-.02 (.01)***
Social capital * college degree			-.02 (.01)**
Social capital * master degree or above			.00 (.01)
Number of observations	2,939		
CFI	.985		
RMSEA	.032		
R-Squared	.108	.210	.067

Note: Numbers in parentheses are standard errors; † $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$ (two-tailed test).



† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$ (two-tailed test)

Figure 14: Structural Equation Modeling of Social Capital, the Interaction of Social Capital with Education, Demographic Variables, Objective Social Status, Social Integration, Subjective Social Status, and Depressive Symptoms (Main Results)

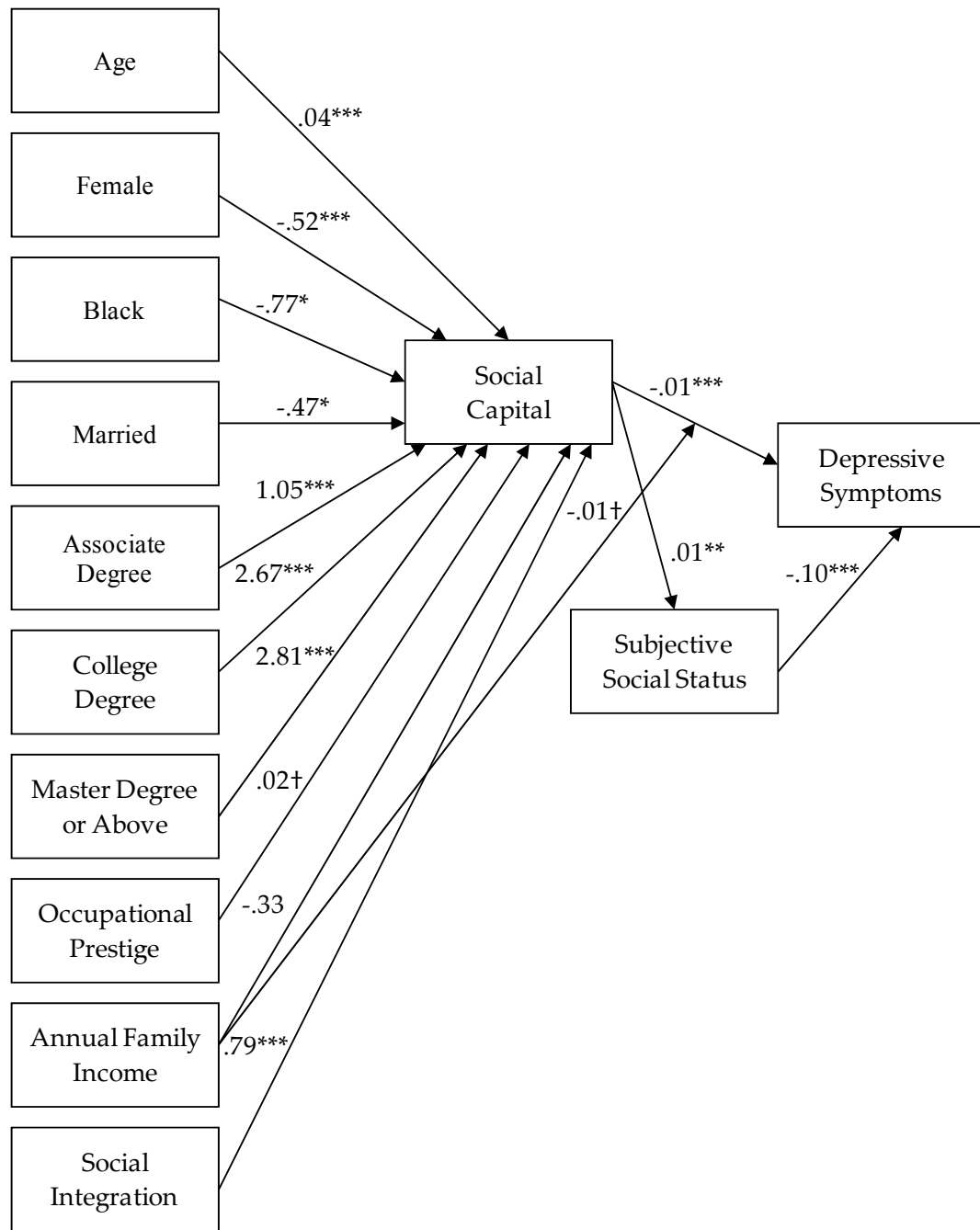
Besides, social capital interacted with annual family income. Table 8 showed the parameter estimates and standard errors of the structural equation model with the

interaction of social capital with annual family income, and Figure 15 displayed paths that had significant parameter estimates and involved social capital. This model fit the data reasonably well. The mean of CFI was 0.921, and the mean of RMSEA was 0.084, which was very close to .08. Social capital marginally significantly interacted with annual family income in a negative direction. The negative effect of social capital on depressive symptoms was stronger for respondents with annual family income of 90,000 or more ($-.01, p \leq .10$) than for those with annual family income of less than 90,000. This supported the cumulative advantage effect hypothesis instead of the compensation effect hypothesis.

Table 8: Parameter Estimates and Standard Errors of the Structural Equation Model of Social Capital, the Interaction Term of Social Capital with Annual Family Income, Subjective Social Status, Depressive Symptom

Independent Variables	Dependent Variables		
	Social Capital	Subjective Social Status	Depressive Symptoms (log)
Age	.04 (.01)***	.00 (.00)*	-.01 (.00)**
Gender (1=Female)	-.52 (.22)*	.09 (.04)*	.14 (.04)***
Race/ethnicity (Reference: white)			
Black	-.77 (.38)*	-.16 (.07)*	.04 (.06)
Latino	.46 (.32)	-.22 (.07)***	-.14 (.06)*
Others	.57 (.42)	-.07 (.09)	-.01 (.08)
Quota	.09 (.25)	-.00 (.05)	-.02 (.04)
Married	-.47 (.22)*	.20 (.05)***	-.23 (.04)***
Education (Reference: high school or less)			
Associate degree	1.05 (.29)***	.14 (.06)*	-.08 (.05)†
College degree	2.67 (.34)***	.23 (.06)***	-.12 (.05)*
Master degree or above	2.81 (.43)***	.29 (.08)***	-.13 (.06)*
Occupational prestige score (last/current job)	.02 (.01)†	.01 (.00)***	-.00 (.00)
Annual family income	-.33 (.89)	.75 (.07)***	-.01 (.06)
Social integration	.79 (.24)***	.10 (.05)*	.04 (.04)
Social capital (centered)		.01 (.00)**	-.01 (.00)***
Subjective social Status			-.10 (.02)***
Social capital * annual family income			-.01 (.01)†
Number of observations	2,939		
CFI	.921		
RMSEA	.084		
R-Squared	.070	.205	.066

Note: Numbers in parentheses are standard errors; † $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$ (two-tailed test).



† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$ (two-tailed test)

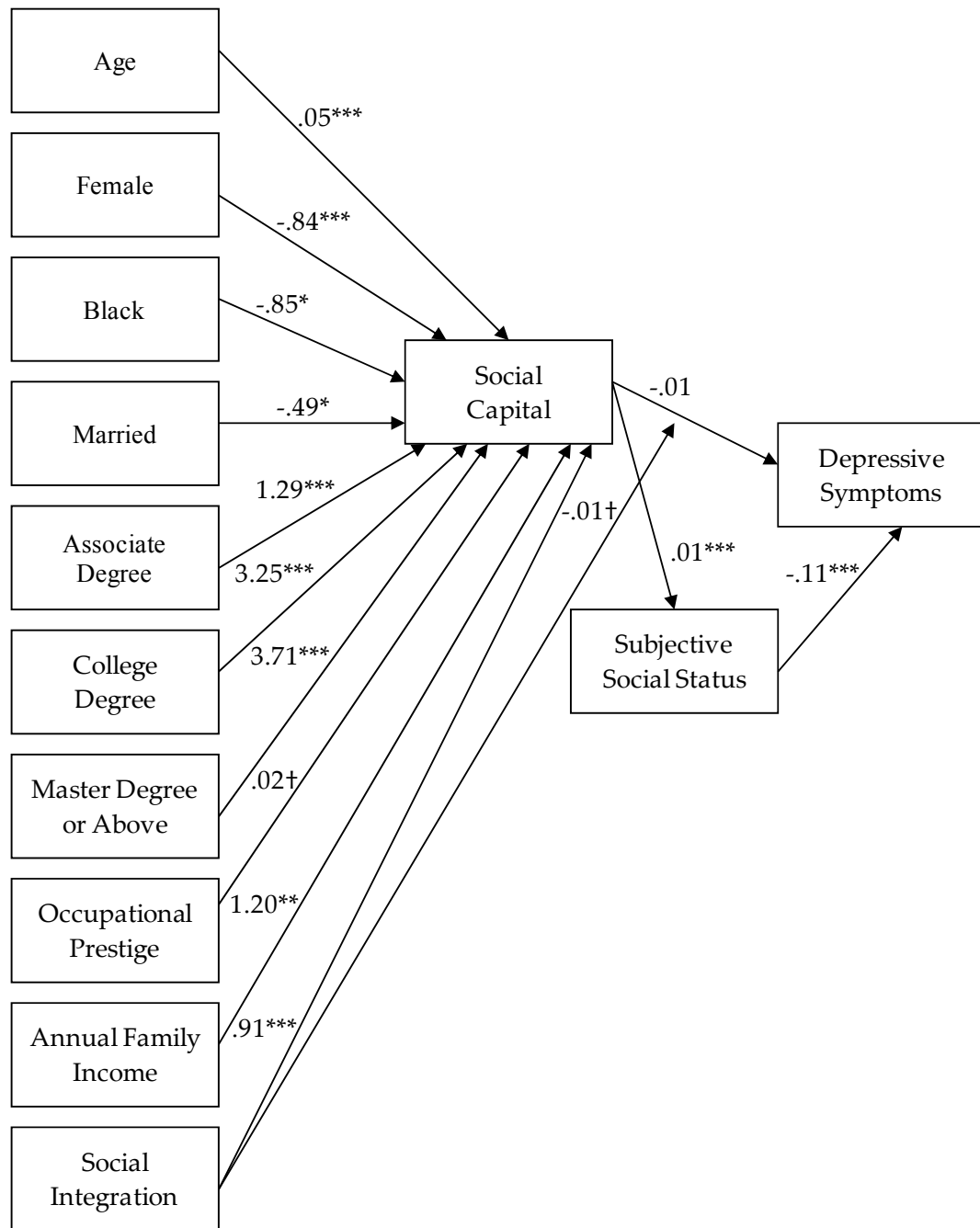
Figure 15: Structural Equation Modeling of Social Capital, the Interaction of Social Capital with Annual Family Income, Demographic Variables, Objective Social Status, Social Integration, Subjective Social Status, and Depressive Symptoms (Main Results)

In addition, social capital interacted with social integration. Table 9 showed the parameter estimates and standard errors of the structural equation model with the interaction of social capital with social integration, and Figure 16 displayed paths that had significant parameter estimates and involved social capital. This model fit the data very well. The mean of CFI was 0.919, and the mean of RMSEA was 0.077. Social capital marginally significantly interacted with social integration in a negative direction. The negative effect of social capital on depressive symptoms was stronger for respondents who participated in voluntary organizations ($-0.01, p \leq .10$) than for those who did not. This supported the cumulative advantage effect hypothesis instead of the compensation effect hypothesis.

Table 9: Parameter Estimates and Standard Errors of the Structural Equation Model of Social Capital, the Interaction of Social Capital with Social Integration, Subjective Social Status, and Depressive Symptom

Independent Variables	Dependent Variables		
	Social Capital	Subjective Social Status	Depressive Symptoms (log)
Age	.05 (.01)***	.00 (.00)*	-.01 (.00)**
Gender (1=Female)	-.84 (.24)***	.09 (.04)*	.14 (.04)***
Race/ethnicity (Reference: white)			
Black	-.85 (.41)*	-.16 (.07)*	.05 (.06)
Latino	.46 (.36)	-.22 (.07)***	-.15 (.06)*
Others	.56 (.42)	-.07 (.09)	-.01 (.08)
Quota	.21 (.26)	-.00 (.05)	-.01 (.04)
Married	-.49 (.25)*	.20 (.05)***	-.23 (.04)***
Education (Reference: high school or less)			
Associate degree	1.29 (.32)***	.14 (.06)*	-.09 (.05)†
College degree	3.25 (.35)***	.23 (.06)***	-.14 (.05)**
Master degree or above	3.71 (.43)***	.29 (.08)***	-.15 (.07)*
Occupational prestige score (last/current job)	.02 (.01)†	.01 (.00)***	-.00 (.00)
Annual family income	1.20 (.37)**	.76 (.07)***	.00 (.05)
Social integration	.91 (.26)***	.10 (.05)*	.03 (.04)
Social capital (centered)		.01 (.00)***	-.01 (.00)
Subjective social Status			-.11 (.02)***
Social capital * social integration			-.01 (.01)†
Number of observations	2,939		
CFI	.919		
RMSEA	.077		
R-Squared	.107	.215	.067

Note: Numbers in parentheses are standard errors; † $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$ (two-tailed test).



† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$ (two-tailed test)

Figure 16: Structural Equation Modeling of Social Capital, the Interaction of Social Capital with Social Integration, Demographic Variables, Objective Social Status, Social Integration, Subjective Social Status, and Depressive Symptoms (Main Results)

Finally, I added all these significant or marginally significant interaction terms into the full model simultaneously. This model fit the data very poorly, and cannot be accepted. The mean of CFI was 0.703, and the mean of RMSEA was 0.176.

6.3 Instrumental Variables Analyses

Finally, I applied the instrumental variables method to verify the causal order between social capital and depressive symptoms, based on the first of the ten imputed data sets. The instrumental variable I used is household size. This instrument had a mean of 3.21 with a standard deviation of 2.01 (see Table 1). It had a right-skewed distribution, and I applied a logarithmic transformation to normalize it. Theoretically, this instrument is expected to not have a direct association with depressive symptoms, but to have a direct negative association with social capital. Household size represents the extensity of strong ties, while the accumulation of social capital is positively associated with the establishment of weak ties. Statistically, as Table 8 showed, this instrument was significantly correlated with social capital ($-.123$, $p \leq .001$) but not with depressive symptoms. The Hausman (1978) test results failed to reject the null hypothesis that OLS regression estimates (Equation 3) and instrumental variables regression estimates were equal at the significance level of .01 (Chi-square=.21, $df=15$, $p=1.000$). This evidence allowed us to comfortably assert that the relationship between social capital and depression is not an artifact of reverse causation or incidental association.

Table 10: Zero-Order Correlations

	1	2	3
1 Depressive symptoms (log)	1		
2 Social capital	-.127***	1	
3 Household size (log)	-.024	-.123***	1

Note: † $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

6.3 Summary

This chapter presents empirical results from correlation analyses, multivariate structural equation models, and instrumental variable analyses. These results leave little doubt that social capital exerted a direct effect on depressive symptoms. They also indicate that social capital mediates the associations of depressive symptoms with age, gender, being black (versus being white), marital status, education, occupational prestige, annual family income, and social integration but not those associations of depressive symptoms with being Latino (versus being white) and other race/ethnicity (versus white). They further show that social capital is indirectly associated with depressive symptoms by promoting subjective social status. Additionally, the results demonstrate that social capital moderates the relationships of depressive symptoms with gender, being black (versus being white), education, annual family income, and social integration. Finally, results from instrumental variable analyses provided strong evidence for the causal flow running from social capital to depressive symptoms instead of vice versa.

7. Conclusion and Discussion

7.1 Conclusion

Social capital is a recently popular concept in the social sciences. This theory has garnered increasing attention in the health literature. Social capital, however, is a diverse construct. It has divergent heuristic sources, a broad range of definitions, and generates a lot of debates. I distinguish two perspectives on social capital: the normative approach as Coleman and Putnam represent and the network approach as Bourdieu and Lin exemplify. The normative approach catches most research attention and contributes most to the health sciences, while the network approach is underexplored. This dissertation does not attempt to reconcile the controversies on the concept of social capital. Instead the central question of this dissertation is whether “who you know” partially shapes the social production of disease and illness. In other words, the purpose of this dissertation is to explore the contribution of the network approach to the burgeoning social capital and health literature, and examine whether and how social capital theory as proposed by Lin applies to the social organization of health. This dissertation is concerned with two major research questions: whether social capital as network resources has a direct protective effect on health, and how it interplays with other social precursors of disease and illness.

Data from a recent national survey of the U.S. adults, “Social Capital: Its Origins and Consequences,” collected in 2004-5 provide a unique opportunity to examine

whether social capital impacts depression net of other variables, and how social capital operates together with other social antecedents of depression. Based on available data, I hypothesize that social capital is associated with the level of depressive symptoms in four ways: social capital can have a direct effect on depression; it can mediate the effect of demographic variables, objective social status, social integration; it can influence depression indirectly by subjective social status; and it can interact with demographic variables, objective social status, social integration, and subjective social status. These research hypotheses in general receive support from results from structural equation modeling analyses. Social capital is directly negatively associated with depression net of age, gender, race/ethnicity, marital status, education, occupational prestige, annual family income, and social integration. Social capital also mediates the relationships of depression with age, gender, being black (versus being white), marital status, education, occupational prestige, annual family income, and social integration but not with being Latino (versus being white) and other race/ethnicity (versus white). Age, education, occupational prestige, annual family income, and social integration are positively associated with social capital, while being female, being black (versus being white), and being married are negatively associated with social capital. Furthermore, social capital is related to depression indirectly through enhancing subjective social status. Finally, social capital interacts with gender, being black (versus being white), education, annual family income, and social integration. The compensation effect hypothesis holds for the

interaction of social capital with gender and being black (versus being white), while the cumulative advantage hypothesis holds for the interaction of social capital with education, annual family income, and social integration. Social capital plays a stronger protective role for women and blacks than for men and white. Social capital also exerts a stronger protective effect for respondents with an associate or college degree, respondents with more annual family income, and respondents with memberships in voluntary organizations than for respondents with a high school degree or less, respondents with less annual family income, and respondents without memberships in voluntary associations. Finally, results from the instrumental variable method provide strong evidence for the causal flow running from social capital to depression.

This dissertation extends relevant literature theoretically in five ways. First, it shows that resources can flow through social networks and shape the social production of disease and illness. Its findings advance our understanding of how social capital as network resources influences health. Social capital is one of the most acknowledged contributions from sociology to other fields of social science over the past two decades (Portes 1998). Within sociology this concept has received incomplete attention in the health literature. This study speculates how social capital can operate like personal capital as a potential fundamental cause of disease and illness. It also elaborates nine mechanisms linking social capital to health, including influence, health information, social credential, psychological resources and emotional support, material support,

healthy norms and behaviors, stressors, health services use, and subjective social status. Its empirical evidence shows that social capital is a unique social determinant of health. It sheds light on a new research area of social capital studies and on a new social source of persistent health disparities.

Second, its results expand our knowledge of the relationships of social capital with other social causes of health. Age, gender, race/ethnicity, marital status, and objective social status can influence health through social capital. Social capital offsets gender inequality and racial/ethnic inequality in depression, while enhancing educational inequality and income inequality in depression. Note that we report no evidence for the interaction between social capital and age, marital status, and occupational prestige. These findings contribute to a more complete picture of how social factors act in sequence and together to shape the social distribution of health.

Moreover, this study contributes to the social network tradition in medical sociology, and elaborates on how different aspects of social relationships can act as antecedents of disease. One major research gap in the social network literature is whether the access to resources in particular material resources is one mechanism through which social networks shapes health (Berkman et al. 2000). Occupation is one central indicator of hierarchical social locations in the stratification literature, and the position generator measures social capital as the occupational distribution of network members. Social capital measured through the position generator contributes to

bridging that foregoing research gap in the social network and health literature (Webber and Huxley 2004). This study offers evidence that social capital is one unique network-based health risk factor. Social integration is also network-based, and in this study it does not exert a direct effect on depression. Instead, it influences health indirectly through its contribution to social capital. Social integration also interacts with social capital. Social capital enhances social integration inequality in depression.

Besides, social capital theory takes a conflict perspective (Hawe and Shiell 2000; Song and Lin 2009), and is embedded in the traditional stratification literature in sociology. The establishment of the linkage between social capital and health contributes to relating health disparities with general stratification theories in sociology. Additionally, this study strengthens the structural perspective in medical sociology, one unique sociological approach to health (Bird et al. 2000). Social capital can be another important approach to social structure and health because network members' structural positions reflect "structural arrangements in which individuals are embedded" (Pearlin 1989:241).

This study also makes methodological contribution. The network instrument, the position generator, has proved to be able to capture social capital and explain health outcomes in the Taiwan society (Song and Lin 2009). This dissertation is the first effort up to now to use the position generator to map social capital and study health outcomes in

the U.S. society. Its findings suggest that the position generator is suited to capturing information regarding social capital which can protect health in the U.S. population.

7.2 Discussion

This dissertation is only a starting point for examining how social capital determines disease. Two data limitations should be kept in mind. First, this study is based on cross-sectional data. The original research design is a two-wave panel survey. I chose to use only the first wave due to the huge attrition rate from the first wave to the second wave. Thus variables of interest in this study were all measured at the time of the first wave survey. Despite the fact that my instrumental variables analyses support the social causation argument that social capital primarily influences disease rather than vice versa, a process of social selection is possible. Physical or mental illness may prevent individuals from knowing or contacting others with higher social positions. The same causal problem also applies to the associations of social capital with marital status, objective social status, social integration, and subjective social status. For purposes of stronger causal inference, future studies should use longitudinal data, ideally three-waves with a reasonable attrition rate and a longer time lag between waves, to examine the competing arguments of social selection and social causation.

Second, the data I used are from a national sample of respondents aged twenty-one to sixty-four, who were currently or previously employed. Data are not available from older adults and adults who were never employed. It is possible that older adults

have fewer opportunities of social interaction due to retirement or physical limitations and, consequently, their volume of social capital may decrease. It is also possible that because the elderly population is at greater risk of illness and more likely to live on fixed incomes, they may be more likely to resort to social capital for health resources and thus benefit more from social capital than the younger population. Individuals without employment histories are likely to possess fewer socioeconomic resources. Considering the finding in this study that social capital can strengthen the inequality in depression across socioeconomic groups, I expect that the effect of social capital would be even stronger role if the data included respondents who were never employed. For purposes of generalizability, future studies need to collect data from a national sample of respondents of all ages and employment backgrounds to examine these issues.

Social capital is inherently intrinsic sociological. Putnam's notion has captured most attention in the health and public health literatures, while the values of sociological theories of social capital have been understudied. To extend Woolcock's statement (1998), the popularity of social capital may help drive sociologists into multidisciplinary discourse on public and individual health issues. Sociologists can now play a crucial role in advancing our understanding of the relationship between social capital and health by responding to the following theoretical and methodological issues.

Theoretically, future studies are challenged to refine and examine current social capital theory in five respects. First, social capital theory assumes that health outcomes

result from expressive purposive actions aimed at maintaining resources (Lin 2001b). It assumes that existing resources are sufficient to protect health, and that individuals are concerned with only how to preserve resources in order to maintain health. These two assumptions are questionable. Not everybody is equipped with sufficient resources to protect health because stratification, technology and other social forces constrain opportunities and accesses to resources for some population subgroups. Even infants need resource investments to be born healthy (e.g., Gortmaker and Wise 1997). Also, at least some individuals are concerned not only with health maintenance but also with health promotion. Health promotion is a life-long process that requires resource investment and resource procurement. I thus argue that health is an outcome of both instrumental and expressive purposive actions.

Second, current social capital theory focuses on returns of social capital to instrumental purposive actions that aim at obtaining resources, and offers four potential mechanisms (Lin 2001a). The specific mechanisms that link social capital to health are not well articulated. This dissertation examined previously-suggested mechanisms by which social capital affects health. I also proposed five additional mechanisms: material support, healthy norms and behaviors, stressors, health services use, and subjective social status. Due to the limits of available data, this dissertation only examined one mechanism, subjective social status. The results indicate that subjective social status does, in fact, partially mediate the effect of social capital on health. Future studies

should collect data measuring all eight of the possible mechanisms and test each empirically. These analyses will certainly contribute to a fuller picture of how social capital influences health through various downstream factors.

Third, social capital is only one type of network-based health risk factor. This study examined only the association between two network-based factors: social integration and social capital. It is not clear whether other network-based concepts such as social cohesion and social support operate as speculated in Figure 2. Future studies should examine all these network-based social antecedents of health and their causal relationships in a systematic empirical study for a more comprehensive understanding of how different relationship-based social factors operate together in the social production of health inequality. Among others, one prominent research gap for medical sociologists to explore is the association between social capital and social support, one intrinsic sociological factor and one potential fundamental cause of disease and illness (Link and Phelan 1995).

Fourth, this study demonstrates that social capital has a direct effect on depression, and that effect varies with ego's gender, race/ethnicity, education, annual family income, and social integration. One of the remaining questions is whether the health effect of social capital will vary with network members' characteristics and with the attributes of the relationship between ego and network members. The data set I used in this dissertation includes information on network members' demographic features

including gender and race/ethnicity. It also contains information on four traits of the relationship between ego and network members including network members' role (e.g., spouse, parents, children, siblings, other relatives, neighbors, friends, co-workers, acquaintances, and etc.), the intimacy of the relationship, the length of the relationship, and whether ego came to know network members through ego's spouse or partner. The exploration of how social capital effects vary with these contact attributes and relationship characteristics will be reserved for future studies. Among others, one interesting research hypothesis would be that social capital derived from stronger ties can play a stronger health effect than that derived from weak ties since the protective effect of strong ties on mental has been well-established.

In addition, valuable resources exist at multiple levels: individual, family, neighborhood, and social network. Individual and family socioeconomic resources prove to be fundamental causes of disease and illness (for a review, see Link and Phelan 1995). Recently community socioeconomic resources also prove to impact various health outcomes net of individual and family resources (for a review, see Robert and House 2000). This dissertation finds that social capital, resources embedded in social network, has a direct effect on depression net of individual and family socioeconomic resources. One following question will be whether social capital can exert health effects independent of individual, family, and neighborhood resources. Hypothetically social capital should play an independent role since it captures networks beyond geographic

locations. Another interesting question will be whether social capital interacts with neighborhood socioeconomic characteristics. The compensation effect hypothesis will argue that social capital plays a stronger role for those living in disadvantaged neighborhoods. The cumulative advantage hypothesis will propose that social capital exerts a bigger effect for those living in advantaged communities.

Methodologically, future studies are challenged to improve the measurement of social capital in three respects. First, the data used in this study included only one measurement instrument of social capital, the position generator. The only health study that uses multiple network instruments (Song and Lin 2009) finds that social capital measured through the position generator is a stronger predictor of health in Taiwan than the name generator. Van der Gaag and colleagues (2008) suggest that the position generator is less able than the resource generator to capture social capital meaningful for health outcomes. Future studies should collect data using multiple measurement instruments and continue to compare the weaknesses and strengths of each instrument in the prediction of various health outcomes. Such efforts will contribute particularly to the methodological session of the social network literature.

Second, multiple measures of social capital can be derived from the position generator. This study uses only one measure: average accessed prestige. In supplemental analyses, I created a few other social capital indices through the position generator, including extensity (i.e., the total number of occupations in which respondents identified

one contact), upper reachability or highest accessed prestige (i.e., the highest prestige score of occupations that respondents have access to), range in accessed prestige (i.e., the difference between the highest and lowest prestige scores of occupations that respondents have access to), and total accessed prestige (i.e., the summed prestige score of all occupations that respondents have access to) (Boxman, Flap, and Weesie 1992; Hsung and Hwang 1992). None of these social capital indices predicted depressive symptoms as well as average accessed prestige. In our previous study (Song and Lin 2009), social capital as a factor derived from extensity, upper reachability, and range does predict depression and self-reported health very well in Taiwan. Future studies should clarify the theoretical and statistical meanings of different social capital indexes, and examine their generalizability across cultures and societies.

Finally, the position generator per se is subject to refinement for health studies. The position generator was originally developed to capture the relationship between social capital and socioeconomic status attainment. It traditionally lists a representative sample of occupational positions salient in a hierarchical society. Most listed positions are not directly relevant to the allocation of health resources. Thus social capital measured in this dissertation may underestimate the health resources embedded in social networks, and the empirical results may understate the health effects of social capital. Revising the position generator to be maximally useful for health studies will be challenging. The data set that I used in this dissertation, for example, contains only one

health-related job, nurse. In supplemental analyses, I found that whether respondents knew a nurse is not associated with the levels of depressive symptoms. This finding may imply that the position generator should include a wider range of health-related occupational positions such as physicians and, for mental health studies, psychologists or psychiatrists. The position generator should not be restricted to a list of physicians with various specialties, however. Social contacts at other hierarchical positions can also offer health resources. Network members such as professors or teachers, for example, may possess valuable health information. Network members such as CEOs or managers may control materials resources and exert crucial influences. Network members such as hair dressers may be important as sources of emotional support (http://www.nytimes.com/2007/12/06/fashion/06SKIN.html?_r=1&scp=8&sq=hair%20salon%20talk&st=cse). Thus I suggest that the position generator be balanced to include not only health-related positions, but also other meaningful hierarchical positions. A comparison between social capital indexes based on health-related positions and those based on other occupational positions will be very helpful in developing more accurate network instruments for health studies. In addition, to capture social capital embedded in social networks more comprehensively, some may suggest that we code these listed positions by a combination of each position's education, income, and prestige instead of simply by prestige scores. This suggestion is beyond the scope of this dissertation, and will be reserved for future studies.

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Biography

Lijun Song was born on December 17, 1978 in Boshan, Shandong Province, People's Republic of China. She entered Shandong University in 1996, and received her Bachelor of Arts in Sociology in June 2000 and Master of Arts in Sociology in June 2003. She joined the Ph.D. Program in Department of Sociology at Duke University in August 2003. She expects to complete all her Ph.D. requirements by June 2009.

During her doctoral studies, she has been honored with several competitive research fellowships and awards, including the Program for Advanced Research in the Social Sciences Fellowship from the Social Science Research Institute, a Summer Research Fellowship from the Graduate School, Graduate Awards for Research and Training in Global Health from the Duke University Center for International Studies, and a Summer Research Fellowship from the Asian/Pacific Studies Institute. She has two journal articles in press. One article, "The Cultural Revolution Depressed Educational Homogamy in Urban China," is forthcoming at *Social Forces*. The other article, coauthored with Nan Lin, "Social Capital and Health Inequality: Evidence from Taiwan," was published in the *Journal of Health and Social Behavior*. She also has a few book chapters in press.

She holds memberships in the American Sociological Association, the Southern Sociological Society, the North American Chinese Sociologists Association, and the International Social Networks Association.