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**The Effects of Disaggregated Longitudinal Volunteering Patterns on  
Self-Rated Health**

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## **Abstract**

Building on an increasing body of evidence that volunteering is beneficial to volunteers' health, the present study aims to further explore the relationship between volunteering and health from the life course perspective. Using the two waves of data from the Americans' Changing Lives Study, I examine the effects of disaggregated longitudinal volunteering patterns on self-rated health by combining consistency (levels of volunteering over time) with both intensity (how many hours spent in volunteering) and diversity (the number of types of organizations), which has not been done in previous studies. Results show that volunteering does benefit volunteers' prospective self-rated health and changes in self-rated health, but the effects differ by different volunteering patterns. These findings indicate the importance of considering the heterogeneity across volunteers, dynamics of volunteering and human agency when studying the relationship between volunteering and health, which should be explored more in future studies with longer periods of panel data. Apart from academic implications, practical meanings are also worth noting: In a so called era of decline in social capital, when more knowledge about the beneficial effects of volunteering is obtained, volunteering as a great form of social integration to connect people may be more easily accepted by the public because this engagement benefits both others and volunteers themselves. Hence, the knowledge from my study further answers the question about how to resolve the paradox between individualism and altruism.

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## Introduction

To me, one of the most charming aspects of the United States is its “paradox”: on the one hand, individualism is a widely shared value and self-interest is an important cultural pillar of the American way of life; on the other hand, public responsibility is deeply ingrained in the American spirit and altruistic values are highly promoted moral pursuits (Bellah, 1985; Wuthnow, 1991). Interestingly, although this era is argued to have seen a decline in social capital (Putnam, 1995, 2001)—though a more complex reality exists (Paxton, 1999)—and a loss of community (Sampson, 2012), volunteering, serving as a bridge to connect people by providing opportunities of social integration—an approach to reduce social problems such as anomie (Durkheim, 1951), is thriving. A report based on data from U.S. Census Bureau and Bureau of Labor Statistics showed that 27%, the rate of volunteering among American adults (16+) in 2005, was the highest during the past 30 years (Grimm, Dietz, & Foster-Bey, 2006) and another recent report revealed that the volunteer rate was still around 25% between September 2014 and September 2015, with about 62.6 million people who volunteered during this period (U.S. Bureau of Labor Statistics, 2016). Therefore, volunteering is worthy of being studied.

According to the “volunteer process model,” volunteering can be logically divided into three stages: antecedents of volunteering, experiences of volunteering, and consequences of volunteering for the volunteer (Musick & Wilson, 2008; Wilson, 2012). In my research, I focus on the third stage—consequences of volunteering. Apart from benefiting the whole society as a form of social integration, which is mentioned above, volunteering can also be beneficial for individuals including both volunteers and beneficiaries. However, with interest in partially

answering the query on how to reconcile the paradox between individualism and altruism (Wuthnow, 1991, p. 17), I examine the rewards for volunteers rather than those for recipients (who are also worth studying though).

Scholars have found several benefits to volunteers such as keeping them from trouble by exposing them to social control and support, preparing them better for civic engagement by cultivating their civic skills, boosting their socioeconomic achievement by helping them build new social networks and providing them with better educational or job opportunities, and enhancing their health (Allyn Piliavin, 2009; Musick & Wilson, 2008; Wilson, 2000, 2012)<sup>1</sup> In this research, my goal is to examine the effects of volunteering on health—an area containing voluminous longitudinal studies (Barron et al., 2009; Burr, Tavares, & Mutchler, 2011; Carlson et al., 2008; Fried et al., 2004; Han & Hong, 2012; Hong & Morrow-Howell, 2010; Kim & Pai, 2010; Krause, 2009; Li, 2007; Li & Ferraro, 2005, 2006; Lum & Lightfoot, 2005; Luoh & Herzog, 2002; Moen, Dempster-McClain, & Williams Jr, 1992; Morrow-Howell, Hinterlong, Rozario, & Tang, 2003; Musick, Herzog, & House, 1999; Musick & Wilson, 2003; Piliavin & Siegl, 2007; Son & Wilson, 2012; Tan et al., 2009; Tan, Xue, Li, Carlson, & Fried, 2006; Tang, 2009; Thoits & Hewitt, 2001; Van Willigen, 2000). However, most of the current studies only tested the effects of volunteering hours rather than volunteering types or continuation. Because they primarily concentrated on hours, they ignored the consistency of hours, let alone the dynamic changes of types over time. Moreover, when volunteering hours or types were examined in relation to health, no research has investigated their heterogeneity. Although I found one study that

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<sup>1</sup> For more detailed descriptions of these benefits, please see the literature review below.

examined diverse patterns of volunteering (Moen et al., 1992), it studied continuation only but not hours or types and the data were non-representative.

Hence, to my knowledge, this current study is the first one using the data from a nationally representative longitudinal study to examine the effects of the disaggregated patterns of volunteering on health by combining either volunteering hours or types with the level of duration.

## Chapter One: Theory and Literature Review

### Volunteering

The definition of volunteering should be elucidated here because it determines how it will be operationalized and measured in research. However, among the studies I reviewed, most of them did not clearly define volunteering or volunteer. This issue was noted more than two decades ago: Cnaan and Amroffell (1994) stated that a clear and coherent definition of volunteer was absent and after they reviewed over 300 articles and reports, they found the “overwhelming majority” did not define volunteer (p. 336). But among those studies which have defined volunteering, the definition is under debate. One of the issues related to my research and thus should be clarified is whether volunteering should be limited to formal volunteering or be extended to include informal helping— “unpaid work done for people outside the household and not within the context of a formal service organization” (Toppe, Kirsch, & Michel, 2001, p. 40)-- as well.

Some scholars argue that volunteering contains only formal forms. For example, Kent (2011) defines volunteering as “unpaid work for or through an organization” and specifically emphasizes that “volunteering” is distinguished from informal helping or caregiving provided to people such as neighbors and friends (p. 1). Similarly, Thoits and Hewitt (2001) explicitly state that informal helping should be excluded from volunteering (p. 116).

In contrast, other researchers maintain that both formal and informal volunteering should be regarded as volunteering work and that both are worth studying (Cnaan & Amroffell, 1994; Li & Ferraro, 2005; Wilson, 2000, 2012; Wilson & Musick, 1997). For instance, Wilson

(2000) defines volunteering as “any activity in which time is given freely to benefit another person, group, or organization” (p. 215) and he underscored that restricting volunteering work to formal organizations is questionable because this restriction underestimates the amount of volunteering at places where those organizations are lagging behind.

Agreeing with the broader definition of volunteering, I also think volunteering work should contain both kinds of activities and they are both worthy of being explored because these two forms of volunteering have distinct effects on each other and are connected to health differently (Li & Ferraro, 2005; Wilson & Musick, 1997). Therefore, formal and informal volunteering should be examined separately. In my research, I only focus on formal volunteering.

Measurement of volunteering is another issue that should be addressed here. Based on previous studies, Piliavin and Siegl (2007) summarize three types of quantitative measures: intensity (how many hours spent in volunteering), diversity (the number of types of organizations) and consistency (levels of volunteering over time). However, existing longitudinal studies on relationships between volunteering and health have paid unbalanced attention to these three aspects. Specifically, intensity is most commonly considered in studies (Burr et al., 2011; Han & Hong, 2012; Kim & Pai, 2010; Krause, 2009; Li, 2007; Li & Ferraro, 2005, 2006; Lum & Lightfoot, 2005; Luoh & Herzog, 2002; Morrow-Howell et al., 2003; Musick et al., 1999; Son & Wilson, 2012; Tang, 2009; Thoits & Hewitt, 2001; Van Willigen, 2000), diversity is second likely to be included (Li & Ferraro, 2005, 2006; Morrow-Howell et al., 2003; Musick et al., 1999; Piliavin & Siegl, 2007; Van Willigen, 2000) and consistency is examined least (Han & Hong, 2012; Moen et al., 1992; Musick & Wilson, 2003; Piliavin & Siegl, 2007). However, some studies

specifically investigated the stability and dynamics of volunteering and factors associated with these phenomena (Butrica, Johnson, & Zedlewski, 2009; Mustillo, Wilson, & Lynch, 2004; Oesterle, Johnson, & Mortimer, 2004; Tang, 2006; Tang, Morrow-Howell, & Choi, 2010; Wilson & Musick, 1999).

Among the existing studies, I did not find any that examined all three dimensions; instead, they only examined one or two. Although Piliavin and Siegl (2007) took all three perspectives into consideration and attempted to examine all of them, they admitted that the data they used could not provide them with a separate measure of intensity because of the absence of information on volunteering hours and the intensity measure they tried to construct was problematic (p. 454). In addition, when intensity and diversity were both considered, no attempt was made to examine consistency over time. Hence, compared to previous research, my study involves all three dimensions.

## **Life Course Theory**

The three perspectives of volunteering—intensity, diversity and consistency— are compatible with life course theory, which contains five core principles (Elder Jr, Johnson, & Crosnoe, 2003, pp. 10-14). In this section, I will briefly illustrate how these five principles play a role in my research.

### ***The Principle of Life-Span Development***

This principle stresses that human development is a lifelong process and thus studying human lives needs to take a long-term perspective. Therefore, life course research requires longitudinal data rather than cross-sectional data. Hence, I primarily pay attention to

longitudinal studies on associations between volunteering and my research is a longitudinal design as well<sup>1</sup>.

### ***The Principle of Agency***

The initiatives of individuals are highlighted by this principle: human beings are not passively living in the world; instead, we are able to make decisions and take actions voluntarily to some extent. In terms of volunteering, some people are willing to be volunteers while others are not. Even among volunteers, some people may volunteer more hours or join more types of prosocial organizations than others. Also, some people may persist in volunteering for a long time while others may quit after a short period of experience.

### ***The Principle of Time and Place***

On the one hand, individuals have agency; on the other hand, their decisions and actions are limited and framed within historical times and social contexts. As mentioned at the beginning of the Introduction section, we are at a paradoxical era in which volunteering may differ from before. In addition, my research concentrates on the United States although there are also many excellent studies in other countries and regions around the world (Erlinghagen & Hank, 2005; Fiorillo & Nappo, 2017; Hank & Erlinghagen, 2009; Haski-Leventhal, 2009; Ho, 2017; Parkinson, Warburton, Sibbritt, & Byles, 2010; Suanet, van Groenou, & Braam, 2009; Williamson, Wildbur, Bell, Tanner, & Matthews, 2017; Windsor, Anstey, & Rodgers, 2008).

### ***The Principle of Timing***

This principle—especially the heterogeneity in timings of life transitions (George, 1993)—is particularly important in terms of what my research can contribute to the existent knowledge

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<sup>1</sup> Please see detailed descriptions of the data used for this research in Methods section.

on the relationship between volunteering and health. Unlike aggregate trajectories treating sample members as a whole, disaggregated trajectories stress diverse patterns of change or stability within the sample because of various timings in the life course (George, 2009). Even though my study cannot be regarded as trajectory analysis (growth curve modeling) which requires three or more repetitive measures for each person (Curran, Obeidat, & Losardo, 2010, p. 125), I am inspired by the ideas behind analysis of disaggregated trajectories. For example, in a study of social integration, Thomas (2011) examined disaggregated trajectories of social engagement and the relation between these patterns and mortality, concluding that even after controlling for other variables, two trajectory classes with different initial levels of social engagement, but both having increased engagement over time, were especially protective for declines in physical limitations. This study raises the question of whether patterns of volunteering will differ in their relationships to health.

However, Thomas' research only derived disaggregated trajectories from people having persistent social engagement but did not compare them with people without any social engagement or with others having limited social engagement. This point was addressed by another study also on the effects of social integration on health (Fothergill et al., 2011). This second study compared people with no community engagement, with one wave of engagement and two waves of engagement. Nevertheless, unlike other studies on volunteering that also considered different levels of consistency (Moen et al., 1992; Musick et al., 1999; Musick & Wilson, 2003; Piliavin & Siegl, 2007), this research investigated the different timings of engagement by dividing people with only one wave of community engagement into two groups—early engagement only and late engagement only. But this study did not consider the



heterogeneity within the group with persistent engagement by taking the variety of intensity change into consideration as Thomas (2011) did.

Thus, these two studies are complementary to each other and meaningful to my study, though they both focus on social integration rather than on volunteering exclusively. Hence, my research integrates merits from both these studies (Fothergill et al., 2011; Thomas, 2011) by combining heterogeneity of consistency and heterogeneous changes (e.g., increase, decrease, no change) of intensity, which has not been done by other studies. Moreover, my study is original also in terms of linking heterogeneity of consistency with heterogeneous changes of diversity.

### ***The Principle of Linked Lives***

Formal volunteering is one way Americans demonstrate their care and compassion (Wuthnow, 1991) to the “generalized other” (Mead, 1934). Volunteers and beneficiaries are thus connected through social relationships or other forms of social bonds such as social networks, social ties and social integration (Berkman, Glass, Brissette, & Seeman, 2000). Social connections have been found to have salutary effects on cognition, longevity, self-rated health and other health outcomes (Béland, Zunzunegui, Alvarado, Otero, & del Ser, 2005; Berkman & Glass, 2000; Berkman et al., 2000; Cohen, 2004; House, Landis, & Umberson, 1988; House, Umberson, & Landis, 1988; Kawachi & Berkman, 2001; Moen, Dempster-McClain, & Williams Jr, 1989; Seeman, 1996; Su & Ferraro, 1997). Studies in this field pave the way for the research on exploring the effects of volunteering on health.

## **Role Theory, Volunteering and Health**

Social integration can also refer to social roles occupied by people (Moen et al., 1989). Besides life course theory, role theory also lays the foundation for my research because it directly explains the possible relationships between volunteering and health from three theoretical perspectives: role enhancement (Sieber, 1974; Thoits, 1983), role strain (Goode, 1960), and role context (Moen et al., 1989).

### ***Role Enhancement***

Role enhancement, also known as role accumulation (Sieber, 1974) or identity accumulation (Thoits, 1983), suggests that occupying multiple roles or identities provides people with many valuable resources (e.g., privileges, security, resources, ego gratification, meaning and purpose in life) which foster psychological and physical health. For example, multiple roles have been found to be associated with longevity, higher life satisfaction, self-efficacy, self-esteem, better self-rated health, functional ability, lower distress, fewer depressive symptoms and fewer chronic diseases (Adelmann, 1994a, 1994b; Miller, Moen, & Dempster-McClain, 1991; Moen et al., 1989, 1992; Thoits, 1983, 1986; Wethington, Moen, Glasgow, & Pillemer, 2000).

From this perspective, being a volunteer--a productive role—will also enhance volunteers' health, which has been widely supported by empirical studies. In Baltimore and other American cities, a senior volunteer program named Experience Corps (EC) is successful in improving the academic performances of children in elementary schools as well as the health and well-being of volunteers. By means of randomized trials, researchers found that relative to comparison groups, volunteers in EC gained more benefits in physical ability or strength (Barron

et al., 2009; Fried et al., 2004; Hong & Morrow-Howell, 2010; Tan et al., 2006), mental health outcomes, such as depression (Hong & Morrow-Howell, 2010), cognitive abilities (Carlson et al., 2009; Carlson et al., 2008; Fried et al., 2004), and self-rated health<sup>2</sup> (Hong & Morrow-Howell, 2010).

Although the results of the EC program come from small samples and short-term trials, they support the causal relationship of volunteering to health because of their experimental or quasi-experimental nature. A number of findings from longitudinal observational studies also support role enhancement theory. In mental health, volunteering has salubrious effects on many aspects of psychological well-being, including happiness, life satisfaction, self-esteem, sense of control, and purpose in life (Greenfield & Marks, 2004; Piliavin & Siegl, 2007; Thoits & Hewitt, 2001; Van Willigen, 2000) and buffers volunteers from depression (Kim & Pai, 2010; Li, 2007; Li & Ferraro, 2005, 2006; Lum & Lightfoot, 2005; Morrow-Howell et al., 2003; Musick & Wilson, 2003; Thoits & Hewitt, 2001). As to physical health, scholars have also found the beneficial impacts of volunteering. For example, volunteering work slows the decline in functional abilities (Li & Ferraro, 2006; Lum & Lightfoot, 2005; Luoh & Herzog, 2002; Moen et al., 1992; Morrow-Howell et al., 2003; Tang, 2009; Van Willigen, 2000) and is protective against mortality (Lum & Lightfoot, 2005; Luoh & Herzog, 2002; Musick et al., 1999).

In addition, a summary health measure, self-rated health, which is the response variable in my research, has been found to be positively influenced by all three dimensions--intensity, diversity and consistency--of volunteering. Although self-rated health is a subjective report of one's health status, it is a reliable measure of health because it is a good predictor of physician-

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<sup>2</sup> Although the effect of EC on volunteers' self-rated health was found marginally significant, there was a trend of these volunteers having fewer decreases than the comparison cohort.

diagnosed health conditions as well as mortality (Idler & Benyamini, 1997; Idler & Kasl, 1991; Maddox & Douglass, 1973; Mossey & Shapiro, 1982). Using data from the American's Changing Lives Survey, Tang (2009) reported that increased volunteering hours (intensity) had salutary effects on later self-rated health, even after inclusion of control variables. In addition, the effects of intensity and consistency of volunteering were examined by Piliavin and Siegl (2007) who found that both were significantly associated with self-reported health though in different ways. Specifically, the relation of volunteering consistency to self-rated health is simple: number of waves of volunteering is positively related to health ratings. In contrast, the association between diversity and self-reported health was much more complex in this research. On the one hand, when previous self-reported health was not included in the model, the positive association between diversity and self-rated health only existed for 0 to 2 organizations, while volunteering in 3 or more organizations showed no significant effect on self-rated health compared to non-volunteering. On the other hand, when previous self-rated health was included in the model, all effects of diversity on self-rated health disappeared. These differing results regarding diversity suggest the importance of considering role strain and role context, both of which challenge the sole focus on the beneficial impacts of volunteering on health.

### ***Role Strain***

According to role strain theory, multiple roles may bring about overloading obligations and role conflicts which are likely to pose negative effects on people's health (Goode, 1960). In this sense, the higher quantity (e.g., intensity, diversity, consistency) of volunteering may not necessarily relate to better health. Evidence from some studies on the relationship between volunteering and health support the role strain hypothesis. For example, Burr et al. (2011)

reported that a modest (instead of large) amount of volunteering hours was related to lower hazard of hypertension. Musick et al. (1999) examined intensity and diversity: they found curvilinear relationships between volunteering and health: volunteering for 40 hours per year or for one organization (relative to higher number of hours or organizations) resulted in optimal protective effects on mortality. As to consistency, intermittent instead of persistent volunteering was more beneficial for functional ability (Moen et al., 1992).

With regard to self-rated health, a couple of studies revealed similar results: a curvilinear relationship between volunteering hours and self-rated health existed and the positive effects of volunteering tapered off after 100 hours per year for senior volunteers (Lum & Lightfoot, 2005; Luoh & Herzog, 2002; Morrow-Howell et al., 2003; Van Willigen, 2000). In addition, engagement in more organizations did not always result in more benefits for self-reported health (Piliavin & Siegl, 2007). Similar results were reported by Van Willigen (2000): elderly volunteers gained beneficial rewards on self-rated health from one type of volunteering organization but not from more than one type, compared to non-volunteers. Moreover, similar to Piliavin and Siegl (2007), Morrow-Howell et al. (2003) also failed to find effects for diversity when previous self-rated health was considered. These results remind us to pay attention to other factors that may affect the association between volunteering and health, indicating the value of the role context perspective.

### ***Role Context***

Unlike role enhancement and role strain, which focus primarily on role quantity, this theory emphasizes the circumstances and nature of roles, suggesting potential heterogeneous relationships between volunteering and health (Moen et al., 1989).

Many personal and social circumstances are related to the role of being volunteers. For example, volunteering participation was found to peak in middle age (Herzog, Kahn, Morgan, Jackson, & Antonucci, 1989; Menchik & Weisbrod, 1987); whites, compared to other racial/ethnic groups, are more likely to engage in volunteering (Foster-Bey, 2008; Mutchler, Burr, & Caro, 2003; Van Willigen, 2000); and men and women were found to volunteer differently in various aspects (e.g., hours, rates, realms) (Musick & Wilson, 2008; Wilson, 2000, 2012). Besides these basic demographic variables, socioeconomic factors are also associated with volunteering. Higher education levels are highly correlated with more volunteering (Mutchler et al., 2003; Oesterle et al., 2004; Taniguchi, 2012; Wilson, 2000). However, income and employment status are more complicated and their associations with volunteering are mixed (Oesterle et al., 2004; Taniguchi, 2012; Wilson, 2000, 2012). In addition, other social roles or forms of social integration also are related to volunteering. Marriage has been widely found to be a positive predictor of volunteering (Piliavin & Siegl, 2007; Rotolo & Wilson, 2004; Taniguchi, 2012; Thoits & Hewitt, 2001; Wilson, 2000). Religious service attendance is also highly associated with volunteering (Li & Ferraro, 2005, 2006; Mutchler et al., 2003; Oesterle et al., 2004; Piliavin & Siegl, 2007; Taniguchi, 2012; Wilson, 2012).

Also among studies examining the relationship between volunteering and self-rated health (Lum & Lightfoot, 2005; Luoh & Herzog, 2002; Morrow-Howell et al., 2003; Piliavin & Siegl, 2007; Tang, 2009; Thoits & Hewitt, 2001; Van Willigen, 2000), two measures of social integration—meetings/organizations attendance and informal social integration—were frequently examined. Therefore, I will treat them as control variables as well. Also on the basis of previous research, several other commonly used health outcomes —functional impairment,

chronic diseases and physical activity—will be controlled. Actually, these three variables are strong determinants of self-rated health (Benyamini, Idler, Leventhal, & Leventhal, 2000).

Apart from these exogenous variables, the nature of volunteering per se may also diversify the relationships between volunteering and health. In my study, since I consider relative intensity and diversity, I compare changes in intensity and diversity within individuals rather than between individuals as previous research did. Hence, my focus is actually not only on quantity but also on directions of change (e.g., increase, decrease, no change). Due to the principle of agency in life course theory mentioned earlier, people may adjust their later volunteering time or organizations based on their former experiences. As a result, diverse patterns of volunteering will emerge both in terms of intensity and diversity and thus their relationships to self-rated health may differ.

## **Hypotheses**

The present research builds upon previous studies to examine the effects of volunteering on health. Based on Piliavin and Siegl (2007), who found that more waves of volunteering (i.e., longer duration) had higher positive effects on self-rated health, I put forward my first hypothesis:

***Hypothesis 1:*** The greater the consistency of volunteering, the higher the respondent's self-rated health.

However, due to the focus on absolute intensity or diversity instead of relative intensity and diversity, previous studies do not provide many clues to my hypotheses regarding these two aspects. But Thomas (2011) shed some light on relative intensity by showing that trajectory

classes with increased engagement over time had the largest protective effects against decline in physical limitations. Based on this finding, I propose my second hypothesis:

**Hypothesis 2:** Volunteering patterns with increases in volunteering hours will predict better self-rated health than no volunteering.

As to the relative diversity, making hypothesis in this respect is hard as well because I have not found any research that examined changing patterns in volunteering types. Thus, I make an inference based on the research by Fothergill et al. (2011), who found that compared to no engagement, late engagement had stronger positive effects on self-rated health. Since late engagement can also be regarded as the change from no engagement at time one to having certain engagement (either church or club activity) at time two, this finding implies a tendency that increasing social engagement diversity will have stronger effects on self-rated health over time. Therefore, I offer my third hypothesis:

**Hypothesis 3:** Volunteering patterns with increases in volunteering types will predict better self-rated health than no volunteering.

In addition to testing the hypotheses, I will also examine the relationships between other volunteering patterns (e.g., decreases in volunteering) and self-rated health.



## Chapter Two: Methods

### Data

Data utilized by this research come from first two waves of the Americans' Changing Lives (ACL) study done by the Institute for Social Research at the University of Michigan (House, 1995). The data were collected on a multistage, stratified, area probability sample of non-institutionalized people who were aged 24 or over and living in the continental United States. In 1986, the baseline survey—face-to-face interviews in respondents' homes—was conducted (N=3617) and included oversamples of African Americans and individuals aged 60 or older. With the same methods, the follow-up data from the second wave were collected in 1989, with an attrition rate of 20.7% (N=2867). With regard to the variables with missing values other than a result of attrition, I use imputed versions if they were created by ACL staff. After the list-wise deletion approach, 2853 cases remained.

In addition, it should be noted that although three-wave data may be better for examining the effects of volunteering consistency on health, two-wave ACL data are also possible to be used for this kind of analysis due to the ways that questions regarding volunteering and self-rated health were asked. The volunteering measures counted respondents' volunteer work during the past 12 months while self-rated health recorded their reports of health perceptions at the time of interviews<sup>1</sup>. Thus, even for questions about volunteering and self-rated health which were asked at the same wave, it is reasonable to assume that respondents' volunteer work in the past year occurred before the time when self-

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<sup>1</sup> Please see detailed descriptions of all measures in the section Measures below.

rated health was reported. Hence, the lagged effects of volunteering patterns—either for hours or for types-- constructed from time- one and time-two measures can be assumed to temporally precede time-two self-rated health. Moreover, one advantage of two-wave data over three-wave data from the same longitudinal dataset is that the former has much less attrition than the latter.

## **Measures**

### ***Dependent Variable***

#### ***Self-Rated Health (T2<sup>2</sup>)***

Respondents were asked, “How would you rate your health at the present time? Would you say it excellent, very good, good, fair, or poor?” I created a dummy variable by dichotomizing these five responses into two categories: 0= fair/poor (or low self-rated health), 1=good/very good/excellent (or high self-rated health).

### ***Independent Variables***

#### ***Volunteering Type Patterns (Based on Diversity and Consistency)***

At both time one and time two, respondents were asked, during the past 12 months, whether they had done volunteer work for any of the following organizations: (a) church, synagogue or other religious organization; (b) school or educational organization; (c) political group or labor union; (d) senior citizen group or related organization; and (e) other organizations. The number of organization reported by a respondent was summed and the answer could range from 0 to 5. Scores were available at both time-one and time-two. Then, I

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<sup>2</sup> T2 means time two (1989) and T1 means time one (1986).

created six patterns of volunteering types were based on respondents' scores at time one and time two. If both answers were 0, this condition was coded as "No type". If the time-one answer was not 0 but the time-two answer was 0, the pattern was coded "Early type". Reversely, the "Late type" is defined as the time-one answer was 0 while the time-two answer was non-zero. For the rest of the respondents with both non-zero answers (persistent volunteering at both times), I further divided them into three categories: "Increased type" (time-two answer is larger than the time-one answer), "Decreased type" (time-one answer is larger than the time-two answer), and "Same type" (time-one and time-two answers were equal). Finally, I created a dummy variable for each of these six volunteering type patterns respectively. For these six dummy variables, 1 refers to that specific pattern (e.g., No Type) and 0 refers to "Other".

#### *Volunteering Hour Patterns (Based on Intensity and Consistency)*

At both waves, if respondents reported any type of volunteering, they were also asked to recall how many hours they spent volunteering in the past 12 months. Midpoints of the response categories were used to denote corresponding categories: 0 = no volunteer work in the past year, 10 = less than 20 hours, 30 = 20-39 hours, 60 = 30-79 hours, 120 = 80-159 hours, 200 = 160 hours or more. Following the same method of forming volunteering type patterns, I also created six volunteering hour patterns from respondent's' answers at time one and time-two: "No hours" (both answers are 0), "Early hours" (time-one number is non-zero but time-two number is 0), "Late hours" (time-one number is 0 but time-two number is non-zero), "Increased hours" (both numbers are non-zero and the time-two answer is larger than the time-one answer), "Decreased hours" (both numbers are non-zero and the time-one answer is

larger than the time-one answer), and “Same hours” (numbers are non-zero and equal at time one and time two). Likewise, dummy variables for each pattern were constructed.

### ***Controls (T1<sup>3</sup>)***

#### *Health Status*

Three variables are used to control respondents’ health. The first is time-one self-rated health, which is coded the same as self-rated health at time two (the dependent variable shown above). Time-one self-rated health is used only in the models that predict changes in self-rated health. The second measure is functional impairment—a four-level Guttman-type scale—describing how difficult respondents reported performing a series of functional activities including bathing by themselves, climbing a few flights of stairs, walking several block, and doing heavy work such as shoveling snow or washing walls. This measure was coded from 1 (most severe functional impairment) to 4 (no functional impairment). The third health indicator is life-threatening chronic conditions which summed the number of five potentially fatal chronic conditions (lung disease, heart attack, diabetes, stroke and cancer) experienced by respondents during the past year.

#### *Physical Activity*

This measure was a standardized index constructed from three variables measuring respondents’ frequency of (a) working in the garden or yard, (b) engaging in active sports or exercise, and (c) taking walks. Responses for all three variables ranged from (1) often to (4) never. Thus, higher (standardized) scores represent lower levels of physical activity.

#### *Social Roles*

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<sup>3</sup> All control variables come from the time one survey.

Marital Status was coded 1 = married and 0 = other. Employment Status was coded 1 = employed and 0 = not employed.

### Social Integration

Social integration can be divided into two types: formal social integration and informal social integration. Formal social integration includes two separate variables: religious service attendance and formal meeting attendance. Religious service attendance was measured by asking respondents “how often do you usually attend religious services?” The six response choices are (1) more than once a week, (2) once a week, (3) 2 or 3 times a month, (4) about once a month, (5) less than once a month, and (6) never. To measure formal meeting attendance, respondents were asked “how often do you attend meetings or programs of groups, clubs or organizations that you belong to?” This measure has the same coding as religious service attendance. Thus, for these two types of formal social integration, higher scores represent lower levels of engagement.

Informal social integration is a standardized index formed by two items. The first item asked respondents to report in a typical week, how often they talked on the telephone with friends, neighbors or relatives. The response categories were (1) more than once a day, (2) once a day, (3) 2 or 3 times a week, (4) about once a week, (5) less than once a week, and (6) never or no phone. The second item asked respondents how often they met with friends, neighbors or relatives and did things together. Responses were coded: (1) more than once a week, (2) once a week, (3) 2 or 3 times a month, (4) about once a month, (5) less than once a month, and (6) never. Hence, high (standardized) scores indicate low informal social integration.

### Socioeconomic Status

Education was coded from 0 to 17 to describe respondents' highest year of schooling completed. Family income was measured by respondents' reports of their and their spouses' earnings combined before taxes during the past 12 months. The responses included ten categories: (1) less than \$ 5, 000, (2) \$5, 000 – 9, 999, (3) \$10, 000 – 14, 999, (4) \$15, 000 – 19, 999, (5) \$20, 000 – 24, 999, (6) \$25, 000 – 29, 999, (7) \$30, 000 – 39, 999, (8) \$40, 000 – 59, 999, (9) \$60, 000 – 79, 999, and (10) \$80, 000+.

### Sociodemographic characteristics

Sex was coded 0 for female and 1 for male. Race was measured to contrast White (1) with all other racial/ethnic groups (0). Age was measured in years, ranging from 24 to 96.

### **Analytical Strategy**

To examine the effects of disaggregated patterns of volunteering on self-rated health (a dichotomous variable), I use the logistic regression (also called logit model) which is an appropriate statistical model to deal with binary dependent variables (Cox, 1958). In my research, I estimate four logit models. From the perspective of independent variables, these four models include two for volunteering hour patterns and two for volunteering type patterns. But from the perspective of dependent variables, two models predict prospective self-rated health and the other two predict changes in self-rated health (Finkel, 1995). To be specific, in the first model, I assess the effects of six volunteering hour patterns on prospective self-rated health by including independent, dependent, and all control variables except time-one self-rated health. In the second model, I test the effects of six volunteering type patterns on

prospective self-rated health by including all variables<sup>4</sup> but time-one self-rated health. Thus, models 1 and 2 predict self-rated health prospectively. In the third model, I explore the effects of six volunteering hour patterns on changes in self-rated health by involving all variables including time-one self-rated health. In the last model, I examine the effects of six volunteering type patterns on changes in self-rated health by including all variables as well.

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<sup>4</sup> Independent variables are changed between two volunteering patterns in these four models.

## Chapter Three: Results

### Descriptive Statistics

Table 1 shows the descriptive statistics for independent variables, the dependent variable and control variables. As described above, I formed two sets of volunteering patterns (volunteering hours and volunteering types) by recoding the ACL volunteer indexes. I do not list the original volunteer variables here. For the dichotomous variables, their means represent the proportion of people coded 1 in each category. For example, 45% of the sample did not volunteer at both waves, indicating that most of the sample (55%) volunteered to some extent at time one or time two.

Longitudinal patterns of volunteering were created for two characteristics: hours spent volunteering and the number of types of organizations for which respondents volunteered. The percentages of the respondents who reported hours at time one only or at time two only were both 12%. Volunteering only at time one is labeled Early hours; volunteering only at time two is labeled Late hours. Decreased hours was the smallest group: only 9% of the sample volunteered at both waves but decreased their hours from wave one to wave two. Persistent volunteers who increased their hours (Increased hours) or kept their hours the same across two waves (Same hours) both consisted of 11% of the sample.

In terms of the volunteering type patterns, Early type (time one only) and Late type (time two only) were both 12% of the sample. However, respondents who continued volunteering but increased or decreased in types of volunteering organizations from time one to time two both had the lowest percentages: 8%.



**Table 1. Descriptive Statistics**

Variables	Means	Standard Deviations	Ranges
<i>Independent Variables</i>			
No hours	0.45	0.50	0-1
Early hours	0.12	0.33	0-1
Late hours	0.12	0.32	0-1
Decreased hours	0.09	0.29	0-1
Increased hours	0.11	0.31	0-1
Same hours	0.11	0.31	0-1
No type	0.45	0.50	0-1
Early type	0.12	0.33	0-1
Late type	0.12	0.32	0-1
Decreased type	0.08	0.26	0-1
Increased type	0.08	0.28	0-1
Same type	0.15	0.36	0-1
<i>Dependent Variable</i>			
Self-rated health (T2)	0.77	0.42	0-1
<i>Control Variables</i>			
Age	52.99	17.09	24-96
Male	0.36	0.48	0-1
White	0.67	0.47	0-1
Education	11.70	3.38	0-17
Family income	4.53	2.64	1-10
Employed	0.54	0.50	0-1
Married	0.57	0.50	0-1
Religious service attendance	3.43	1.79	1-6
Formal meeting attendance	4.15	1.82	1-6
Informal social integration	-0.01	1.02	-3.07-1.35
Functional impairment	3.63	0.80	1-4
Fatal chronic conditions	0.23	0.52	0-3
Physical activity	-0.13	1.03	-2.47-1.50
Self-rated health (T1)	0.80	0.40	0-1

In contrast, 15% of the respondents were persistent volunteers without changing types from time one to time two; and this group included more people than any other groups except non-volunteers. With regard to the dependent variable, 77% of the sample reported high self-rated health at time two.

As to the control variables, the average age of the sample was about 53 years old. The majority of respondents were female (64%) and white (67%). The mean level of education was 11.7 years. Mean family income was about \$20,000. A majority of respondents were employed (54%) and married (57%). Since higher scores represent lower levels of social integration, frequencies of religious service attendance, formal meeting attendance and informal social integration were all moderate. In terms of health-related predictors, respondents on average had low levels of functional impairment, few life-threatening chronic conditions, high time-one self-rated health and medium levels of physical activity.

### **Volunteering Hour Patterns and Prospective Self-Rated Health**

Table 2 presents the coefficients for the logit model of time-two self-rated health regressed on volunteering hour patterns and control variables including sociodemographic characteristics, socioeconomic status, social roles, social integration and health-related indicators. Figures in the second column are original coefficients (logged odds ratios) of the logistic regression. For the sake of easier interpretation, I exponentiated these coefficients and provide the odds ratios, which are listed in the third column.

It is important to note that volunteering hour patterns as a whole is a significant predictor of time-two self-rated health. However, diverse patterns have different relationships

**Table 2. Self-Rated Health at Time Two by Volunteering Hour Patterns**

Variables	Self-Rated Health (T2)	
	Logged Odds Ratios	Odds Ratios
Early hours	0.146	1.157
Late hours	0.228	1.257
Deceased hours	0.393†	1.482†
Increased hours	0.661**	1.937**
Same hours	1.018***	2.768***
Age	-0.074**	0.929**
Age Squared	0.001**	1.001**
Male	0.140	1.151
White	0.365**	1.440**
Education	0.035†	1.036†
Family income	0.091**	1.095**
Employed	0.447***	1.564***
Married	-0.149	0.862
Religious service attendance	0.051	1.052
Formal meeting attendance	-0.042	0.959
Informal social integration	0.069	1.072
Functional impairment	0.660***	1.934***
Fatal chronic conditions	-0.901***	0.406***
Physical activity	0.076	1.079

*Note:* No Hour is the reference group for volunteering hour patterns. Logged odds ratios indicate original coefficient of the logistic regression while odds ratios are anti-logged (exponentiated) coefficients.

†  $p < .10$ ; \*  $p < .05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < .001$ .

to prospective self-rated health. Specifically, respondents who volunteered at either wave one only (Early hours) or wave two only (Late hours) had higher odds of reporting high self-rated health than people who did not volunteer at both waves. However, these differences are non-significant. The effect of the decreased hours group—in which respondents volunteered at both waves, but decreased their volunteering hours from time one to time two—on time-two self-rated health is only marginally significant (odds ratio = 1.482,  $p < 0.1$ ) relative to the No hours group.

In contrast, both the Increased hours group and the Same hours group report significantly higher self-rated health at time two than non-volunteers. For respondents who sustained volunteering and increased volunteering hours from wave one to wave two, their odds of reporting high self-rated health are nearly 2 times the odds for respondents who did not volunteer at both waves (odds ratio = 1.937,  $p < 0.01$ ). The positive effect of same hours is even stronger than that for increased hours: the odds of having high self-rated health for persistent volunteers are about 3 times the odds for non-volunteers (odds ratio = 2.768,  $p < 0.001$ ). It is interesting to note that the odds ratios for these two groups are larger than those for any other variables in the model.

With regard to the control variables, some of them are significantly associated with time-two self-rated health while others are not. Both age and quadratic age are significant predictors, indicating that the relationship between age and self-rated health is curvilinear. According to the formula<sup>1</sup> for calculating the turning point, I find that as age increases, the odds

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<sup>1</sup> Coefficient of age/ (-2\*coefficient of age squared). For the calculation here, I used the original coefficients from the model rather than the rounded ones shown in the Table 1. So the turning point is “-0.0735327/ (-2\*0.0006265) = 59” instead of “-0.074/ (-2\*0.001) = 37”.

of reporting high self-rated health decrease until near 60 years old, after which increases in age are associated with increases in the odds of having high self-rated health. The odds of having prospective high self-rated health for whites are higher than the odds for other racial/ethnic groups (odds ratio = 1.440,  $p < 0.01$ ). For every one level increase in income, the odds of reporting better health increase by about 10% (odds ratio = 1.095,  $p < 0.01$ ). Employed respondents are more likely<sup>2</sup> to report better self-rated health than the non-employed (odds ratio = 1.564,  $p < 0.001$ ). Both health indicators (functional impairment and fatal chronic conditions) are strongly related to time-two self-rated health. However, other control variables—sex, marital status, religious service attendance, formal meeting attendance and informal social integration—are all non-significant while the effect of education is marginally significant (odds ratio = 1.036,  $p < 0.1$ ).

In summary, despite inclusion of the control variables, two volunteering hour patterns—increased hours and same hours—are significant predictors of better prospective self-rated health compared to no volunteering.

### **Volunteering Type Patterns and Prospective Self-Rated Health**

Table 3 shows the coefficients for the logit model of time-two self-rated health regressed on volunteering type patterns, including the same control variables as in Table 2. Similar to volunteering hour patterns, volunteering type patterns as a whole is also a significant predictor of time-two self-rated health and heterogeneous effects of different patterns exist as well. To be specific, the odds for Early type and Late type are not significantly different from the

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<sup>2</sup> Probability is different from odds, but higher odds indicate higher probability.

odds for non-volunteers. In contrast, Decreased, Increased and Same types are all significant predictors for better prospective self-rated health. The odds of reporting high self-rated health at time two for respondents who increased volunteering types between waves are about 80 % higher than the odds for non-volunteers (odds ratio = 1.790,  $p < 0.05$ ). For volunteers who decreased types from wave one to wave two, their odds of having high self-rated health are more than two times the odds for non-volunteers (odds ratio = 2.031,  $p < 0.01$ ). The largest beneficial effect occurred for the Same type: the odds for this group are about 2.1 times the odds for no type (odds ratio = 2.071,  $p < 0.001$ ). It is also important to note that the odds ratios for both increased type and same type are larger than any of the control variables in this table.

With regard to the control variables, age still has a curvilinear relationship to time-two self-rated health and the turn occurs at about age 60 as well. Race, family income and employment status are still significant predictors of better prospective self-rated health: whites have 44% higher odds of reporting better self-rated health at wave two than other racial/ethnic groups (odds ratio = 1.437,  $p < 0.01$ ); each one category increase in family income predicts about a 10 % increase in the odds of having better time-two self-rated health (odds ratio = 1.095,  $p < 0.01$ ); employed respondents, compared with unemployed ones, have more than 50% higher odds of reporting high self-rated health at wave two (odds ratio = 1.564,  $p < 0.001$ ). In terms of health indicators, functional impairment and fatal chronic conditions are strong predictors of self-rated health (T2). The same set of control variables that are not significant in Table 2 are not significant in this table either.

**Table 3. Self-Rated Health at Time Two by Volunteering Type Patterns**

Variables	Self-Rated Health (T2)	
	Logged Odds Ratios	Odds Ratios
Early type	0.144	1.155
Late type	0.229	1.257
Deceased type	0.709**	2.031**
Increased type	0.582*	1.790*
Same type	0.728***	2.071***
Age	-0.073**	0.929**
Age Squared	0.001**	1.001**
Male	0.126	1.134
White	0.362**	1.437**
Education	0.037†	1.037†
Family income	0.090**	1.095**
Employed	0.447***	1.564***
Married	-0.151	0.860
Religious service attendance	0.052	1.053
Formal meeting attendance	-0.041	0.960
Informal social integration	0.069	1.071
Functional impairment	0.661***	1.936***
Fatal chronic conditions	-0.884***	0.413***
Physical activity	0.080	1.083

*Note:* No Type is the reference group for volunteering type patterns. Logged odds ratios indicate original coefficients of the logistic regression while odds ratios are anti-logged (exponentiated) coefficients.

†  $p < .10$ ; \*  $p < .05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < .001$ .

In sum, even after adjusting for the control variables, three persistent volunteering type patterns—Increased, Decreased and Same type—are all significant predictors of high prospective self-rated health relative to no volunteering.

### **Volunteering Hour Patterns and Changes in Self-Rated Health**

Table 4 has the same variables as Table 2 except that the former includes an extra health indicator: time-one self-rated health. This additional variable is added to examine whether the effects of volunteering patterns on time-two self-rated health actually are a result of baseline self-rated health. In other words, the coefficients of independent variables in Table 4 can be interpreted as the effects of volunteering hour patterns on changes in self-rated health between 1986 and 1989.

It is important to note that even after controlling for baseline self-rated health, volunteering hour patterns as a whole is a significant predictor of time-two self-rated health. In addition, the patterns of volunteering hours are differentially associated with changes in self-rated health. It also is important to note that positive coefficients predict both improvements in self-rated health and slower declines in self-rated health relative to non-volunteers. Cross-tab analysis of changes (not shown here) in self-rated health showed that slower declines in self-rated health were much more common than improvements in self-rated health. Therefore, to ease interpretation, henceforth positive coefficients will be referred to as slower decline in self-rated health.

With regard to specific volunteering patterns, respondents who volunteered only at either wave one or wave two do not significantly differ in changes in self-rated health from



those who did not volunteer. The decreased hours group, however, has a somewhat stronger relationship to changes in self-rated health than these two non-significant groups, but the effect is marginally significant (odds ratio = 1.561,  $p < 0.1$ ). In contrast, the effects of Increased hours and Same hours are significant. Increased hours of volunteering were positively related to slower decreases in self-rated health: these respondents have about 2 times the odds of a slower decline in self-rated health than those who did not volunteer at both waves (odds ratio = 1.977,  $p < 0.01$ ). For persistent volunteers with stable hours between 1986 and 1989, their odds of a slower decline in self-rated health are nearly 3 times the odds for the no hour group (odds ratio = 2.689,  $p < 0.001$ ).

In terms of the control variables, the coefficient for age is significant: for every year increase in age, the odds of a slower decline in self-rated health decreases about 5% (odds ratio = 0.948,  $p < 0.05$ ). Whites are significantly more likely to report a slower decline in self-rated health at time two than other racial/ethnic groups (odds ratio = 1.409,  $p < 0.01$ ). The odds of a slower decline in self-rated health for employed respondents are about 50 % higher than the odds for their unemployed counterparts (odds ratio = 1.458,  $p < 0.01$ ). The control variables in Table 2 and Table 3 that are non-significant also are non-significant in Table 4. In addition, age squared is only marginally significant (odds ratio = 1.000,  $p < 0.1$ ) here and family income is no longer significant. As for the health indicators, both functional impairment and fatal chronic conditions are significant predictors of decreases in self-rated health. Not surprisingly, time-one self-rated health (odds ratio = 5.428,  $p < 0.001$ ) is the strongest predictor in the table. It is also worth noting that other than baseline self-rated health, the two significant volunteering hour patterns have odds ratios larger than those of the control variables.

**Table 4. Changes in Self-Rated Health by Volunteering Hour Patterns**

Variables	Self-Rated Health (T2)	
	Logged Odds Ratios	Odds Ratios
Early hours	0.198	1.219
Late hours	0.274	1.315
Deceased hours	0.446†	1.561†
Increased hours	0.682**	1.977**
Same hours	0.989***	2.689***
Age	-0.053*	0.948*
Age Squared	0.000†	1.000†
Male	0.194	1.214
White	0.343**	1.409**
Education	0.024	1.025
Family income	0.045	1.046
Employed	0.377**	1.458**
Married	-0.131	0.877
Religious service attendance	0.054	1.056
Formal meeting attendance	-0.033	0.968
Informal social integration	0.037	1.037
Functional impairment	0.384***	1.469***
Fatal chronic conditions	-0.698***	0.498***
Physical activity	0.046	1.047
Self-rated health (T1)	1.692***	5.428***

*Note:* No Hour is the reference group for volunteering hour patterns. Logged odds ratios indicate original coefficients of the logistic regression while odds ratios are anti-logged (exponentiated) coefficients.

†  $p < .10$ ; \*  $p < .05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < .001$ .

In short, even after including all the control variables in the model, two volunteering hour patterns—Increased hours and Same hours—significantly predict a slower rate of decline in self-rated health from 1986 to 1989 compared to No hours.

### **Volunteering Type Patterns and Changes in Self-Rated Health**

Similar to Table 4, Table 5 presents the coefficients of the logit model in which the effects of volunteering type patterns are regressed on changes in self-rated health from 1986 to 1989. Among the five volunteering type patterns, all three persistent patterns—Decreased, Increased and Same type—are significantly stronger predictors of changes in self-rated health than no type, while Early type and Late type are not. The odds of a slower rate of decline in self-rated health for the Increased type group are about 70% higher than the odds for respondents who reported no volunteering at both waves (odds ratio = 1.721,  $p < 0.05$ ). For the Decreased type and Same type groups, the odds of slower declines in self-rated health are more than two times the odds for the No type group. It is worth noting that although the Decreased type has a larger odds ratio than Same type (2.168 vs. 2.104), the effect of latter is more significant than the former ( $p < 0.001$  vs.  $P < 0.01$ ).

As to the control variables, those that were significant in Table 4 are also significant in Table 5. Age has a negative effect on changes of self-rated health (odds ratio = 0.949,  $p < 0.05$ ). Whites have higher odds of slower declines in self-rated health than other racial/ethnic groups (odds ratio = 1.407,  $p < 0.01$ ). Compared to unemployed respondents, employed ones have about 45% higher odds of sustaining high self-rated health (odds ratio = 1.453,  $p < 0.01$ ). In

**Table 5. Changes in Self-Rated Health by Volunteering Type Patterns**

Variables	Self-Rated Health (T2)	
	Logged Odds Ratio	Odds Ratio
Early type	0.196	1.216
Late type	0.274	1.315
Deceased type	0.774**	2.168**
Increased type	0.543*	1.721*
Same type	0.744***	2.104***
Age	-0.053*	0.949*
Age Squared	0.000†	1.000†
Male	0.182	1.200
White	0.341**	1.407**
Education	0.026	1.026
Family income	0.044	1.045
Employed	0.373**	1.453**
Married	-0.133	0.875
Religious service attendance	0.055	1.056
Formal meeting attendance	-0.032	0.969
Informal social integration	0.037	1.038
Functional impairment	0.384***	1.468***
Fatal chronic conditions	-0.684***	0.504***
Physical activity	0.049	1.050
Self-rated health (T1)	1.701***	5.479***

*Note:* No Type is the reference group for volunteering type patterns. Logged odds ratios indicate original coefficients of the logistic regression while odds ratios are anti-logged (exponentiated) coefficients.

†  $p < .10$ ; \*  $p < .05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < .001$ .

terms of health, functional impairment, fatal chronic conditions and self-rated health are all strong and highly significant predictors of changes in self-rated health ( $p < 0.001$ ).

To sum up, even when all the control variables are in the model, three volunteering type patterns—Decreased, Increased and Same type—have significantly stronger protective effects against declines in self-rated health from 1986 to 1989 than the No type pattern.

## Discussion

Building on an increasing body of evidence that volunteering is beneficial to volunteers' health and well-being, the present study was aimed at exploring whether diverse patterns of volunteering would affect the self-rated health of volunteers. Compared to the existing bulk of research, this research is unique and original in terms of three major aspects. First, it considered the heterogeneity within the sample rather than treating respondents as an aggregate: diverse volunteering patterns were created to examine whether their relationships to self-rated health were distinct. Second, this study included all three dimensions of volunteering: intensity, diversity and consistency. Moreover, these three dimensions were not examined separately; instead, intensity and diversity were both combined with consistency to investigate the effects of the dynamics of intensity and diversity. Third, because the same amount of volunteering (e.g., hours, types) may have different meanings for people and thus affect them differently, relative instead of absolute intensity and diversity were addressed in this study. Due to the focus on dynamics and relativity, this research stressed human agency during the life course of individuals and studied how specific behavioral patterns would play a role in people's health.

Three hypotheses were put forward in this research but the results I found were much more complicated than I had hypothesized. For the first hypothesis, that greater consistency of volunteering would predict higher self-rated health, evidence has not fully supported it. Although I found that longer time of volunteering had positive effects on both prospective self-rated health and changes in self-rated health, volunteering at only one wave did not have significant effects compared to no volunteering. In contrast, among three two-wave

volunteering patterns either for intensity (Decreased hours, Increased hours and Same hours) or for diversity (Decreased type, Increased type, and Same type), at least two patterns have significant positive effects on the two self-rated health outcomes relative to no volunteering. These results, however, did not agree with those found by Piliavin and Siegl (2007) that no matter whether previous self-reported health was considered or not, volunteering at one point in time had significant positive impacts on later self-reported health compared to no volunteering, and volunteering across two waves appeared to have additive effects.

This discrepancy in findings may lie in the differences between the data used in these two studies. Piliavin and Siegl used data from the Wisconsin Longitudinal Study (WLS) whose sample was only composed of graduates from Wisconsin high schools in 1957, indicating a single birth cohort. In contrast, the ACL study was a nationally representative survey whose sample included a wide range of birth cohorts. In addition, the WLS sample included only whites; the ACL includes a wide range of race and ethnicity. Thus, respondents' health scores may differ a lot between two surveys due to differences in sample composition. Also, the interval between two waves (1975 and 1992) of the WLS was much longer than the one between the first two waves (1986 and 1989) of the ACL study. Hence, "two waves" actually mean very different research periods for two studies. Interestingly, when these two seemingly different results are considered together, we can infer that longer volunteering has greater beneficial effects on self-rated health but these benefits may need a certain length of time to take effect. Therefore, the surmise that simply taking the role of volunteering will benefit people's health (Musick et al., 1999) appeared to be wrong. Instead, it may be the case that volunteers do not gain more health benefits from volunteering than non-volunteers only for a

short period of time, as was found here (i.e. neither early nor late volunteering were significantly better than no volunteering), implying the importance of consistency. However, it is unclear how long it takes for volunteers to start gaining significant health benefits.

Like the first hypothesis, the second one, that patterns with increases in volunteering hours will predict better self-rated health than no volunteering, has been partially supported. Early hours or Late hours can also be regarded as decreasing hours to 0 or increasing hours from 0 to a certain amount across two waves. Although odds ratios for one-wave volunteering patterns are larger than 1, these patterns including Late hours do not significantly predict better self-rated health outcomes than no volunteering. Also note that although Late hours has higher odds ratios than Early hours for both prospective and changes in self-rated health, these differences are small and are not significant<sup>1</sup>. Among the three persistent volunteering patterns, both Increased hours and Same hours have significantly more positive effects on self-rated health outcomes than No hours. Also, Same hours has larger odds ratios than Increased hours in both models (Table 2 and Table 4), though the differences between these two patterns are non-significant<sup>2</sup>.

It is important to note that although Same hours assumes that volunteers did not change their hours across two waves, we actually do not know exactly whether this “no change” is literally true because the volunteering hour index in the ACL study recorded ranges of hours

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<sup>1</sup> I re-ran the models (not shown here) for both prospective self-rated health and changes in self-rated health regressed on volunteering hour patterns separately by choosing Early hours as the reference category and did not find that the odds ratios for Late hours were significant.

<sup>2</sup> I re-ran the models (not shown here) for both prospective self-rated health and changes in self-rated health regressed on volunteering hour patterns separately by choosing Same hours as the reference category and did not find that the odds ratios of Increased hours were significant.



instead of specific numbers. For example, if a respondent reported 20 hours of volunteering at wave one and 39 hours at wave two, these two numbers both belonged in the second category (20-39) and would be coded as the midpoint of 30. In this case, volunteering hours actually increased from 20 to 39 but this respondent was treated as a member of Same hours instead of the Increased hours group. Therefore, despite the fact that Same hours has the largest odds ratios among all volunteering hour patterns in both models for self-rated health, it is unclear whether these effects can be primarily attributed to slight increases, decreases or exact no changes in volunteering hours. However, both for prospective self-rated health and changes in self-rated health, Increased hours has significantly more positive benefits than no volunteering while Decreased hours does not. Thus, it is reasonable to assume that slight increases in hours may play an important role in Same hours' significant relationships to self-rated health. However, when I re-ran the models (not shown here) for both prospective self-rated health and changes in self-rated health regressed on volunteering hour patterns separately by choosing Decreased hours as the reference category, I did not find that the odds ratios of Increased hours were significant. So future research is needed to further explore whether slight increases, slight decreases, or no adjustment in volunteering hours over time will benefit volunteers' health more.

In addition, among volunteering hour patterns, Same hours has the largest odds ratios in both models for self-rated health, generally consistent with previous studies that found a curvilinear relationship between volunteering hours and self-rated health (Lum & Lightfoot, 2005; Luoh & Herzog, 2002; Morrow-Howell et al., 2003; Van Willigen, 2000). In other words, although those studies did not examine longitudinal patterns of volunteering, similar to their

results, my finding regarding Same hours supports both the role enhancement and role strain theoretical perspectives: keeping the same hours or approximately the same hours of volunteering over appears to benefit volunteers' health more. As mentioned before, the beneficial effects of Same hours are not significantly larger than those of Increased hours when Same hours was used as the reference category in both models for self-rated health. Nonetheless, the large odds ratios of Same hours imply that more attention should be paid to stable volunteering. For example, a longer period of stable volunteering may be required to observe its significantly more positive effects on health than other persistent volunteering patterns (e.g., Increased hours). Maybe future research will provide the answer.

The findings about volunteering hour patterns and self-rated health also provide evidence for the role context perspective that stresses heterogeneous relationships between volunteering and health. After adjusting potentially confounding variables including sociodemographic characteristics, socioeconomic status, social roles, social integration and health-related indicators, the effects of six volunteering hour patterns on self-rated health differed, suggesting that different social or individual contexts may affect the relationships between volunteering and health in different ways for different volunteers.

Similar to the second hypothesis, the third hypothesis, that patterns with increases in volunteering types will predict better self-rated health than no volunteering, has been partly supported. Like Early hours and Late hours, Early type and Late type represent decreasing types to 0 and increasing types from 0 to a certain number across two waves. But in terms of both prospective self-rated health and changes in self-rated health, the effects of these two patterns are not significant compared to no volunteering. This result appears to be inconsistent with the

finding by Fothergill et al. (2011) that late community engagement has significant positive effects on self-rated health relative to no engagement. This disparity in findings may primarily stem from different sample composition and independent variables. The sample used by Fothergill and her colleagues consisted of African American Women only and their independent variable—community engagement—was measured by participation in church or clubs, which are both different from the corresponding elements of my study.

Moreover, the effects of these two patterns-- Early hours and Late hours--do not significantly differ<sup>3</sup>. In contrast, all three persistent volunteering type patterns—Decreased type, Increased type and Same type--are significant predictors of high prospective self-rated health and a slower decline in self-rated health relative to no volunteering. These results are inconsistent with the study by Morrow-Howell et al. (2003), who did not find a significant relationship between volunteering diversity (number of volunteering organizations) and self-rated health. This disparity in findings may be mainly attributable to the differences in the ways of examining volunteering: absolute type number versus disaggregated type patterns. These inconsistent findings also strengthen the importance of disaggregating volunteering diversity in future research.

However, for both aspects of self-rated health, the sizes of the odds ratios differ. For prospective self-rated health, the odds ratio of Increased Type is lowest among the three while that of Same type is the highest. As for the changes in self-rated health, Increased type has the lowest odds ratio, Decreased type has the largest odds ratio, and Same hour is in between.

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<sup>3</sup> I re-ran the models (not shown here) for both prospective self-rated health and changes in self-rated health regressed on volunteering type patterns separately by choosing Early type as the reference category and did not find that the odds ratios of Late type were significant.

Similar to the results for volunteering hour patterns, these results also support the role enhancement, role strain and role context perspectives. However, when each of these three persistent volunteering type patterns were treated as the reference category in both models predicting self-rated health (not shown here), no pattern significantly differed from the other two patterns. It also is possible that more waves of data are needed to detect significantly different effects across these three patterns. Hence, future studies of disaggregated persistent volunteering type patterns are promising.

Unlike the volunteering hour indexes in the ACL study, volunteering type indexes measure the exact numbers of volunteering organizations reported by respondents. So Same type denotes no change in the number of the volunteering organizations over time. However, it is also worth noting that specific types of volunteering may change (e.g., educational organization at time one and religious organization at time two), though the total number of types remains the same. Although Morrow-Howell et al. (2003) did not find significantly different effects across volunteering types on self-rated health, we do not know whether changes in type number over time for different type combinations (e.g., religious and secular types vs. only secular types) exert diverse effects on health. In addition, according to the results in present study, we can see that volunteering hour patterns and volunteering type patterns differ in their relationships to self-rated health. Thus, given the focus on intensity in previous research, more studies are required to examine the role played by the diversity or relative diversity (combining diversity and consistency) in the associations between volunteering and health.

It is interesting that all three hypotheses in this research are only partially supported by the findings. Because of the three major novel properties of this study mentioned above, I could not find many clues from previous studies about proposing hypotheses. Hence, more studies are needed to pay attention to the heterogeneity within volunteers and thus to further explore the relationships between disaggregated patterns of volunteering and health especially when dynamics of intensity and diversity are considered.

In addition to the findings and strengths of this research, some major limitations should also be emphasized here. First, as mentioned several times, longer periods of study (e.g., more waves of data) may be better than two waves of data. However, attrition is another issue that complicates longitudinal studies. The more waves of data that are collected over long periods of time, the greater the attrition. Nonetheless, attrition is also a potential issue in my study. For example, in the two models predicting prospective self-rated health (Table 2 and Table 3), age squared terms are significant. It may be that older respondents were more likely to die than younger adults, resulting in high odds of high self-rated health among survivors. Thus, future studies should try to balance the length of data collection and attrition.

The second limitation is also related to time: my study did not examine cohort differences or compare life stages. Hence, my study did not examine whether relationships between volunteering and health differ across life stages. In contrast, some previous studies compared older and younger cohorts (Kim & Pai, 2010; Li & Ferraro, 2006; Musick & Wilson, 2003; Van Willigen, 2000). For example, Van Willigen (2000) investigated whether older volunteers (aged 60 or older) benefit more from volunteering than younger volunteers (less than 60). She found that older adults experienced greater positive changes in both life-

satisfaction and self-reported health than their younger counterparts, partly because older people were more likely to participate in types of volunteering (e.g., church-based volunteering) that had a more beneficial influence on well-being than volunteering for other kinds of organizations. This kind of study raises the question of whether the relationship between disaggregated patterns of volunteering and health differ across age cohorts. Also, it is important to note that from the life course perspective, these studies with age group comparisons primarily examined cohort effects (between individuals) rather than aging effects (within individuals). However, they are important for understanding individuals' lives over the life course (Elder, Jr & George, 2016; Yang, 2010). Hence, future studies also need to explore both cohort differences and age changes, especially when heterogeneity of volunteers and dynamics of volunteering over time are considered.

Third, like many other longitudinal studies on the associations between volunteering and health, my research also faces the issue of social causation (roles affect health) versus social selection (health affects roles) (Verbrugge, 1983, p. 26). Although in the models examining the effects of volunteering patterns on changes in self-rated health, previous health predictors including baseline self-rated health were included, I did not specifically explore possible social selection processes. Some studies on volunteering and health examined both social causation and selection and found reciprocal links (Li & Ferraro, 2005; Luoh & Herzog, 2002; Thoits & Hewitt, 2001). For example, Thoits and Hewitt (2001) found that volunteering enhanced multiple aspects of well-being and people with higher levels of well-being invested more hours in volunteering. Given the heterogeneity of volunteering, future investigations of

whether health affects people's choices of diverse volunteering patterns and how choices change over the life course are needed.

However, the distinction between social causation and social selection may be less important because these two processes probably happen simultaneously and interactively. Thus a dynamic approach to studying social integration and health is required (Moen et al., 1992, p. 1613). Importantly, with three or more waves of data, trajectory analysis can be utilized for future studies to explore the interplay between trajectories of disaggregated volunteering patterns and health.

Fourth, although the results show that diverse volunteering patterns have differential effects on self-rated health, the mechanisms through which these different effects occur are unclear. For example, we do not know why in terms of prospective self-rated health and changes in self-rated health, Decreased type and Same type have larger odds ratios than other volunteering patterns. It might be the case that when volunteers became more experienced, they gradually concentrated on organizations in which they had stronger intrinsic interest (Musick et al., 1999, p. S179) or that they found more rewarding. With regard to the Same type group, it is possible that stable volunteering provided them with a regular schedule and rewarding social relationships that were beneficial to their well-being and health. It is also possible that at the individual level, each person has an upper limit on how much they can engage in volunteering. Hence, for some respondents, Same type/hours may represent the maximum that they could handle and it was unrealistic to expect that they would increase over time beyond that point. But stabilizing their commitment to volunteering over time would be

expected to benefit their health. However, all of these conjectures and other unknown mechanisms are waiting for evidence from future empirical studies.

Fifth, only one health outcome—self-rated health—was used as dependent variable in this study, although it is a reliable measure of health, as mentioned earlier. However, some studies examined the effects of volunteering not only on self-rated health but also on other measures of well-being or health and did find that volunteering affected health outcomes differently. (Lum & Lightfoot, 2005; Luoh & Herzog, 2002; Piliavin & Siegl, 2007; Van Willigen, 2000). Based on these studies, it is worth examining the effects of disaggregated volunteering patterns on other well-being or health outcomes (e.g., mortality, depression, life-satisfaction).

Apart from these five limitations, several other issues are worth noting. It should be noted that relative to classical experiments, observational studies like mine are less than perfect in terms of examining causal relationships. It is possible that some other confounding variables were ignored by my models, which might influence the validity of my results. Also, when respondents answered the survey questions, it was unclear whether they answered the questions accurately, especially for variables that required them to recall experiences during the past year such as the volunteering indexes. So concerns about accurate recall are legitimate. However, just because of these issues, future surveys or studies with better designs are needed. Nonetheless, it will never be possible to randomly assign study participants to volunteering hours or types. Thus, as in most studies of social factors and health, observational studies will remain the norm and the most important aspect of analysis is to control for as many potentially confounding variables as possible.



In conclusion, evidence in this current work supports the notion that volunteering is beneficial to volunteers' health. Using two-wave data from the American's Changing Lives study, I examined the effects of disaggregated volunteering patterns on self-rated health by combining consistency with both intensity and diversity, which has not been done in previous studies. Although all three hypotheses were not fully supported, I did find differential effects of volunteering patterns on health. Future studies with longer periods of time and better measurements are needed to explore more about the heterogeneity across volunteers and the associations between dynamics of disaggregated volunteering patterns and health over the life course. Also in this field, some important issues require further exploration such as cohort differences and aging effects, mechanisms, bi-directional causation and the relationships of volunteering to other well-being or health outcomes. Despite its limitations, this research is meaningful not only in terms of its unique contributions to the academic community, but also in its implications for the real world. In a so called era of decline in social capital, when more knowledge about the beneficial effects of volunteering is obtained, volunteering as a great way of social integration to connect people may be more easily accepted by the public because this engagement benefits both others and volunteers themselves. Hence, the knowledge from my study further answers the question about how to resolve the paradox between individualism and altruism (Wuthnow, 1991, p. 17).

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