Relationship between Social capital and Chronic illness self-management in Seoul, Korea

사회자본에 따른 만성질환 자가관리 양상 연구

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서울대학교 보건대학원

보건학과 보건학전공

김 은 아

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지도교수 조 성 일

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서울대학교 보건대학원
보건학과 보건학전공
김 은 아

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위 원 장 ___정 해 원___ (인)
부 위 원 장 ___조 영 태___ (인)
위 원 ___조 성 일___ (인)

Abstract

Relationship between Social capital and Chronic illness self-management in Seoul, Korea

Eun Ah, Kim
Department of Epidemiology
Graduate School of Public Health
Seoul National University

Introduction: A growing burden and impact of hypertension and diabetes has led to a growing interest in its management. Chronic illness self-management supports patients with chronic conditions to have the best possible quality of life, improving health behaviors and decreasing the frequency of hospitalization (Bodenheimer et al., 2002). To implement effective self-management, more socialized understanding of the process is required (Gately et al., 2007). Several studies have indicated that socioeconomic status (SES) has a relationship with social capital (Glanz et al., 2002; Barlow, 2002) and influence the adherence ability to manage chronic illness (Goldman & Smith, 2002). Furthermore, "satisfaction" is the outcome of social capital (Harpham, 2002) as well as it decides treatment compliance and accessibility to health care (Hjortdahl & Laerum, 1992). The purpose of this study was to demonstrate the relationship between social capital and self-

management of patients with hypertension and diabetes; furthermore investigate the differences in association by SES; and clarify the mediating effect of "satisfaction".

Methods: The data used in this study came from the Korean Community Health Survey (KCHS) of 2011, and the region was restricted to 8 districts of Seoul. The subject criteria was "prevalence of hypertension and/or diabetes" and "adults aged 30 and above." Following Putnam's notion, social capital was defined in terms of "trust, reciprocity, networks, and participation," and "Taking medication, following non-medication therapy, and attending to self-management education" were set as management matters of chronic illness. Breslow-Day test and Mantel-Haenszel test were used in SES stratification analysis, and mediating effect of "satisfaction" was analyzed based on Baron & Kenny's approach. Logistic regression was performed for analyzing adjusted association between variables. All analytic processes were performed using the statistical program SAS version 9.3.

Results: Hypertension patients were mostly dependent on medication for self-care, rather diabetes group attempted to manage their disease with more diverse manners including attending education. Generally, comorbidity group indicated better self-management aspects than those with single disease. Intimate and homogenous ties were predominant among participation (e.g. friendship activities: 56.97%) and network (e.g. family network: 79.26%). There are significant differences between social capital and self-management distribution by SES and several combinations indicate positive effect for high SES group only. And "satisfaction" came into mediator between "trust" and "non-medication." After adjustment for confounding factors, "network" still had

association with "medication" (OR 1.46, 95%CI 0.93－2.28, p<0.1), and "participation" with "non－Medication" (OR 1.38, 95%CI 1.03－1.84, p<0.05).

Conclusion: The structural social capital comprised of participation and network, tend to have positive effects on chronic illness self－management than cognitive social capital based on trust and reciprocity. The distribution and effectiveness of social capital and self－management manner depend on SES. In other words, high SES group manage chronic condition using their social resources (e.g. social capital and SES itself) properly, while low SES group have difficulty in achieving benefit of social capital due to a lack of their capacity. That is, low SES could be a barrier to take advantage of social capital on self－management, and it can broaden the health inequality between SES groups. We need to understand social context for chronic illness self－management and bring social capital strategies into self－management paradigm for enhancing patients' efficacy and management efficiency.

Student Number: 2012－21888

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Chapter1. Introduction

1.1. Background

Hypertension (high blood pressure) has a large impact on morbidity and mortality in considerable populations, due to its high prevalence and strong association with the incidence of cardiovascular and renal disease. The lost disability adjusted life years (DALYs) attributed to high blood pressure is considerably larger than those lost to smoking and alcohol. (Remington et al., 2010) According to a worldwide study, it is the second largest contributor to the burden of disease with high mortality (WHO, 2002) Hypertension is a very common disease in the Republic of Korea and the prevalence rate is on the rise, up to 18.9% in 2012, from 16.5% in 2008 (KCDC, 2012). The prevalence of diabetes among the chronic diseases has also increased sharply. According to one American study, the prevalence rate, which was 0.37% in 1935, increased to 7.8% in 2007 (Kenny et al., 1995; CDC, 2011). Diabetes leads to several complications that can cause disability and life-threatening risks. These can include cardiovascular disease, renopathy, and eyesight abnormality (CDC, 2011).

The growing burden and the impact of chronic disease has also led to a growing interest in self-management. Self-management education supports those living with chronic conditions to have the best possible quality of life, improving health behaviors and health status and decreasing the frequency of hospitalization, something

which has the potential to lead to substantial savings in health care costs (Bodenheimer et al., 2002; Lorig et al., 1999). Accordingly, optimal health outcomes for persons with chronic diseases depend on appropriate self-management (Lorig et al., 2001). Self-management could be the key to prolonging life expectancy in a healthy condition.

There has been lots of research into the idea that self-management doesn't reside in individual preference, but in the social environment. The effectiveness of the management of chronic illnesses is related to socioeconomic status (SES) (Glanz et al., 2002). Self-management may be one way of bridging the gap between patients' needs and the capacity of health and social care services to meet those needs (Barlow et al., 2002). We need to consider broaden conditions, such as how society and culture can impact on healthy behaviors. Social network theory is recognized as relevant to shaping and supporting self-care practices, producing resources and in identifying points where health inequalities might be perpetuated or ameliorated (Kendall et al., 2007). In this context, social capital could be an explanatory variable for determining chronic illness self-management aspects.

1.2. Objective

The aim of this study is to investigate the relation between social capital and self-management for chronic patients. Objectives in this study are represented as follows:

To demonstrate the social capital level and self-management aspects of patients with hypertension and diabetes.

To clarify the social capital effect on self-management by setting "satisfaction" as a mediator.

To investigate the different association between social capital and chronic illness self-management by socioeconomic status.

To figure out the effectiveness of social capital on chronic illness self-management and to identify the suitable strategies to apply social capital to the chronic disease control policy by each socioeconomic group.

1.3. Literature Review

To investigate the study objectives more rigorously, I have represented the definition of social capital, its characteristics, and the dynamic of the relationship between social capital and self-management.

1.3.1. Chronic illness self-management

- Attributes of chronic illness self-management

Traditionally, the successful management of chronic diseases was judged by how effectively practitioners adhered to a prescribed therapeutic regimen. This traditional, compliance-based medical approach is represented as a term of "compliance" or "adherence."

A great deal of effort has been spent in developing methods for measuring compliance and the techniques and strategies used to promote adherence (Funnell, 2004).

However, this approach does not match the reality of chronic disease (e.g. diabetes) care. The serious nature of chronic diseases, the complexity of their management, and the multiple daily self-care decisions, mean that adhering to a predetermined care program is generally not adequate over the course of a person's life with diabetes (Funnell, 2004). Anderson suggested that the use of "compliance" and "adherence" was counter-productive, because both terms construe the problem to be patients' behavior (Anderson, 1985).

When the role of patients started to be considered, a new chronic illness management paradigm emerged: the empowerment-based

interventions for chronic patients and patient−physician partnership paradigm. Many researchers emphasized autonomy motivation (Williams et al., 1998), self−efficacy (Bandura, 1997), responsibility of patients (Glasgow & Anderson, 1999), collaborative goal settings (Wagner, 1995), and self−management education, instead of traditional standards.

The responsibility of patients means that patients with chronic disease are fully responsible for the self−management of their ailments, unlike the treatment of acute illnesses. In short, patients are in control. No matter what health professionals do or say, patients are in control of important daily self−management decisions such as eating, physical activity, stress management, monitoring, etc. (Glasgow & Anderson, 1999). Optimal chronic care is achieved when a prepared clinical team interacts with an informed, active patient (Bodenheimer et al., 2006).

Collaborative care describes a situation in which physicians and patients make health care decisions together. Professionals are experts on diseases, while patients are experts on their own lives. Patients accept that they have responsibility to manage their own conditions. This paradigm views internal motivation as being more effective than external motivation in the context of lifestyle change (Funnell et al., 2006).

Chronic self−management education is the essential foundation for the empowerment approach and is necessary for patients to effectively manage disease (e.g. diabetes) and make decisions. It helps patients to make decisions about their care and obtain clarity about their goals, values, and motivations (Funnell et al., 1991; 2004). Moreover, it activate collaboration with the health care team

and has the potential to improve clinical outcomes, health status, and quality of life (Funnell et al., 2009). It also provides problem‑solving skills, which are useful in identifying problems and finding solutions. These skills enable patients to deal with medical, social, and emotional changes in circumstances and changes in their condition (Funnell et al., 2006).

― Components of self‑ management

Effective management of chronic illness requires significant participation by patients and their families. A diverse range of self‑management components was classified as engaging in activities that promote physical and psychological health, interacting with health care providers and adherence to treatment recommendations, monitoring health status and making associated care decisions, and managing the impact of the illness on physical, psychological and social functioning (Bayliss et al., 2003). Social support and communication are also one of important components. (Barlow, 2002)

― Impact of self‑management education

It is difficult to make generalizations about the impact of self‑management education across different studies. In certain circumstances, however, self‑management education and self‑management program can be effective in improving clinical outcomes and, possibly, in reducing costs for chronic conditions (Bodenheimer et al., 2006). Through the ongoing management of chronic disease, patients can achieve physically and psychologically optimal outcomes and enjoy reduced complications, which may otherwise result in a decreased length and quality of life (Funnell, 2004). Through educational intervention, patient

empowerment improves psychosocial aspects of living with diabetes, as well as metabolic outcomes such as blood glucose levels (Anderson, 1995). For patients suffering from congestive heart failure, intervention through self-management support and the redesign of a delivery system, was associated with a more than 50% reduction in hospital costs, resulting in overall savings (Rich et al, 1995; Stewart et al., 1999; Cline et al., 1998).

－ Barriers to chronic illness self-management

Multiple barriers have been reported in the context of self-care, including concerns about knowledge deficits, physical and financial access to care, adverse effects of medications, negative emotions, personal struggles, and difficulties with lifestyle changes.

Persons with comorbid chronic diseases are especially susceptible to a wide range of barriers to self-care, including multiple medical conditions. Multiple medication issues and the burden of caring for a single dominant condition commonly disturb effective self-care. There has been a significant decline in adherence, with increases in complexity or number of medications (Bayliss dt al., 2003).

On the other hand, a study examined the educational differences in treatment adherence among diabetes patients and assessed the impact of adherence on health status. As a result, the less educated were much more likely to switch treatment, which led to worsening general health. The ability to maintain a health regimen varies in relation to schooling and is an important determinant of health outcomes. Thus, self-maintenance is an important reason for the steep SES gradient in health outcomes. Education levels influence adherence when patients comprehend physician order itself, and accommodate medical recommendation. Technological differences

(such as complicated drug regimens) also play a critical role in explaining health disparities between different levels of education (Goldman and Smith, 2002).

1.3.2.　Social capital

－ Definitions of social capital

Social capital is a multidisciplinary concept. There is still no agreed definition of social capital across diverse fields of study. The definition has its roots in sociology, political science, economics, and educational sociology. Despite an absence of consensus on definitions, there are several prominent concepts and characteristics of social capital. These are as follows

　"Social capital is the sum of resources, actual or virtual, that accrue to an individual or a group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition (Bourdieu and Wacquant 1992)."

Bourdieu, a French sociologist, is mainly concerned with unequal access to resources and the maintenance of power. The existence of a network of relationships is not a natural given, but it is the product of an endless effort of institutions, which is necessary in order to produce and reproduce profitable relationships. In other words, the network is the product of investment strategies, which are individual or collective, and consciously or unconsciously aimed at transforming contingent relations (such as those of the neighborhood, the workplace, or even kinship) into social relationships, implying durable obligations (feelings of gratitude, respect, friendship, etc.) (Bourdieu, 1986). For Bourdieu, social

capital is derived from economic capital, and the production and reproduction of capital creates inequality. He described the dynamic development of structured sets of values and ways of thinking as forming "the habitus," in which groups were able to use cultural symbols as marks of distinction, both signaling and constituting their position in the social structure (Field, 2008).

Coleman and Lin also interpret social capital as "resources." They state: "Social capital is the set of resources that inhere in family relations and in community social organizations, and that are useful for the cognitive or social development of a child or young person" (Loury, 1977; Coleman, 1994); "Resources embedded in a social structure that are accessed and/or mobilized in purposive action (Nan Lin, 2001)."

James Coleman, an American sociologist, attempted to build a bridge between sociology and economics. He analyzed social capital on the basis of the economic principle of rational choice theory, in which people chose to cooperate to serve their own interests. He defined social capital by its function, as:

"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 the structure" (Coleman, 1994).

He argued that relationships constitute capital resources through expectations and obligations between individuals. In the context of this argument, people hold their own obligations in social life and expect the obligations of others to be repaid. In addition, the trustworthiness of the social environment, the existence of

effective norms, and the securing of the information flow facilitate the form of social capital (Coleman, 1988).

In contrast to the sociologists Coleman and Bourdieu, Robert D. Putnam, the American political scientist, contributes political considerations to the definition of social capital. He defines social capital as:

"Features of a social organization, such as trust, norms, and networks, which can improve the efficiency of society by facilitating coordinated actions (Putnam et al., 1994)."

Putnam emphasized the role of civic engagement for social integration, arguing that associational activity helps to build and sustain a wider set of networks and values, which foster general reciprocity and trust and, in turn, facilitate mutual collaboration (Field, 1995). Likewise, Tocqueville also argued that voluntary associations are an important foundation of American democracy and make bondage between individuals (Tocqueville, 1968).

Even though ideas of social capital notions defined in different terms, the descriptions all consider that social capital consists of personal connections and the shared values. People connect through a series of networks and they tend to share common values with other members of these networks, which allows people to pursue their goals. Thus, membership of networks and a set of shared values can be seen as a resource that forms a kind of capital and comes to the heart of the concept of social capital (Field, 2008).

Besides conflicting definitions, some social scientists have argued that social capital lacks obvious properties of "capital," such as reducibility to a common currency, substitutability, transferability, and opportunities for direct investment. Some critics believe that

the term should be replaced (Robinson et al. 2002), while some question whether it is possible to regard networks and norms as a form of capital. However, even though it cannot readily be translated into cash terms, social capital does have a degree of transferability that is at least as high as human capital (Cohen, 1999). It is appropriate to use the term "capital," insofar as it gives rise to resources that can be deployed in order to enable actors to pursue their goals more effectively than they could without it (Field, 2008).

Coleman compared the concept of social capital with human capital, claiming that social and human capital are generally complementary (Coleman, 1994). However, the key distinction between human and social capital is that the former focuses on individual agents (e.g. the knowledge, skills, and other attributes embodied in individuals), and the latter on relationships between them and the networks they form (Schuller, 2001). Thus, human capital is considered as private good whose ownership resides with individuals, while social capital is public good that is created by, and benefits, all who are part of a structure (Coleman, 1988). Moreover, human capital is measured by duration of schooling and the outcomes are represented as enhanced income or productivity. On the other hand, social capital is measured by levels of active participation in civic life, or in terms of attitudes or values. It has wider outcomes, including the generation of further social capital, social cohesion, and enhanced economic performance (Schuller, 2001).

ㅡ Components and measurement of social capital

Social capital is mostly defined in terms of networks, norms and trust, and the way these enable participants to act together more effectively in achieving shared objectives (Putnam, 2000; Schuller, 2001). Putnam's definition has been most commonly used in the health sciences, and there are five principle characteristics (Putnam et al., 1994): community network, voluntary, state, personal networks and density/ civic engagement, participation and use of civic networks/ local civic identity-sense of belonging, solidarity and equality with local community members/ reciprocity and norms of cooperation, a sense of obligation to help others, and confidence in return of assistance/ trust in the community.

In terms of network or participation, social capital must be understood as a relational construct. It embraces an attribute of the individual and of the collective (Field, 2008). The most common measures of social capital look at participation in various forms of civic engagement, such as membership of voluntary associations, churches, or political parties (Schuller, 2001). The central idea of social capital is that social networks are a valuable asset. Networks provide a basis for social cohesion, enabling people to cooperate with one another for mutual advantage.

However, there are arguments about the property of trust. John Field argued that trust is a product of social capital, not one of its components (Field, 2008). Woolcock also pointed out that trust and reciprocity are nurtured by particular combinations of social relationships, but they do not exist independently of social relationships (Woolcock, 1998).

‒ Typology of social capital

Several types of social capital have been distinguished by the direction of ties and levels of formality, strength and diversity (Ferlander, 2007). Classifying social capital according to its attributes, there are three key dimensions along which social capital can be measured: **(a)** vertical vs horizontal, **(b)** strong vs weak ties, **(c)** bridging vs bonding (Putnam, 2000), and **(d)** structural vs cognitive social capital, type can be classified.

(a) Vertical vs Horizontal social capital: This depends upon which networks involve relationships amongst agents that are more or less equally located in the relevant hierarchy, as opposed to relationships between agents that are located at different levels. Putnam argued that "vertical" bonds might be less helpful than "horizontal" ties, in that they might undermine the capacity for collective action and create suspicion (Putnam et al., 1994).

(b) Strong vs Weak ties: The strength of an interpersonal tie is determined by a combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the tie. Weak ties, which entail access to a wider and more heterogeneous set of connections, are essential for the opportunity to integrate into communities. Strong ties breed local cohesion and lead to overall fragmentation. They create greater solidarity among network members, but can be dysfunctional, excluding information and reducing the capacity for innovation (Granovetter, 1973).

(c) Bridging vs Bonding social capital: Bridging ties bring together heterogeneous members, whereas bonding ties link more or less homogeneous members.

(d) Structural vs Cognitive social capital: Structural social capital describes the relationships, networks, associations, and institutions that link people and groups together (e.g. the number of church groups, local societies, football teams, or volunteer groups). Cognitive social capital consists of value, norms, reciprocity, altruism, and civic responsibility, sometimes called "collective moral resources."

1.3.3. Social capital and health

An attention of health risk factors have broadened from micro agents, such as viruses, to social and cultural causes. It is uncontroversial that ethnicity, gender, socioeconomic status, and neighborhood play important roles in the distribution of health in society. In the 1950s, a Roseto community study demonstrated that social integration (social capital) acts as a buffer against disease (hypertension) (Lasker et al., 1994). Likewise, in terms of mental health, the French sociologist Emile Durkheim, argued that suicide rates increased when social integration and social regulation declined in consequence of egoistic individualism and the erosion of religious and moral constraints on individuals (Durkheim, 1951). Durkheim challenges us to understand how individual acts rest not upon psychological foundations, but upon the "social facts," and his theories have developed a sociological understanding of health and illness more broadly (Berkman et al. 2000).

These studies made significant implications that social integration and social capital act a disease buffers, and that the health consequences were unintended "social facts." In conclusion, differences on health are closely connected to the differences in

the resources that we possess to protect our well−being, and social capital is a fundamental resource, besides material and cultural resources (Turner, 2004).

Berkman et al. argue that networks operate at the behavioral level through four primary pathways: provision of social support, social influence, social engagement and attachment, and access to resources and material goods (Berkman et al. 2000).

Through this mechanism, social capital has been linked to both mental and physical health. A wealth of empirical research makes connections between the positive function of social capital on health. It reduced mortality (Kawachi et al., 1997), increased self− rated health (Kawachi, 1999; Rose, 2000; Subramanian et al., 2002), and related positive mental health (Cobb, 1976; House et al., 1988; Berkman et al., 2000). Social capital has also been linked to various health−related behaviors, such as smoking, leisure− time physical activity, and dietary habits (Poortinga, 2006). Social capital enable us to form social affiliation and social cohesion within neighborhoods and communities, reducing the risk of morbidity and mortality. Informal social control, the maintenance of healthy norms, and access to various forms of social support, can contribute to both healthier lifestyles and positive well−being (Kawachi 1997, 1999).

When it comes to health effect by social capital types, bridging and linking social capital provides access to new information and resources, enhancing people's actual control and improving their ability to solve various problems. At the societal level, these wide networks promote the spread of healthy norms (Kawachi et al.,

1997) and control unhealthy behaviors, such as smoking and alcohol abuse (Subramanian et al., 2002).

Moreover, communities with high levels of bridging and linking social capital may have the power to influence political health issues. (Ferlander, 2007) For instance, socially cohesive communities are more successful in fighting potential budget cuts and therefore have better access to local services (Sampson et al., 1997; Kawachi et al., 1999).

However, social capital, especially strong bonding ties, could be a source of strain, leading to conflicts (Thoits, 1985), and an emotional burden for the support provider (Ferlander, 2007). For example, women with large networks are often highly involved in the stress of others, and thus experience more stress (Sarason et al., 1997). Strong bonding social networks may also affect negative health behaviors. Where little external information is added and the level of social influence is high, social capital can promote unhealthy norms of behavior, such as tobacco and alcohol consumption, drug use, and harmful sexual practices (Berkman et al., 2000).

1.3.4.　Social capital and chronic self-management

For chronic illness self-management, there has been a focus on providing information, developing empowerment, and joint decision making at the interface with health professionals, improving professional-patient communication and developing self-efficacy (Heisler et al., Michele et al., 2002; Blakeman et al., 2006; Macdonald et al., 2008; Rogerset al., 2005).

However, these factors lack a discussion about accessing resources and the organization of everyday life and relationships, outside of formal healthcare settings. To develop and implement effective and appropriate self-management strategies, an understanding of the dynamic between the consultation field and the patient world is required (Vassilev et al, 2011). A study of social networks and social capital has a role to play in offering a more specific socialized understanding of the process of chronic illness self-management, demonstrating the significance of the social context for self-care (Gately et al., 2007). Five characteristics demonstrate that social capital influences the practices of self-care. These are set out below (Vassilev et al, 2011):

(a) Shaping Knowledge, Discourses, and Narratives: Patients' understanding of their illnesses and how they talk about them, is shaped by those around them. The form and content of illness narratives are constructed within social networks (Walter et al., 2004). Everyday discussions of health problems allow the sufferer to gain new information about their condition, reinforce health actions, and attempt to persuade or intervene directly. That is, symptoms are evaluated and constituted by conversations, rather than stemming from their actual physics (Furstenberg et al, 1984).

(b) Setting Stigma on Poor Management: Stigma is construed and experienced in relation to others. Therefore, structural social positions and social relational elements are related with forming and activating stigma. Poor management states could be considered a stigma, described as "personal failing" or "inferior," while illness management can be affected by stigma on the basis of personal responsibility for self-care.

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(c) Negotiation and Coordination of Membership Arrangements: The chronic illness management involves arrangements related to the home, family, employment, leisure and friends. Thus, networks negotiate individual and group responsibility, deciding who should do what work, when and how, in the context of managing disease (Gregory et al, 2005).

(d) Constructing a Relationship between Health Services: Patients who have interaction with formal healthcare services and professionals have a significant role to play in the construction of meaning, as well as the practical management of illness. It decides the ability of patients to understand and transfer the advice of health professionals into their everyday life, as well as being able to explain the specific circumstances of their illnesses within the context of the consultation. The consultation is often attended by a patient companion (triadic: physician-patient-companion), acting as effective mediators and improving each other's' understanding (Eggly et al, 2006).

(e) Substitutability of Lay and Professional Networks: Illness work is shaped by professional and non-professional networks, raising the possibility of the substitutability between these different sources. While access to one form of network support is limited or absent, its functions might be provided by alternative means. For example, professionals may, in some circumstances, be a substitute for the lack of locality networks

Chapter2. Methods

2.1. Study design and hypotheses

This study aims to investigate the relationship between social capital and chronic illness self-management. Each variable will be analyzed respectively in order to confirm what type of social capital significantly influences chronic illness self-management.

Following Putnam's notion, social capital is defined in terms of "trust, reciprocity, networks, and participation," as independent variables (Putnam et al., 1994; Putnam, 2000). High levels of trust in society can facilitate the faster and wider diffusion of information, which may promote healthier behaviors (Yip et al., 2007) and enable socially cohesive communities to have better access to local services (Kawachi et al., 1999). Furthermore, family and friend networks, which are based on kin and intimate ties, influence the use of health services for patients. Relatives and friends, acting as lay consultants, could be a source of social control in terms of using health services (Mckinlay, 1973). Through the preceding research results, it becomes apparent that social capital influences chronic illness self-management by regulating the information flow, health related behavior, accessibility to health service centers, and social support from the intimate network.

There are 3 sets of tasks faced by people with chronic conditions: medical management of the condition (taking medication, changing diet, or self-monitoring blood sugar levels etc.), creating and

maintaining new meaningful life roles (jobs, family, and friends etc.), and coping with the anger, fear, frustration, and sadness that living with a chronic condition often entails (Corbin & Strauss, 1988). Education in managing chronic illnesses helps patients obtain clarity about their goals, values, motivations, and supports informed decision-making and problem-solving. Thus, attending to education is essential for self-management and improving clinical outcomes, health status, and quality of life (Funnell et al., 1991; 2004; 2009).

Therefore, "Taking medication," "following non-medication therapy", and "attending to self-management education" are set as important management matters of chronic illness in this study.

In the Community Health Survey questionnaire, a data resource, the domain of social capital is ambiguously integrated with the neighborhood environment. It seems to deal with the "satisfaction" of the social environment, providing proxy variables for social capital (KCDC, 2011). Harpham, however, claims that "enjoyment of the area, neighborhood quality, and security etc.," are sometimes regarded as social capital, but can be more correctly and more usefully regarded as intermediate variables between social capital and health (Harpham, 2002). Furthermore, satisfaction and chronic illness self-management are related. In the chronic care model, satisfaction to health care service encourages patients to continue as customers of primary care practices (Bodenheimer et al., 2002). Similarly, care that is less satisfactory is associated with non-compliance with the treatment, return appointments, and a poor understanding and retention of medical information (Hjortdahl & Laerum, 1992). General dissatisfaction with health care delivery resulting from

noncompliance, may induce poor medical outcomes (Korsch & Negrete, 1972) and affect management of chronic diseases such as diabetes (Parchman et al., 2002). In this study's conclusion, the domain of satisfaction is regarded as a mediator, preventing it from diluting the social capital concept, as well as finding out its mediation effect related to self-management.

Capital is linked to historic ideas about socioeconomic status (SES: comprised of education, income, and occupation), and it brings into focus the important dimension of social relationships (Krieger et al. 1997). In recent years, several studies have indicated that SES has a relationship with social capital, as well as chronic illness self-management (Glanz et al., 2002; Barlow, 2002). SES impacts well-being at multiple levels and is associated with a wide array of health, cognitive, and socio-emotional outcomes (Bradley, 2002.) It has been revealed that occupation type (SES) partially determines one's social network and may also affect social capital (Entwisle & Astone, 1994). Similarly, Kawachi et al. found that social capital mediates the relationship between income inequality and health status. As income inequality becomes greater, a state's store of social capital decreases, leading to the poorer health of its citizens (Kawachi et al., 1997). Accordingly, SES should be considered to be significant confounding factors in analyzing the association between social capital and chronic illness self-management.

To accurately identify the links between social capital and self-management, several confounding variables should be controlled, and satisfaction variables should be viewed as mediators during analysis. The study full model is represented in <figure1>.
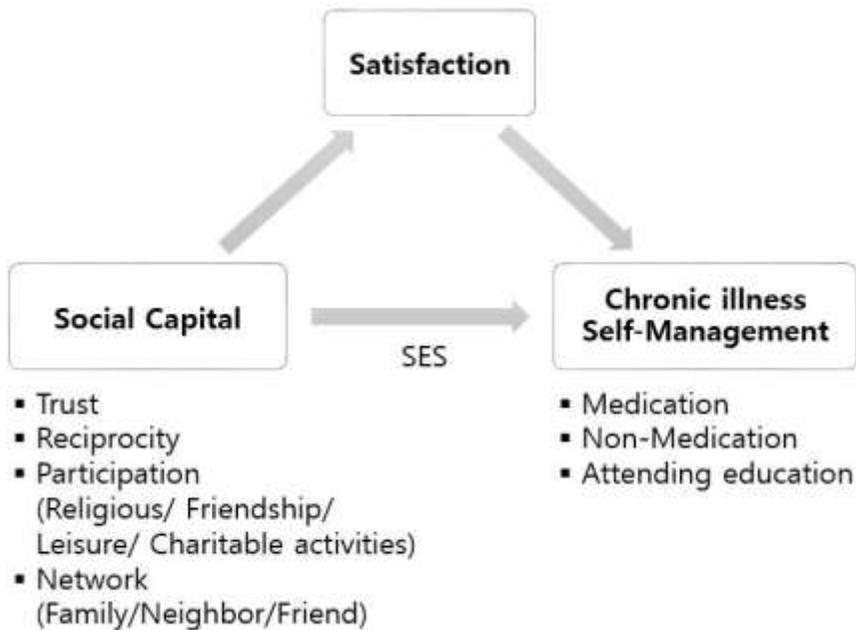
<Figure 1> Study model

According to the study model <Figure 1>, I have formulated a study hypotheses to verify the relationship between each variable and attain the study objectives.

Hypothesis 1. According to socioeconomic status (SES), each type of social capital has different impact on chronic illness self-management manner.

Hypothesis 2. "Satisfaction" mediates an association between social capital and chronic illness self-management.

Hypothesis 3. Social capital and chronic illness self-management is significantly associated, after controlling possible confounding factors.

2.2. Data collection

─ Using data from the Korean Community Health Survey (2011)

The data used in this study comes from the Korean Community Health Survey (KCHS) of 2011. This survey is annually conducted by the Korea Center for Disease Control (KCDC), under law, for regional public health sections 4 and 5. As a national survey, it has been carried out in every one of the 253 primary local authorities (districts) since 2008. It aims to estimate community health conditions and produce health statistics to implement evidence-based health policies. Adults over 19 years of age become subjects of this cross-sectional study, and about 900 subject samples (within 450 households) are randomly selected from each district. A trained researcher visits the selected household and carries out the interview, using a computer-assisted personal interview (CAPI). The questionnaire is comprised of 18 domains and 247 questions, including several health behaviors, morbidity (chronic illness and self-management related variables), utilization of healthcare services, quality of life, accident experiences, social environment (social capital related variables), and demographics.

─ Subjects

In this study, the region was restricted to 8 districts of Seoul in order to minimize the regional effects on social capital. A name of the region is "Gangseo, Gwanak, Guro, Geumcheon, Dongjak, Mapo, Yangcheon, and Yeongdeungpo" district. The subject criteria is "prevalence of hypertension and/or diabetes" and "adults aged 30 and above," on the grounds that these chronic diseases rarely occur in younger people.

2.3. Variables

All variables are on the basis of the KCHS (Korea Community Health Survey) questionnaire. Detailed question contents, answer types, and criteria, are represented in <table 1.>.

- Independent variables : Social capital

According to KCHS data, they contain variables about social and physical surroundings, instead of exact social capital terms. It is just as well that there are essential components of social capital: trust, reciprocity, participation, and network. I classify these separated variable as social capital, according to Putnam's definition (1994; 2000), in which these variables are regarded as fundamental attributes of social capital and predominant classifications in the field of health research.

Trust and reciprocity represents cognitive social capital, while participation and network represents structural social capital. The questions are composed as dichotomous variables, the network section aside. The existence or absence of a network is defined, intentionally, by its frequency. When people answered "more than once a month," they are considered to have a network. The more frequently they met people, or had some form of contact, the stronger the network. When people meet or contact each other over the phone frequently, the network is activated, and strong bonds are formed. I thus classified a "strong network" as being one in which people communicate "more than once a week."

To assess aggregate trends of the "participation" and "network" domains, several detailed questions are integrated into one representative variable. The frequency of the answer "yes" and

the median value, become criteria when making a new integrated variable. For the participation domain, people who answer "yes" more than once within 4 questions, are reclassified as "generalized participation." In the network domain, people who answer "yes" more than twice are reclassified as "generalized network."

- Dependent variables: Chronic illness (Hypertension/Diabetes) self-management

Chronic patients are sorted according to their answers on whether they have ever been diagnosed by a doctor. When people were diagnosed with hypertension or diabetes, they were questioned about self-management aspects. In this paper, "medication (drug compliance), non-medication therapy (including exercise, diet, life style change, and stress adjustment), and "attending to Management Education," is dealt with as chronic illness self-management.

- Mediating variable: Satisfaction (Neighborhood level)

Although KCHS consider the satisfaction of neighborhood as social capital, it should be dealt with as an outcome of social capital (Harpham, 2002). Thus, I minimize the confusion of satisfaction variables in the definition of social capital, by classifying them as mediators. The satisfaction domain consists of 5 questions: satisfaction with overall safety level, natural and living environment, public transportation, and health care services. To investigate the general tendency as a mediator, I make these detailed questions with one representative variable, "generalized satisfaction." The median value of the frequency with which people answered "yes," became the cut-off line. If people answer "yes" more than 4 times, they are reclassified to the "generalized satisfaction" group.

- Definition of SES

Socioeconomic status usually pertains to a combination of education, income, and occupation, but there is no consensus on how best to composite the set of indicators and to measure each component (Krieger et al. 1997). SES indicators are also likely to perform differently across cultural groups (Bronfenbrenner, 1995).

Occupation type is categorized as white/pink/blue collar, by job description. A 'white collar' worker typically performs work in an office environment, which may involve sitting at a computer or desk. Administrators, professionals, and office workers fall into this category. "Pink collar" refers to service and sales workers who work in the service industry. In contrast, "blue collar workers" engage in skilled or unskilled manual labor; this category comprises craftsmen, operators, and elementary workers. Housewives and the unemployed are separated respectively, but agricultural workers, servicemen (those serving in the army), and students are removed because of their rare frequency.

The second standard for socioeconomic status is household income. An average household income (per month) is divided into a quartile range of "under 1 million won," "more than 1 million," "under 2 million," "more than 2 million," "under 4million," and "more than 4 million won."

Table 1. Definition of variables

Variables	Question Contents	Answer type and Criteria
INDEPENDENT VARIABLES : SOCIAL CAPITAL		
Trust	My neighbors are reliable and we can trust each other.	Dichotomous (Y/N) Answer-Yes
Reciprocity	In my neighbor's celebrating or mourning occasions, our community members help each other traditionally.	Dichotomous (Y/N) Answer-Yes
Participation	Do you participate in following activities more than once a month? Type1. **Religious activities** Type2. **Friendship activities** (e.g. alumni meeting, senior citizens' center, meeting of hometown friends, clan gathering, etc.) Type3. **Leisure activities** Type4. **Charitable activities**	Dichotomous (Y/N) Answer-Yes
Social Network	How often do you meet or contact with following subject who have the highest frequency? (Only relevant is direct meeting or phone call. Using message, e-mail, or SNS are excluded.) Type1. With your **Family** or relative Type2. With your **Neighbor** Type3. with your **Friend**	Ordinal 6 Scales More than once a month

Table1. (Continued)

MEDIATING VARIABLE : SATISFACTION		
Satisfaction	I'm satisfied with the following environment in my village	Dichotomous (Y/N)
	Type1. The **overall safety level** (Natural disaster, Traffic accident, Agricultural accident, Crime, etc.)	Answer−Yes
	Type2. The **natural environment** (Quality of air and water, etc.)	
	Type3. The **living environment** (Electricity, water and sewage, removal of garbage, Sports facilities, etc.)	
	Type4. The **public transportation** (Bus, Taxi, Subway, Train, etc.)	
	Type5. The **health care services** (Health center, Clinics and Hospitals, Oriental medicine hospitals, Pharmacies, etc.)	

DEPENDENT VARIAVLES : CHRONIC ILLNESS SELF−MANAGEMENT		
Taking Medication	Do you take a following treatment to manage the blood pressure/blood glucose? **Medication**−> "Yes/No"	Dichotomous (Y/N) Answer−Yes
Following Non− Medication therapy	Do you take a following treatment to manage the blood pressure/blood glucose? **Non−medication therapy**−> "Yes/No" (including exercise, diet, life style change, stress adjustment)	Dichotomous (Y/N) Answer−Yes
Attending management education	Have you ever been **educated** about managing the disease in following institute? Hospital−> "Yes/No" Oriental medicine Hospital−>" Yes/No" Health center−> "Yes/No" (excluding less than 10 min consultation with doctors)	Dichotomous (Y/N) Answer−Yes at least one time among 3 Questions

2.4. Statistical Analysis

To meet the objective of this study, the following method and contents will be analyzed on the basis of study design. (1) Frequency analysis: to investigate demographics of chronic illness patients and frequency distribution of social capital and self-management variables, (2) Stratification analysis: to investigate different associations between social capital and chronic illness self-management by socioeconomic status (income and education level) (3) Mediator analysis: to investigate the mediating effect of satisfaction variables. (4) Logistic regression: to investigate the association between social capital and self-management after adjustment for age, SES, residence duration, and satisfaction.

– Frequency analysis

Frequent analysis was conducted to examine the general demographics of subjects by chronic illness type. The dependent variables' characteristics were expressed using mean and standard error.

– Stratification analysis by SES

As all the explanatory and outcome variables were composed of dichotomous answers such as "yes" or "no," we can compare the proportion of having a certain outcome across different levels of explanatory variables, by calculating the odds ratio. To determine the SES effect on that association, the SES group was stratified into 2 groups and each odds ratio was compared.

To control the confounding variables effect, or investigate the interaction between variables, the stratified analysis was needed. Through the analysis, we could indicate "stratum-specific odds

ratios," stratified by possible confounder/interaction, and "common odds ratio," adjusted for confounder to demonstrate the link between variables.

In this paper, SES, which is defined as household income and education level, is regarded as a stratum between social capital and chronic illness self-management. There are lots of report that indicate SES has an influence on chronic disease drug compliance and self-management (Barlow, 2002), as well as accessibility to social capital resources (Glanz et al., 2002).

The Breslow-Day test was used to assess the homogeneity of the odds ratios (ORs) across the stratum (e.g. SES level). Its null hypothesis is "stratum-specific odds ratios are homogeneous for each other," and a value of P 0.05 was considered statistically significant. This test has two meaningful aspects: It show the trend in "odds ratio homogeneity," and is used to assess "interaction" between variables and the stratum (Breslow & Day, 1980).

A common odds ratio was calculated using the Mantel-Haenszel exact method. This aggregate odds ratio assesses the association between independent and dependent variables, with adjustment for stratum (Mantel & Haenszel, 1959). The statistics represent the significance of the common odds ratio after adjusting for confounder (e.g. SES level). The Mantel-Haenszel common odds ratio has the advantages of interpretation of different ORs and being unbiased. (Penfield, 2003).

The Breslow-Day test for homogeneity of ORs was used to determine whether the association between social capital and chronic illness self-management differed, depending on SES levels. If the Breslow-Day test was not statistically significant and cannot

reject Ho, it means there is homogeneity in the stratum-specific odds; thus, the adjusted common OR of the Mantel-Haenszel test is meaningful. On the contrary, if the null hypothesis of the Breslow-Day test is rejected ($p < 0.05$), it indicates that the stratum-specific odds ratios differ from one another, and there is interaction between SES and social capital. To account for this, the Mantel-Haenszel adjusted odds ratio should not be reported. Instead, stratum specific odds ratios should be used to interpret the association (Li, 2011).

ㅡ Mediating effect analysis

An intervening variable (mediator) transmits the effect of an independent variable to a dependent variable. The most common analysis to estimate the mediator effect is Baron & Kenny's (Baron and Kenny, 1986) approach, but this has a low statistical power because of a high Type 1 error. Instead, MacKinnon et al. recommended the test for experimental investigations involving the simple intervening variable model portrayed <Figure2.>.

X is the independent variable, Y is the dependent variable, and I is the intervening variable. βo is the population regression intercepts; α represents the relation between the independent and intervening variables, τ represents the relation between the independent and dependent variables (adjusted for the effects of the intervening variable), β represents the relation between the intervening and the dependent variables (adjusted for the effect of the independent variable), and ϵ is the residuals.

The main hypothesis is that: (1) the independent variable leads to changes in the intervening variable ($\alpha \neq 0$) and (2) the intervening variable is associated with dependent variable ($\beta \neq 0$) when

adjusted for the effect of the independent variable (MacKinnon et al., 2002).

To analyze the effect of "satisfaction" as a mediator, MacKinnon et al.'s approach was used. At first, I analyzed the association between social capital (X) and satisfaction (I). The association between satisfaction (I) and chronic illness self-management(Y) was demonstrated, after adjustment for social capital (X).

$$I = \beta o(1) + \alpha X + \epsilon(1)$$

$$Y = \beta o(2) + \tau X + \beta I + \epsilon(2)$$

<Figure 2> Path diagram and equations for the mediating variable equation

- Logistic Regression

As all variables are defined as binominal value, binominal logistic regression analysis was used to analyze the relationship between dependent and independent variables. To ascertain the association between self-management and social capital, the potential confounding factors (gender, age, and socioeconomic status) were adjusted through modeling. A statistic program SAS (v.9.3) was used during the analysis.

Chapter3. Results

3.1. Demographics

General demographics and variable distributions are presented at <table 2>. All subjects are chronic illness patients who were diagnosed with hypertension and/or diabetes, and total sum is 1492 people. Partially, the number of patients who have hypertension disease are 1011 people, diabetes are 198 people, and the cases combined with both diseases are 283 people. Female consists 55.63% and male are 44.37%. The elder over fifty-year-old (cumulative sum: 85.45%) and married people (72.72%) are dominant and they tend to settle down in their neighbor for more than 15 years (67.90%), representing the stable adulthood life course. Compare with the patients who have one kind of chronic disease, comorbidity group have higher portion of the elder especially over 70-year-old people. Thus, we could suggest that the generation of comorbidity is related aging effect.

As for socioeconomic status, people who graduated elementary school or high school take large part in every disease group. When household income level is 3rd quartile, the proportion of subjects is higher. Housewife and unemployed group is main occupation type for each disease patients, while blue collar (27.27%) especially related with diabetes patients.

The health behavior as "present smoking" records 12.73%, "drinking alcohol experience in lifetime" is 78.15%, and "obesity measured by BMI" is 33.18%.

Table 2. General characteristics of subjects by chronic illness type

Variables	Hypertension only (N=1011)	Diabetes only (N=198)	Both diseases (N=283)	Total (N=1492)
	N (%)	N (%)	N (%)	N (%)
Gender				
Female(0)	571(56.48)	97(48.99)	162(57.24)	830(55.63)
Male(1)	440(43.52)	101(51.01)	121(42.76)	662(44.37)
Age				
30<=age<40	42(4.15)	13(6.57)	4(1.41)	59(3.95)
40<=age<50	109(10.78)	30(15.15)	19(6.71)	158(10.59)
50<=age<60	280(27.70)	51(25.76)	54(19.08)	385(25.80)
60<=age<69	316(31.26)	70(35.35)	102(36.04)	488(32.71)
70<=age	264(26.11)	34(17.17)	104(36.75)	402(26.94)
Education				
Uneducated	117(11.63)	26(13.13)	49(17.44)	192(12.93)
Elementary school graduate	228(22.66)	37(18.69)	77(27.40)	342(23.03)
Middle school graduate	181(17.99)	29(14.65)	48(17.08)	258(17.37)
High school graduate	268(26.64)	67(33.84)	65(23.13)	400(26.94)
More than college	212(21.07)	39(19.70)	42(14.95)	293(19.73)
Income(quartile range)				
income<100	197(21.65)	38(20.43)	65(25.1)	300(22.14)
100≤income<200	175(19.23)	48(25.81)	63(24.32)	286(21.11)
200≤income<400	300(32.97)	54(29.03)	74(28.57)	428(31.59)
400≤income	238(26.15)	46(24.73)	57(22.01)	341(25.17)
Occupation type *				
White collar	147(14.54)	29(14.65)	28 (9.89)	204(13.67)
Pink collar	117(11.57)	18(9.09)	23 (8.13)	158(10.59)
Blue collar	184(18.20)	54(27.27)	50 (17.67)	288(19.30)
Housewife	315(31.16)	56(28.28)	103(36.40)	474(31.77)
Unemployed	248(24.53)	41(20.71)	79 (27.92)	368(24.66)
Marital status				
Single	39(3.86)	4(2.02)	3(1.06)	46(3.08)
Married	730(72.21)	149(75.25)	206(72.79)	1085(72.72)
Separated/Divorced/Widower	242(23.94)	45(22.73)	74(26.15)	361(24.20)

Table 2. (Continued)

Variables	Hypertension only (N=1011)	Diabetes only (N=198)	Both diseases (N=283)	Total (N=1492)
	N (%)	N (%)	N (%)	N (%)
Length of residence				
Years<5	118(11.67)	16(8.08)	20(7.07)	154(10.32)
5≤years<15	225(22.26)	46(23.23)	54(19.08)	325(21.78)
15≤years	668(66.07)	136(68.69)	209(73.85)	1013(67.90)
Smoking				
No(0)	892(88.23)	162(81.82)	248(87.63)	1302(87.27)
Yes(1)	119(11.77)	36(18.18)	35(12.37)	190(12.73)
Drinking				
No(0)	224(22.16)	29(14.65)	73(25.8)	326(21.85)
Yes(1)	787(77.84)	169(85.35)	210(74.2)	1166(78.15)
BMI				
Normal(25<)	677(66.96)	145(73.23)	175(61.84)	997(66.82)
Obesity(≥25)	334(33.04)	53(26.77)	108(38.16)	495(33.18)

* 'White collar' is composed of Administrator, Professional, and Office worker.

'Pink collar' is composed of Service and Sales worker.

'Blue collar' is composed of Craft, Operator, and Elementary worker.

Agricultural, Serviceman (army), and Student group are removed because of their rare frequency.

The distribution of chronic illness self−management manner by each disease is indicated at <Table3−1> and <Table 3−2>.

In case of hypertension group, the total subjects are 1294 people including comorbidity patients (having hypertension and diabetes both). The rates of hypertension drug compliance are quite high both in hypertension group (84.27%) and comorbidity group (95.41%). Meanwhile, non−medication rates which means the rate of doing exercise and diet for controlling hypertension are little low as 32.64% for hypertension group and 42.40% for comorbidity group. Attending management education rates are 19.84% for hypertension group, and 29.18% for comorbidity group. The rate difference between groups for each items are statistically significant (p<0.05), consequently, comorbidity patients are more concern for their hypertension self−management than having hypertension only group.

Table 3−1. Frequency distribution of Hypertension management manners

Variables (total N=1294)	Hypertension only (N=1011)	Hypertension and Diabetes (N=283)	P-value
	N (%)	N (%)	
Hypertension Medication			
Yes(1)	852(84.27)	270(95.41)	*<.0001*
No(0)	159(15.73)	13(4.59)	
Non-medication for hypertension			
Yes(1)	330(32.64)	120(42.40)	*0.0023*
No(0)	681(67.36)	163(57.60)	
Attending Hypertension Management education			
Yes(1)	200(19.84)	82(29.18)	*0.0008*
No(0)	808(80.16)	199(70.82)	

These self-management tendencies by manners are maintained to diabetes patients also. <Table 3-2> demonstrates frequency distribution of diabetes self-management by manners. Total number of patients who have diabetes only (n=198) and comorbidity patients having hypertension also (n=283) is 481 people. The rate of diabetes medication are 72.22% for diabetes only group and 85.87% for comorbidity group, which group difference is significant at p-value, 0.0002. Non-medication (e.g. exercise or diet) for diabetes control represents group difference between diabetes patients (34.85%) and comorbidity patients (46.10%) with significant p-value, 0.138. On the other hands, the rate of attending education for diabetes management is about 37% for both diabetes and comorbidity group reporting non-significance on group difference (p=0.9618).

Table 3-2. Frequency distribution of Diabetes management manners

Variables (Total N=481)	Diabetes only (N=198)	Hypertension and Diabetes (N=283)	P-value
	N (%)	N (%)	
Diabetes Medication			
Yes(1)	143(72.22)	243(85.87)	*0.0002*
No(0)	55 (27.78)	40(14.13)	
Non-medication for Diabetes			
Yes(1)	69 (34.85)	130(46.10)	*0.0138*
No(0)	129(65.15)	152(53.90)	
Attending Diabetes Management education			
Yes(1)	74 (37.37)	106(37.59)	0.9618
No(0)	124(62.63)	176(62.41)	

Making a comparison between management aspects by disease type, hypertension groups are usually dependent on medication, rather diabetes groups are tried to attend education as well as medication and non-medication.

For comorbidity patients, they manage their disease more diligently in every management manner. And they follow hypertension medication at 95.41%, whereas diabetes medication at 85.87%, which means comorbidity patients tend to emphasize their hypertension medication than diabetes.

3.2. Degree of Social capital and Satisfaction
: The verification of hypothesis 1.

<Table 4-1> demonstrate the degree of subjects' general satisfaction, and <Table 4-2> and <Table 4-3> indicates the degree of social capital. Each variable was analyzed in mean (%) and standard error value according to proportion of responses. Total subjects were 1492 people having hypertension or diabetes.

In <Table 4-1>, the satisfaction domain, people satisfy with their village safety level (70.40%), natural environment (65.89%), living environment (77.44%), public transportation system (85.96%), and health care services (80.73%) in overall high degree.

When it comes to social capital domain in <Table 4-2>, 63.62% of subjects responded that they trust their neighbors. And 47.56% people answered that their community members help each other in celebrating or mourning occasions, which represented in terms of "reciprocity". As for participation domain, people seldom participate in charitable (9.45%) and leisure activities (28.44%) while they more frequently participate in religious (42.52%) and friendship activities (56.97%).

In regard to social network, <Table 4-3>, network type is distinguished by meeting frequency. The more often people contact each other, the density of network becomes higher to be called "strong network". Thus, I regarded network more than once a weak as "strong network", more than once a month as "weak network", and less than that as "no existence of network".

In the case of "weak network" which means people network more than once a month, 79.26% have weak network with family, 76.66%

with friends, and 66.80% with neighbor. That is, weak network with family member is prevalent and weak network with friend is less exist.

Comparison to Strong network, the prevalence rank is turned nearly reversed: "strong network with family" shows 46.11% prevalence, "strong network with friend" is 45.46%, and "strong network with neighbor" is 52.87%,

Thus, we can come to conclusion that neighbor network rarely exist itself, but once it developed, it becomes strong bondage representing even higher than family's. However, family network show high prevalence (existence rate), but low density for patients with chronic illness.

Table 4−1. Degree of Satisfaction

Variable*		%	(SE)
Satisfaction on	safety	70.40	(1.23)
	Natural environment	65.93	(1.25)
	Living environment	77.44	(1.09)
	Public transportation	85.96	(0.91)
	Health-care services	80.73	(1.05)

*Variables are composed dichotomous question answering 'Yes' or 'No'. Each percentage indicates the number of person who answered 'Yes'.

Table 4−2. Degree of social capital: Trust, Reciprocity, Participation

Variable*		%	(SE)
Trust		63.62	(1.38)
Reciprocity		47.56	(1.37)
Participation in	Religious activities	42.52	(1.28)
	Friendship activities	56.97	(1.28)
	Leisure activities	28.44	(1.17)
	Charitable activities	9.45	(0.76)

*variables are composed dichotomous question answering 'Yes' or 'No'. Each percentage indicates the number of person who answered 'Yes'.

Table 4−3. Degree of social capital: Social Network

Variable*		Weak network (More than once a month)		Strong network (More than once a week)	
		%	(SE)	%	(SE)
Social Network within	Family	79.26	(1.05)	46.11	(1.29)
	Neighbors	66.80	(1.23)	52.87	(1.31)
	Friends	76.66	(1.10)	45.46	(1.29)

*variables are composed dichotomous question answering 'Yes' or 'No'. Each percentage indicates the number of person who answered 'Yes'.

3.3. Social capital and self-management distribution by Socioeconomic status(SES)
: The verification of hypothesis 2

Variables need to be stratified by socioeconomic status to demonstrate clear influence of dependent variables, because SES could be intermediate or confounding factors according to preceding researches. Each social capital variables are binominal (Yes/No), therefore <table 5> represents the frequency based on answered "Yes" and p-value by chi-square analysis.

Trust is rarely involved with education, occupation type, and income level. So far to reciprocity, it has difference between education (p<.0001) and income (p=0.0103) level shaping the opposite U curve. In short, middle group of SES has better reciprocity than others.

Participation and network related variables have significant difference by SES level, except "religious participation and education level" and "family network and education level". It means that very intimate tie based family and religious is irrelative with education level. However, more people participates in friendship, leisure, and charitable activities when they get higher income, better occupation type, and longer educated in significant p-value (p<.0001)

In case of network, it represent particular aspects by each subtype. Network with family represents non-significant difference between education levels, but high frequency in mid-income group and low frequency in unemployed group. Network with neighbor indicate inverse correlation with SES. That is, if people are more

likely to be uneducated, unemployed and low－income, they contact with their neighborhood more frequently. On the other hands, the frequency of friend network rise up according to SES level, showing similar tendency with participation aspects.

As for chronic illness self－management and SES, medication manner is especially associated with SES. Lower SES group lean on medication and higher SES group people less take medication. On the contrary, people who educated the more, attempts to non－pharmaceutical therapy. Attending management education rates are not related with SES.

Table 5 . Unadjusted prevalence of social capital and chronic illness self-management by socioeconomic status

Variables (N=1492)*	Trust	Reciprocity	Religious participation	Friendship participation	Leisure participation	Charitable participation	Family network	Neighbor network	Friend network	Medi-cation‡	Non medication‡	Attending education‡
	N(%)†	N(%)	N(%)	N(%)	N(%)	N(%)	N(%)	N(%)	N(%)	N(%)	N(%)	N(%)
Education												
Uneducated	111(66.87)	84 (49.70)	88 (45.83)	66 (34.38)	16(8.33)	6(3.13)	144(75.79)	141(75.00)	119(62.96)	174(90.63)	61(31.77)	52(27.23)
Elementary school	189(66.32)	150(48.86)	155(45.32)	169(49.42)	57(16.67)	20(5.85)	259(75.73)	236(70.03)	240(70.18)	313(91.52)	102(29.82)	99(28.95)
Middle school	139(63.76)	142(60.17)	111(43.19)	158(61.24)	70(27.24)	20(7.75)	211(81.78)	184(72.16)	203(78.68)	229(88.76)	86(33.33)	56(21.88)
High school	188(58.02)	166(45.48)	152(38.00)	257(64.25)	124(31.00)	41(10.25)	320(80.00)	255(64.72)	321(80.65)	344(86.00)	180(45.00)	107(26.82)
More than college	144(66.67)	88 (35.34)	125(42.66)	196(66.89)	156(53.24)	54(18.43)	241(82.25)	155(54.77)	251(85.67)	203(69.28)	117(39.93)	74(25.26)
P-value	0.1411	*<.0001*	0.2528	*<.0001*	*<.0001*	*<.0001*	0.1524	*<.0001*	*<.0001*	*<.0001*	*0.0001*	0.3888
Occupation type												
White collar	101(65.16)	77 (42.54)	85 (41.67)	140(68.63)	102(50.00)	39(19.12)	168(82.35)	101(51.53)	171(83.82)	140(68.63)	75(36.76)	50(24.51)
Pink collar	74 (57.36)	65 (45.77)	60 (37.97)	106(67.09)	48(30.38)	17(10.76)	121(76.58)	94(60.65)	126(79.75)	132(83.54)	59(37.34)	34(21.52)
Blue collar	147(60.74)	138(54.76)	93 (32.29)	173(60.07)	78(27.08)	27(9.38)	236(82.23)	184(65.48)	225(78.67)	248(86.11)	96(33.33)	65(22.73)
Housewife	259(65.9)	205(47.79)	249(52.53)	262(55.27)	120(25.32)	44(9.28)	390(82.45)	357(76.28)	368(77.64)	424(89.45)	179(37.76)	140(29.60)
Unemployed	192(64.86)	149(45.29)	147(40.05)	169(45.92)	76(20.71)	14(3.80)	266(72.28)	242(66.48)	250(68.49)	326(88.59)	140(38.04)	102(27.79)
P-value	0.3683	0.0938	*<.0001*	*<.0001*	*<.0001*	*<.0001*	*0.0017*	*<.0001*	*0.0003*	*<.0001*	0.7464	0.1275
Income												
Income <100	160(62.5)	123(44.09)	138(46.00)	114(38.00)	48(16.00)	10(3.33)	215(71.67)	211(72.01)	197(65.89)	265(88.33)	106(35.33)	91(30.33)
100≤Income<200	156(66.1)	139(53.88)	124(43.51)	148(51.75)	53(18.60)	27(9.44)	236(83.10)	203(72.50)	221(77.82)	254(88.81)	98(34.27)	67(23.51)
200≤Income<400	215(60.56)	194(50.65)	155(36.21)	278(64.95)	136(31.78)	40(9.35)	353(82.48)	282(66.51)	341(79.67)	355(82.94)	154(35.98)	110(25.76)
400≤Income	178(65.93)	122(41.50)	158(46.33)	221(64.81)	152(44.57)	47(13.78)	272(79.77)	185(55.56)	270(79.18)	276(80.94)	129(37.83)	92(27.06)
P-value	0.4227	*0.0103*	*0.0141*	*<.0001*	*<.0001*	*0.0001*	*0.0012*	*<.0001*	*<.0001*	*0.0089*	0.8193	0.2928

* Total respondents are 1492 people. But there is missing value within range from 1 people up to 375 people depending questions, which they denied answering sensitive questions.

† The percentage indicates a proportion of people who answered 'Yes' to each question among all respondents.

‡ It is merged responses from hypertension and/or diabetes disease patients.

3.4. Association between social capital and chronic illness self-management

: The verification of hypothesis 3

<Table 6-1> and <Table6-2> represented association between social capital and self-management by SES stratification. Though basic variables (e.g. age, gender) were not adjusted, these analysis are meaningful for giving information about stratum (SES)-specific odds ratio and common aggregate odds after adjusting for a confounding factor, thus, providing a room to consider the tendency changing by stratum.

In <Table 6-1>, the relation between social capital and chronic illness self-management are stratified by income level. Income level was divided into two groups on the basis of median value, 2.66 million won. If people's household income is less than 2.66million, they are classified as low-income group, whereas more than 2.67million as high-income. There aren't any significant Breslow-Day statistics at 0.05 p-value in every combination, which means income level doesn't work as an interaction term for social capital and chronic illness self-management. Investigating each pair by stratum-specific odds ratio (OR) and 95% confidence interval (95% CI),

"Reciprocity and medication" represents statistical significance only for high income group (OR 1.61, 95%CI 0.99-2.62, p=0.056), which means high level of reciprocity improve the medication level among the rich, but it doesn't work for poor people. Cochran-Mantel-Haenszel's common OR is not significant (p=0.324) after adjustment for income level.

Likewise, "network and medication" for high income group has 1.47 OR (95%CI 0.95-2.29, p=0.086). But, especially, the significant

effect of network on self－management remained after controlling for income, where Cochran－Mantel－Haenszel statistics (common OR 1.38, 95%CI 1.01－1.88)) indicate significant at 0.046 p－value.

The association between "participation and non－medication" represent high significant for the poor (OR 1.53, 95%CI 1.13－2.06, p=0.006) as well as the rich (OR 1.52, 95%CI 1.07－2.16, p=0.018). When stratum－specific ORs are integrated after adjusting income level, Cochran－Mantel－Haenszel statistics show more powerful significance (common OR 1.53, 95%CI 1.21－1.92, p=0.0003).

On the other hands, "trust and attending education" for high income group shows decreased OR (OR 0.70 95%CI 0.46－1.07 p=0.098). That is, in the case of the rich, the more people trust each other, the less frequently attend the management education. And aggregate OR by Cochran－Mantel－Haenszel test isn't significant (p=0.179) after controlling income level. Also "reciprocity and attending education" for high income group shows decreased OR (OR 0.70, 95%CI 0.46－1.05, p=0.084) and the common OR isn't significant (p=0.715).

Table 6−1. Association between respective Social capital and Chronic illness self−management variables by Income (SES) stratification

	Medication			Non-medication			Attending education		
	ChiSq	P-value	OR(95%CI)	ChiSq	P-value	OR(95%CI)	ChiSq	P-value	OR(95%CI)
Trust									
Low income level	0.37	0.542	1.17(0.71-1.93)	0.05	0.818	0.96(0.69-1.34)	0.14	0.706	0.93(0.66-1.33)
High income level	0.21	0.646	1.13(0.68-1.88)	0.23	0.633	0.91(0.61-1.35)	2.74	**0.098†**	0.70(0.46-1.07)
Mantel-Haenszel test ‡	0.57	0.450	1.15(0.80-1.64)	0.23	0.630	0.94(0.73-1.21)	1.81	0.179	0.83(0.64-1.09)
Breslow-Day test §	0.01	0.923		0.05	0.826		1.06	0.303	
Reciprocity									
Low income level	0.20	0.653	0.90(0.58-1.41)	0.74	0.389	0.88(0.65-1.18)	0.87	0.352	1.17(0.84-1.62)
High income level	3.65	**0.056†**	1.61(0.99-2.62)	0.14	0.710	1.07(0.74-1.55)	2.99	**0.084†**	0.70(0.46-1.05)
Mantel-Haenszel test ‡	0.97	0.324	1.18(0.85-1.64)	0.19	0.665	0.95(0.75-1.20)	0.13	0.715	0.95(0.74-1.23)
Breslow-Day test §	2.92	0.088		0.69	0.405		3.73	0.053	
Participation									
Low income level	0.02	0.900	0.97(0.62-1.53)	7.72	**0.006****	1.53(1.13-2.06)	1.07	0.300	0.84(0.60-1.17)
High income level	0.17	0.682	1.09(0.72-1.66)	5.57	**0.018***	1.52(1.07-2.16)	0.84	0.359	1.19(0.82-1.75)
Mantel-Haenszel test ‡	0.05	0.829	1.03(0.76-1.41)	13.26	**0.0003*****	1.53(1.21-1.92)	0.03	0.857	0.98(0.76-1.25)
Breslow-Day test §	0.14	0.712		0.00	0.982		1.88	0.170	
Network									
Low income	1.22	0.269	1.28(0.82-2.01)	0.13	0.723	1.05(0.79-1.41)	0.45	0.504	0.90(0.65-1.23)
High income	2.94	**0.086†**	1.47(0.95-2.29)	0.27	0.602	0.91(0.64-1.30)	0.03	0.864	0.97(0.66-1.42)
Mantel-Haenszel test ‡	3.99	**0.046***	1.38(1.01-1.88)	0.00	0.951	0.99(0.79-1.24)	0.39	0.532	0.92(0.72-1.18)
Breslow-Day test §	0.18	0.675		0.39	0.531		0.08	0.771	

† p<0.1 , * p<0.05, **p<0.01, ***p<0.001

‡ Cochran- Mantel-Haenszel common odds ratio which means aggregate odds ratios after adjusting SES stratum is useful just in case Breslow-Day test is not statistically significant.

§ If Breslow-Day statistic indicates significant p-value, read respective stratum-specific odds ratio instead of Mantel-Haenszel common odds ratio.

In <Table 6-2>, the stratum for stratification is based on education level. When people graduate more than high school, they are regarded as having high education level, but people who graduated less than middle school are classified as having low education level.

To interpret the results precisely, it is needed to understand breslow-Day and Cochran-Mantel-Haenszel statistics. When Breslow-Day statistic indicates significant p-value (p<0.05), it is hard to assume the homogeneity of odds ratios (ORs) across the stratum, and we can tell there is interaction between explanatory variables, thus, each stratum-specific OR should be investigated respectively. However, when Breslow-Day statistic isn't significant difference between stratum-specific ORs, we could consider these ORs as homogeneity and then make common OR after adjustment for stratum, whose significance is distinguished by Cochran-Mantel-Haenszel test. Investigating each combination of social capital and chronic illness self-management by education level, statistics as OR, 95%CI, and p-value are used.

"Reciprocity and medication" is associated significantly for high educated people (OR 1.68, 95%CI 1.09-2.57, p=0.017), however, in the case of low educated group, OR show decreasing tendency with scant signification (OR 0.66, 95%CI 0.40-1.09, p=0.103). Those results is confirmed by Breslow-Day test (0.66 vs 1.68, p=0.005) rejecting their homogeneity, and we could suggest that reciprocity and education variable have interaction effect for each other.

"Network and medication" for high educated group is related significantly (OR 1.49, 95%CI 1.02-2.18, p=0.040), but not for low educated group. Because there is lack of the significance of Breslow-

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Day test, Cochran-Mantel-Haenszel's common OR (OR 1.43, 95%CI 1.05-1.96, p=0.024) is useful.

"Participation and non-medication" relation follow the same tendency with income stratification analysis. They maintain high significant and homogeneity for each stratum, and common OR (Cochran-Mantel-Haenszel OR 1.42, 95%CI 1.14-1.77, p=0.0015) becomes more significant after adjustment for education level.

"Participation and attending management education" association demonstrate different aspects according to education level. Stratum-specific OR decreased for low educated group (OR 0.71, 95%CI 0.50-1.01, p=0.053), while it increased for high educated ones (OR 1.41, 95%CI 1.04-1.91, p=0.025). Breslow-Day statistics (0.71 vs 1.43, p=0.005) indicates their attributes are somewhat heterogeneity, and there is an interaction between education level and participation.

Table 6－2. Association between respective Social capital and Chronic illness self－management variables by Education (SES) stratification

	Medication			Non-medication			Attending education		
	ChiSq	P-value	OR(95%CI)	ChiSq	P-value	OR(95%CI)	ChiSq	P-value	OR(95%CI)
Trust									
Low education level	0.08	0.781	0.93(0.53-1.60)	0.25	0.616	1.09(0.77-1.54)	1.05	0.306	0.83(0.58-1.19)
High education level	1.47	0.225	1.32(0.84-2.08)	0.40	0.527	0.89(0.63-1.27)	0.04	0.834	0.96(0.65-1.41)
Mantel-Haenszel test ‡	0.56	0.456	1.14(0.81-1.61)	0.01	0.930	0.99(0.77-1.26)	0.79	0.373	0.89(0.68-1.15)
Breslow-Day test §	0.97	0.325		0.64	0.423		0.29	0.589	
Reciprocity									
Low education level	2.66	0.103	0.66(0.40-1.09)	0.24	0.626	0.93(0.68-1.27)	0.19	0.664	0.93(0.67-1.30)
High education level	5.66	**0.017***	1.68(1.09-2.57)	0.19	0.662	1.07(0.78-1.48)	0.15	0.698	0.93(0.65-1.34)
Mantel-Haenszel test ‡	0.62	0.433	1.14(0.83-1.56)	0.00	0.964	0.99(0.79-1.25)	0.34	0.560	0.93(0.73-1.19)
Breslow-Day test §	7.76	**0.005****		0.43	0.514		0.00	0.994	
Participation									
Low education level	0.71	0.401	0.81(0.49-1.33)	5.08	**0.024***	1.43(1.05-1.96)	3.74	**0.053†**	0.71(0.50-1.01)
High education level	2.76	**0.097†**	1.36(0.94-1.97)	5.02	**0.025***	1.41(1.04-1.91)	4.17	**0.041***	1.43(1.01-2.01)
Mantel-Haenszel test ‡	0.73	0.394	1.14(0.85-1.53)	10.07	**0.0015****	1.42(1.14-1.77)	0.00	0.945	1.01(0.79-1.28)
Breslow-Day test §	2.77	0.096		0.00	0.948		7.91	**0.005****	
Network									
Low education level	0.92	0.338	1.27(0.78-2.07)	0.08	0.779	1.04(0.77-1.42)	0.03	0.856	0.97(0.70-1.34)
High education level	4.21	**0.040***	1.49(1.02-2.18)	0.35	0.552	0.91(0.67-1.24)	0.23	0.630	0.92(0.65-1.30)
Mantel-Haenszel test ‡	4.86	**0.027***	1.40(1.04-1.89)	0.05	0.823	0.98(0.79-1.21)	0.21	0.645	0.95(0.75-1.20)
Breslow-Day test §	0.26	0.612		0.38	0.536		0.05	0.820	

† p<0.1 , * p<0.05, **p<0.01, ***p<0.001

‡ Cochran-Mantel-Haenszel common odds ratio which means aggregate odds ratios after adjusting SES stratum is useful just in case Breslow-Day test is not statistically significant.

§ If Breslow-Day statistic indicates significant p-value, read respective stratum-specific odds ratio instead of Mantel-Haenszel common odds ratio.

<Table 7> indicates the logistic regression results of social capital and chronic illness self-management including an analysis of "satisfaction" mediating effect.

To analyze the satisfaction variable as mediator, logistic regression models are demonstrated as following <Table 7>. First hypothesis of MacKinnon et al.'s approach (2002) which distinguish mediating effect is that independent variables (social capital) are associated with mediator (satisfaction): it is demonstrated in model 2. And second one is that mediator (satisfaction) is associated with dependent variable (chronic illness self-management) when independent variables (social capital) are adjusted: Analysis of medication as a dependent variable is presented in model 4, non-medication in model 6, and attending management education in model 8. When these two hypothesis is fulfilled both, we could define "satisfaction" as a mediator. However, even one of the two does not meet the hypothesis, we should deny its mediating function. In model 2, "satisfaction" is related with "trust" only (OR 3.03, 95%CI 2.20-4.16, p<.001) among several independent variable while fulfilling first hypothesis. In model 4 and 8, however, there is no association between "satisfaction and medication/ attending education" after adjusting "trust", which means satisfaction doesn't mediate between trust and medication/ attending education manner. On the other hands, "satisfaction" represents statistically significant association (OR 1.36, 95% CI 1.02-1.81, p<0.05) with "medication" even after adjustment for "trust" in model 6. As a result, the relation between "trust" and "non-medication" is mediated by "satisfaction".

Except the relation between "trust" and "non-medication", "satisfaction" didn't work as a mediator between social capital

and chronic illness self－management. Instead, "network" still has association with "medication" (OR 1.46, 95% CI 0.93－2.28, p<0.1), and "participation" with "non－Medication" (OR 1.38, 95%CI 1.03－1.84, p<0.05) as a main effect after adjusting several control variables, whereas there is not any significant relation in case of attending management education manner.

In this study design, age is considered as possible confounding factor. However, in some full－model, several age categories indicate statistical significance in comparison to the reference value, the thirties. As growing old, age becomes highly significant positive association with "satisfaction" and "medication", meanwhile only the fifties indicate significant p－value with Non－medication. On the contrary, age shows moderate significance with attending management education after adjusting the other variables and has negative association for reference value.

Table 7. Binary logit regression of Social capital and Chronic illness self−management: Considering Satisfaction variable as a mediator

Variable (Reference)	Mediator: Satisfaction		Dependent variable: Medication	
	Model1 OR(95%CI)	Model2 OR(95%CI)	Model3 OR(95%CI)	Model4 OR(95%CI)
Control variable				
gender(F)				
Male	0.88(0.64-1.21)	0.92(0.63-1.33)	0.55(0.35-0.87)*	0.57(0.32-1.01)†
Age(30-39)				
40-49	1.32(0.58-3.03)	1.56(0.54-4.51)	5.19(2.55-10.56)***	6.69(2.53-17.64)***
50-59	2.17(0.99-4.73)†	2.44(0.89-6.68)†	10.22(5.09-20.53)***	13.94(5.44-35.75)***
60-69	2.51(1.13-5.57)*	3.14(1.12-8.80)*	16.18(7.66-34.20)***	17.14(6.29-46.69)***
≥70	3.80(1.66-8.68)**	5.18(1.80-14.91)**	21.52(9.46-48.96)***	26.42(8.73-79.98)***
Income(Quartile1)§				
Quartile2	1.25(0.87-1.81)	1.05(0.70-1.59)	1.31(0.76-2.26)	1.46(0.75-2.82)
Quartile3	1.38(0.97-1.98)†	1.37(0.91-2.04)	1.09(0.66-1.80)	1.26(0.68-2.32)
Quartile4	1.38(0.94-2.04)	1.22(0.78-1.90)	1.40(0.80-2.45)	1.49(0.74-3.00)
Occupation‡ (White collar)				
Pink collar	0.86(0.50-1.46)	0.66(0.36-1.21)	1.22(0.66-2.27)	0.86(0.39-1.89)
Blue collar	1.16(0.72-1.87)	1.05(0.61-1.82)	1.27(0.72-2.22)	1.08(0.51-2.31)
Housewife	0.78(0.47-1.29)	0.66(0.37-1.18)	0.99(0.52-1.89)	1.03(0.43-2.47)
Unemployed	0.86(0.52-1.40)	0.69(0.39-1.23)	1.20(0.66-2.21)	1.01(0.45-2.26)
Education(Uneducated)				
Elementary	0.85(0.56-1.28)	0.91(0.57-1.45)	1.24(0.64-2.39)	1.22(0.56-2.64)
Middle school	0.78(0.49-1.23)	0.88(0.52-1.49)	1.19(0.59-2.38)	1.71(0.71-4.12)
High school	0.78(0.50-1.21)	0.87(0.53-1.44)	1.38(0.70-2.71)	1.36(0.60-3.10)
≥college	1.04(0.62-1.76)	1.03(0.56-1.91)	0.76(0.37-1.57)	1.08(0.42-2.74)
Length of residence(<5 yrs)				
5≤years<15	1.47(0.92-2.34)	0.89(0.50-1.60)	1.32(0.74-2.35)	1.69(0.74-3.86)
15≤years	1.23(0.80-1.88)	0.66(0.38-1.13)	0.97(0.58-1.61)	1.03(0.50-2.12)
Explanatory Variables				
Trust(Low) **: Independent**		**3.03(2.20-4.16)***		1.13(0.70-1.82)
Reciprocity(Low) **: Independent**		1.12(0.83-1.52)		0.75(0.47-1.20)
Participation(Low)**: Independent**		1.06(0.79-1.43)		1.01(0.65-1.58)
Network(Low) **: Independent**		1.08(0.81-1.44)		**1.46(0.93-2.28)†**
Satisfaction(Low) **: Mediator**				1.03(0.66-1.61)

† p<0.1 , * p<0.05, **p<0.01, ***p<0.001
‡ 'White collar' is composed of Administrator, Professional, and Office worker.
  'Pink collar' is composed of Service and Sales worker.
  'Blue collar' is composed of Craft, Operator, and Elementary worker.
  Agricultural, Serviceman (army), and Student group are removed because of their rare frequency.
§ An average household income a month is divided into quartile range as '<1 million won',
  '1 million≤income<2 million', '2 million≤income<4million', and '≥4 million won'.

Table 7. (Continued)

Variable (Reference)	Dependent Variable : Non-Medication		Dependent Variable : Attending education	
	Model5	Model6	Model7	Model8
	OR(95%CI)	OR(95%CI)	OR(95%CI)	OR(95%CI)
Control variable				
Gender(F)				
Male	1.29(0.94-1.76)	1.20(0.83-1.74)	1.32(0.94-1.85)	1.13(0.76-1.67)
Age(30-39)				
40-49	2.26(1.07-4.79)*	2.16(0.82-5.71)	0.58(0.29-1.16)	0.42(0.17-1.02)†
50-59	3.20(1.56-6.58)**	2.53(1.01-6.36)*	0.63(0.33-1.20)	0.48(0.21-1.09)†
60-69	2.46(1.18-5.14)*	1.77(0.69-4.57)	0.62(0.32-1.21)	0.46(0.20-1.09)†
≥70	2.46(1.15-5.28)*	2.08(0.78-5.54)	0.81(0.41-1.63)	0.65(0.26-1.58)
Income(Quartile1)§				
Quartile2	0.85(0.60-1.22)	0.90(0.60-1.36)	0.75(0.51-1.09)	0.65(0.42-1.00)†
Quartile3	0.87(0.62-1.23)	0.85(0.57-1.27)	0.87(0.61-1.24)	0.83(0.55-1.26)
Quartile4	0.91(0.63-1.32)	0.80(0.52-1.24)	0.96(0.65-1.42)	0.83(0.53-1.31)
Occupation‡ (White collar)				
Pink collar	1.07(0.66-1.75)	0.91(0.51-1.62)	0.96(0.56-1.66)	0.99(0.53-1.87)
Blue collar	1.03(0.66-1.60)	0.97(0.57-1.64)	0.97(0.59-1.57)	1.02(0.57-1.81)
Housewife	1.59(0.99-2.55)†	1.29(0.73-2.28)	1.42(0.85-2.39)	1.15(0.62-2.12)
Unemployed	1.32(0.84-2.08)	1.12(0.65-1.94)	1.01(0.61-1.65)	0.78(0.43-1.42)
Education(Uneducated)				
Elementary	0.94(0.62-1.43)	0.95(0.59-1.54)	1.14(0.75-1.76)	1.22(0.75-2.00)
Middle school	1.21(0.77-1.91)	1.24(0.73-2.11)	0.90(0.56-1.47)	0.93(0.53-1.64)
High school	2.04(1.32-3.14)**	1.76(1.06-2.92)*	1.11(0.70-1.75)	1.13(0.66-1.94)
≥college	1.89(1.15-3.11)*	1.85(1.01-3.40)*	0.92(0.54-1.57)	1.00(0.52-1.91)
Length of residence(<5 yrs)				
5≤years<15	1.23(0.79-1.90)	1.17(0.66-2.08)	0.79(0.51-1.23)	0.94(0.53-1.69)
15≤years	1.28(0.87-1.90)	1.40(0.82-2.37)	0.72(0.48-1.06)†	0.75(0.44-1.28)
Explanatory Variables				
Trust(Low) **: Independent**		0.77(0.57-1.05)		0.99(0.71-1.38)
Reciprocity(Low) **: Independent**		1.05(0.78-1.42)		0.97(0.71-1.34)
Participation(Low)**: Independent**		**1.38(1.03-1.84)***		1.04(0.77-1.42)
Network(Low) **: Independent**		0.87(0.65-1.16)		0.92(0.68-1.25)
Satisfaction(Low) **: Mediator**		**1.36(1.02-1.81)***		1.06(0.78-1.44)

† p<0.1 , * p<0.05, **p<0.01, ***p<0.001
‡ 'White collar' is composed of Administrator, Professional, and Office worker.
  'Pink collar' is composed of Service and Sales worker.
  'Blue collar' is composed of Craft, Operator, and Elementary worker.
  Agricultural, Serviceman (army), and Student group are removed because of their rare frequency.
§ An average household income a month is divided into quartile range as '<1 million won',
  '1 million≤income<2 million', '2 million≤income<4million', and '≥4 million won'.

Chapter 4. Discussion and Conclusion

4.1. Discussion on data and analyzing methods

The social capital variables of the KCHS (Korea Community Health Survey) were introduced for the first time in 2011. They have allowed for a meaningful scope in investigating the association between social environmental and health, on a large scale. However, due to the lack of consensus on definition and multidimensional attributes of social capital (OECD, 2001), the variables related to the concept seem to suffer from many limitations. In KCHS data, they seem to deal "satisfaction" as proxy variables for social capital. However, Harpham claims that "enjoyment of area, neighborhood quality, and security" should be regarded as an outcome of social capital, not as an indicator itself (Harpham, 2002). I have, therefore, separated the satisfaction variables from social capital, by classifying them as mediators.

There are several typologies of social capital and it is important to distinguish between them, because they imply different resources, support, and obligations. The distribution of different forms of social capital may help us better understand the underlying reasons for good or poor health. (Ferlander, 2007). However, in this KCHS data, social capital types are not diverse and are restricted to intimate and close ties.

For instance, "network," which is measured in the range of family, friends, and neighbors, has intimate attributes, showing a

"strong tie," based on emotional intensity and mutual confiding. "Participation," which is comprised of religious, friendship, leisure, and charitable activities, mostly link with homogeneous members suggesting its "bonding" capital attributes. These variables (network and participation) represent strong and bonding ties, while there is a lack in bridging, weak, and vertical ties.

The strong bonding ties, however, can be dysfunctional, excluding information (Granovetter 1973), and being a source of conflicts (Thoits, 1985) and an emotional burden for the support provider (Ferlander, 2007). Contrastively, bridging and linking social capital provides access to new information and resources, enhancing people's actual control and improving their ability to solve various problems (Kawachi et al., 1997). Furthermore, the vertical and horizontal concepts are absent in the data, though vertical ties have positive functions in enhancing capacity, leading to collective action (Putnam et al., 1994). In other words, the present composition of social capital variables deprives of an opportunity to investigate the positive effects on bridging, linking, and vertical social capital.

To consider the attributes of social capital, we can divide it into two areas: structural and cognitive. Network and participation are classified as examples of "structural" social capital, while trust and reciprocity are classed as "cognitive" examples.

In terms of the analytic method, I made new representative variables for "participation" and "network," by integrating detailed questions during the analysis of the association between social capital and self-management. This enable us to investigate the overall tendency, not segmented, detailed questions. However,

this does not allow us to achieve a clear overview of the main attributes of the questions. In the case of the "participation" domain, religious and friendship activities showed a high frequency, while leisure and charitable activities were rather low. Thus, the integrated "overall participation" variable appeared biased toward religious and friendship attributes. This problem can be similarly applied to the "network" domain. The "overall network" variable actually tended to indicate a network of family and friends, as opposed to one comprised of neighbors.

4.2. Discussion of the results

To manage the chronic disease successfully, patients must be able to set goals and make frequent daily decisions that are both effective and fit their values and lifestyles (Glasgow and Anderson, 1999; Funnell, 2004). Through interaction with people, patients can be provided some expertise and the knowledge necessary to make informed decisions about self-management and acquired social and emotional support (Glasgow & Anderson, 1999). In this context, a study of social networks and social capital has a role to play in offering a more specific socialized understanding of the process of chronic illness self-management, demonstrating the significance of social context for self-care. (Gately et al., 2007). I analyzed the aspects of social capital and chronic illness self-management itself, as well as the association between variables, using SES stratification and adjusting the mediating effect.

- Demographics

At first, the patients' demographics demonstrate they are usually in their stable adulthood life course (with long length of residence and married status). Especially, comorbidity patients (who have hypertension and diabetes) are older and more enthusiastic to manage their disease than patients with one disease. On the basis of management manner by disease type, hypertension groups are mostly dependent on medication, whereas diabetes sufferers are more likely to attempt to manage their disease in more diverse ways (table3).

In regards to the degree of social capital, intimate ties such as religious (42.52%) and friendship (56.97%) activities were recorded more frequency than leisure (28.44%) and charitable (9.45%) activities (table 4-2).

This "participation" (friendship/leisure/charitable participation) become higher as socioeconomic status (SES, defined as education, occupation, and income level) rose (p<.0001), religious participation aside (table 5).

When high SES groups participate in alumni meetings (meeting of hometown friends, and clan gathering, etc. as a friendship activities), we can understand their participation as a kind of "habitus." Bourdieu developed this concept to explain the dynamic of social class. The habitus is a set of depositions, reflexes, and forms of behavior that people acquire through acting in society. (Bourdieu, 1977; 2000).

'Religious tie' is meaningful in terms of the few remaining organizations, beyond family, that cross generations (Coleman, 1990). Furthermore, religion is a powerful and enduring source

of social capital, and indeed, of a social capital that has socially and ethically desirable effects (Greeley, 1997). In my results, religious participation does not have an association with education, while there are high frequencies at the extreme ends of SES. Low-income and high-income groups participate in religious activities more frequently than mid-income groups. Barusch's research has threads of connection, showing that religious activity contributes to psychological and physical well-being and personal identity, and acts as a means of coping with adversity, especially for low-income, elderly women (Barusch, 1999).

In the case of social network, the proportion of prevalence or the density, represents the reverse. For instance, neighbors' network showed a low percentage of prevalence (existence), but, once it developed, it became a strong bond, leading to solid ties. Conversely, the family network showed high prevalence, but low density (table 4-3).

When analyzing these networks by SES, it becomes obvious that there are differences between network types.

 "Neighbor network" indicates a negative correlation with SES, meaning that low SES group tend to gather with their neighbors. On the one hand, this social cohesion within neighborhoods can reduce the risk of morbidity, maintain healthy norms, and provide accessibility to various forms of social support (Kawachi 1997, 1999). On the other, this local cohesion can make the group fragmented and isolated from overall society (Granovetter, 1973).

 "Friends network" has a positive correlation with SES; high SES groups that meet or contact their friends frequently, show similar tendencies in relation to the participation aspects.

"Family network" represents non-significance with education levels, but unemployed or low-income groups rarely meet their family, thus, they are excluded from family support as well as burden. According to some research, the family network does not always work positively in supporting patients of chronic diseases. Family barriers are associated with lower disease care self-efficacy, and both barriers and support from family, were associated with patients' self-management adherence (Rosland et al., 2010).

- Stratification analysis by SES

When analyzing the chronic illness self-management variables (medication, non-medication, and attending education) by SES (table5), it becomes apparent that medication manner is significantly related to SES. Those in lower SES groups lean more on medication than higher SES groups. Conversely, those in high SES groups (higher education level) tend to follow non pharmaceutical therapy. In other words, those in higher SES groups have more chance to choose the manner of chronic self-management via social capital, as opposed to those in lower groups, excluded from the benefit of social capital (table 5). There has been similar research into education level (schooling) and chronic treatment adherence (Goldman & Smith, 2002). Goldman and Smith argued that treatment adherence is differentiated by SES, and the ability to maintain a better health regimen determines health outcome. As a result, individual ability, by education level produces different effects in self-management adherence and health outcomes. These results indicate that social inequality exists in self-management determination and health gradient.

Analyzing the association between social capital and self-management by SES stratification, it is possible to observe that several combinations of social capital and self-management are only significant to higher SES groups. For high income groups, the following combinations are statistically significant: "trust and attending education" (OR 0.70 95%CI 0.46-1.07 p=0.098), "reciprocity and attending education" (OR 0.70, 95%CI 0.46-1.05, p=0.084), "reciprocity and medication" (OR 1.61, 95%CI 0.99-2.62, p=0.056), and "network and medication" (OR 1.47, 95%CI 0.95-2.29, p=0.086) (table 6-1). "Network and medication" combination was especially sensitive to high SES group, having a significant impact on highly educated groups also (OR 1.49, 95%CI 1.02-2.18, p=0.040) (table 6-2).

In the case of "Participation and non-medication", they indicated a high significance for every SES group as: low income (OR 1.53, 95%CI 1.13-2.06, p=0.006); high income (OR 1.52, 95%CI 1.07-2.16, p=0.018); low education (OR 1.43, 95%CI 1.05-1.96, p=0.024); and high education group (OR 1.41, 95%CI 1.04-1.91, p=0.025).

These results mean that those people in higher SES groups are able to receive some benefit from enhancing social capital (when they are willing to manage chronic illness), while those in lower SES groups cannot be influenced by social capital. This has the potential to increase health inequality and make the health gap bigger. "Participation", however, could be a key to close the gap in chronic illness self-management through enhancing non-medication level of every SES group. Furthermore, structural social capital (participation for non-medication, network for medication) tend to have positive effects in relation to chronic illness self-management

- "Satisfaction" variable as a mediator

The effect of "satisfaction," as a mediator, is only meaningful between "trust" and "non-medication." In other words, "trust" is not related "non-medication" self-management directly, but "satisfaction" mediates between them. I propose that this is because trust and satisfaction come from the same source-related perspectives and cognitive aspects. Non-medication depends more on one's subjectivity and willingness to control disease. In comparison to medication, nonmedical strategies such as exercise and diet need continuous interest and effort to maintain the principle. This could be affected by emotional standards, such as satisfaction. To conclude: people who have high levels of trust tend to evaluate neighborhood safety level generously; as a result, satisfaction with safety levels leads people to take up exercise in order to control the disease.

- Association between "social capital" and "chronic illness self-management"

In order to verify the association between social capital and chronic illness self-management, I adjusted several possible confounding variables. Despite this adjustment, "network" still has association with "medication" (OR 1.46, 95%CI 0.93-2.28, p<0.1), while "participation" is still associated with "non-medication" (OR 1.38, 95%CI 1.03-1.84, <0.05). We should also consider that "satisfaction" mediates between "trust" and "non-medication." Thus, we can conclude that structural social capital (participation, network) is more effective than cognitive social capital (trust, reciprocity) for chronic patients' self-management.

Due to the cross-sectional nature of the study, however, there are limitations; we cannot assure the causality between social capital and self-management and should also consider the reverse causality. For instance, chronic conditions are associated with increased levels of disability and decreased levels of physical well-being (Bayliss et al., 2003). An increased likelihood of patient morbidity could diminish the association between social capital and self-management. If patients' chronic conditions lead to difficulties in mobility, their participation and outside network will decrease, while their management needs will increase.

Furthermore, the 8 districts used as a data source, only represent a certain part of Seoul, Korea. The results are not useful in achieving a generalized overview and are not representative of all aspects of Korea.

4.3. Conclusion

The results allow us to make the conclusion that there are meaningful relationships between social capital and chronic illness self-management, and SES leads to significantly different association between social capital and self-management, inducing social inequality and health gradient.

Social capital and self-management combinations being stratified by SES, "network and medication" represent only significant to higher income and educated groups. Patients in higher SES group take advantage of social capital (network) on self-management (medication), while those in lower groups may experience little benefit from social capital. On the other hand, "participation and non-medication" combination indicates a high significance for every SES group. In conclusion, SES could be a barrier to take advantage of social capital on self-management. High SES group manage their illness using social resources they possess, while low SES group have difficulties in achieving benefit of social capital on self-management due to lack of their capacity.

Furthermore, we can estimate the importance of the "participation" effect on "non-medication" and "network" on "medication" in the way that there is still significant association after adjustment for confounding factors including SES. An analysis of the variable attributes suggests that participation and network of subjects tend to be intimate and homogenous ties, which facilitate the information flow, health related behavior, accessibility to health service centers, and social support (Yip et al., 2007; Kawachi et al., 1999; Mckinlay,

1973). These structural social capital as participation and network tend to have positive effects on self-management.

As for mediator, "satisfaction" variables are not a social capital indicator itself, rather act as a mediator between "trust" and "non-medication."

This study has implications insofar that national health survey data was used for the first time to demonstrate social capital effect on self-management, and furthermore, SES stratification clarify the different aspects of association. To enhance chronic illness self-management effectively, we need to encourage participation and network, and consider plans to prevent lower SES group from isolation (local cohesion), excluding information and reducing the capacity for innovation. Although patients are in control of management, especially for chronic disease, we are not supposed to construe the problem to be patients' behavior. We need to understand social context for chronic illness self-management and bring social capital strategies into self-management paradigm for enhancing patients' efficacy and management efficiency.

The study is limited by its cross-sectional nature, which makes conclusions about causality problematic. Social capital and self-management variables would not completely reflect the exact meaning, because the data is not preplanned for a specific aim, but a general health survey.

For further research, we need to consider each participation and network variable in detail. When analyzing the association between participation/network and chronic illness self-management, it is better to use segmented variables (family, neighbor, friend network, etc.) to figure out each dynamic.

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사회자본에 따른
만성질환 자가관리 양상 연구

김은아

보건학과 역학전공

서울대학교 보건대학원

연구배경 및 목적: 고혈압 및 당뇨의 유병률과 질병부담이 증가하면서 만성질환의 자가관리의 중요성이 부각되고 있다. 만성질환 자가관리는 건강행태 개선과 입원기간의 축소 등을 통하여 만성질환자가 높은 수준의 삶의 질을 향유할 수 있도록 한다(Bodenheimer 등, 2002). 효율적인 자가 관리방안 마련을 위해서는 사회문화적 맥락과 같은 보다 다차원적인 이해가 동반되어야 하는데 (Gately 등, 2007), 사회경제적 수준(SES)은 사회자본과 밀접한 연관이 있으며(Glanz 등, 2002; Barlow, 2002) 만성질환관리 능력에도 영향을 미친다(Goldman 과 Smith, 2002). 또한 "만족감"은 사회자본의 결과물이자(Harpham, 2002) 만성질환자의 복약순응도 및 보건의료 서비스의 접근 가능성과도 밀접한 연관이 있다(Hjortdahl 와 Laerum, 1992). 이에 본 연구에서는 고혈압 및 당뇨 질환자의 자가관리에 미치는 사회자본의 영향을 살펴보고, 사회경제적 수준에 따른 각 변수들의 연관성 차이와, 매개변수로서 "만족감"의 효과를 함께 고찰하고자 한다.

방법: 2011 년도 지역사회건강조사 자료를 이용하였으며, 서울시 8 개구의 만 30 세 이상 성인 중 고혈압 및 당뇨병 진단경험자를 대상으로 하였다. Putnam 의 정의에 따라 "신뢰, 호혜성, 네트워크, 참여" 문항을 사회자본으로 정의하였으며, "약물치료, 비약물치료, 관리교육 이수율"에 대한 문항을 만성질환 자가관리 변수로 정의하였다. Breslow-Day 검정과 Mantel-Haenszel 검정을 사용하여 사회경제적 수준 별 층화분석을 시행하였고, "만족감"의 매개효과를 관찰하기 위해 Baron 와 Kenny 의 접근법을 사용하였다. 또한 사회자본과 자가관리의 연관성 파악 및 혼란변수의 보정을 위해 로지스틱 회귀분석을 시행하였으며, 모든 분석절차는 SAS 통계 프로그램 9.3 버전으로 진행되었다.

결과: 고혈압 환자는 자가관리 방법으로서 약물치료에 의존하는 반면 당뇨 환자는 관리교육 이수를 포함한 보다 다양한 방법으로 질환을 관리하고 있다. 또한 복합질환자의 경우 전반적인 자가관리의 양상이 비교적 모두 양호하였다. 참여(예: 친목활동 참여, 56.97%)와 네트워크(예: 가족 연결망, 79.26%) 변수는 주로 친밀성과 동질성이 보장되는 유대의 속성이 우세하였다. 사회자본과 자가관리의 분포는 사회경제적 수준에 따라 유의한 차이를 보였고, 몇몇의 연관관계에서는 오직 높은 SES 그룹에서만 유의한 Odds 값을 보였다. SES 를 비롯한 여러 혼란변수를 보정한 후에도 "네트워크와 약물치료"(OR 1.46, 95%CI 0.93-2.28, p<0.1), "참여와 비약물치료"(OR 1.38, 95%CI 1.03-1.84, p<0.05)사이의 유의성은 유지되었다.

고찰: 만성질환 자가관리에 미치는 사회자본은 신뢰 및 호혜성을 기반으로 하는 인지적 측면보다, 참여와 네트워크 기반의 구조적 측면에서 유효한 효과가 나타난다. 또한 사회경제적 수준에 따라 사회자본 및 만성질환의 관리 수준과 그 효과가 상이하게 나타난다. 즉, 만성질환 관리에 있어 높은 SES 그룹은 그들이 소유하고 있는 사회자원(예: SES 와 사회자본 등)을 효과적으로 활용하는 반면, 낮은 SES 그룹은 수용능력의 부족 등으로 인해 사회자본의 이점을

충분히 활용하지 못하고 있음을 의미하며, 이는 사회경제적 지위에 따른 건강격차를 심화시킬 수 있다. 추후 만성질환 관리에 있어서 사회적 맥락을 고려하고, 사회자본을 자가관리의 전략으로 적극 활용함으로써 환자의 효능감 향상과 관리의 효율성을 제고하여야 할 것이다.

주요어: 사회자본, 만성질환 자가관리, 사회경제적 지위

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