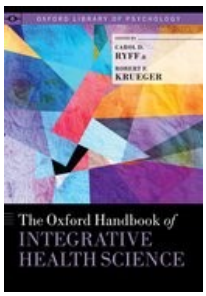


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CHAPTER

# 14 Social Capital, Altruistic Behavior, and Mental Health

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## Abstract

Social capital matters for health, but issues of causal directionality and underlying mechanisms are not well understood. It is widely known that receiving social support is good for health, although few studies have investigated the impact of showing caring, altruistic behaviors on health of the provider. Further, as the family is a core component of society, altruistic behaviors toward children may be a unique context for evaluating the impact of such caring on the mental health of parents. This chapter provides a brief overview of prior research on social capital, altruism, and health. It then describes a series of studies conducted with the Midlife in the United States data set, including longitudinal and twin analyses, to examine the impact of altruistic behaviors on various mental health outcomes. The impact of altruistic behaviors toward children on the mental health of parents and grandparents is also considered. The chapter concludes with suggested directions for future research.

**Keywords:** health, altruistic behavior, children, mental health, parents, social capital, altruism, MIDUS, grandparents

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## Introduction

An African proverb states, "It takes a village to raise a child." This is an expression of the importance of social capital or surrounding resources and how they matter for health from the early stage of life and across the life course. From a scientific perspective, it is unclear which components of social capital are beneficial for which aspects of health. Whether relationships between social capital and health are unidirectional or bidirectional is also an important question. Although it is widely known that receiving social support is good for health, few studies have investigated the impact of altruistic behaviors (giving to others) on the health of the provider. The overarching idea behind this chapter is that providing social support or altruistic behaviors toward others may benefit the mental and physical health of the provider.

The chapter is organized into three primary sections. The first provides an overview of prior research on social capital and health to situate the studies that follow in a larger context. The second section reviews findings from four investigations from the Midlife in the United States (MIDUS) study that have linked various cognitive (trust, sense of belonging, mutual aid) and structural (volunteer work, community participation) social capital to diverse mental (anxiety, depression) and physical health assessments. These studies exploited the richness of the longitudinal data as well as the twin subsample. Two additional studies explored links between altruistic behaviors and sense of obligation to children on the mental health of parents and grandparents. The third section of the chapter considers directions for future research linking social capital and altruistic behaviors to health.

## Background Literature on Social Capital and Health

*Social capital* refers to resources accessed by individuals and groups within a social structure that facilitate
p. 192 cooperation, collective action, and the ↳ maintenance of norms (Kawachi, 2006). In health research, social capital has been measured by multiple indicators, such as levels of interpersonal trust, the presence of reciprocal exchanges between citizens, and membership in civic organizations (Veenstra et al., 2005). Further, social capital can be measured at the community and individual levels (Kawachi, 2006), and to date, numerous studies reported the robust association between social capital and health, including self-rated health in a quasi-experimental intervention study in Japan (Ichida et al., 2013), mental health in systematic review (Ehsan & De Silva, 2015), or mortality in an ecological study (Kawachi, Kennedy, Lochner, & Prothrow-Stith, 1997) and a longitudinal study (Aida et al., 2011).

As the science has progressed, dimensions of social capital have been elaborated, such as cognitive perceptions (De Silva et al., 2006) and structural social factors (Harpham, Grant, & Thomas, 2002; Mitchell & Bossert, 2007). Cognitive dimensions of social capital include perceptions of trust, as well as beliefs about the extent to which neighbors can be called on to provide social support, while structural dimensions of social capital include actual behaviors, such as participating in locally based associations (Harpham et al., 2002). For example, a recent review reported that cognitive social capital, rather than structural social capital, showed robust benefits for common mental disorders (Ehsan & De Silva, 2015).

The differential impact of two dimensions of social capital on mental health is important because policy implications on how to boost social capital may differ. Such differences may be due to directionality of social support, that is, providing to others or receiving from others. Cognitive social capital, for example, might be more likely to involve receiving from others because people may recognize neighbors through receiving social support, which in turn can bring trust. Structural social capital, in contrast, may be composed more from providing to others, or engaging in altruistic behaviors, perhaps because structural social capital induces obligations to contribute to others (Sakuraya et al., 2017). To date, few studies have investigated the impact of altruistic behavior on health.

## Altruistic Behavior Toward Others and Health

*Altruistic behavior* is defined as "behavior intended to benefit another, even when this risks possible sacrifice to the welfare of the actor" (Monroe, 1996, p. 6). However, a key component of social capital involves reciprocal norms within the community, such that social capital for individuals can be decomposed into receiving social support from others and providing social support to others, as via altruistic behaviors. Multiple studies have reported that receiving social support is protective for health (Berkman & Syme, 1979), but the impact of providing social support is poorly investigated (Liao et al., 2015; Schwartz, Meisenhelder, Ma, & Reed, 2003). Schwartz et al. (2003) found a positive and significant association between altruistic behaviors and mental health. Specifically, providing social support was a more important predictor of mental health outcomes than receiving social support in the United States, suggesting that altruistic behaviors may more effectively protect against mental health disorders than receiving social support. Liao et al. (2015) also reported that providing social support extended the length of life among the elderly givers with low educational levels in Taiwan.

How then can altruistic behaviors have positive health outcomes for the provider? One possible pathway is through positive emotions, which might be promoted by altruistic behavior. According to positive psychology, defined as the "scientific study of ordinary human strengths and virtues" (Sheldon & King, 2001, p. 216), positive emotion is associated with mental and physical health (Salovey, Rothman, Detweiler, & Steward, 2000; Seligman & Csikszentmihalyi, 2000; Taylor, Kemeny, Reed, Bower, & Gruenewald, 2000). Therefore, it is hypothesized that altruistic behaviors may prevent onset of mental disorders such as anxiety disorder or depression. On the other hand, the actor of altruistic behavior might feel stressed when the sacrifice of the actor is too large.

Beyond altruistic behaviors toward others in general, there is also growing interest more targeted studies focused on altruistic behaviors from parents toward their children and consider implications for the mental health of parents. These are discussed in the next section.

## Altruistic Behaviors Toward Children: Implications for Parental Mental Health

As the science of social capital and health progresses, it is important to consider the specific contexts in which altruistic behaviors are expressed. One notable context is the family. That is, altruistic behaviors toward children or grandchildren might be genetically programmed and have survival value for offspring,
p. 193 but along the way, such ↳ behaviors may also have an impact on the health of parents and grandparents. However, few studies have investigated the impact of altruistic behaviors toward children.

Previous research has shown that adults who have children, especially mothers, report more psychological distress than childless adults (Hope, Rodgers, & Power, 1999), but these studies may be biased toward stressful parenting. More specifically, parents who have ill or young children tend to develop mental disorders (Raina et al., 2004). Further, in the aging society, family assistance flows from parents to adult children (Soldo & Hill, 1993); grandparents assume the responsibility of raising grandchildren in response to their adult child's illness, financial need, divorce, or work commitment (Goodman & Silverstein, 2002; Musil & Ahmad, 2002), and a growing number of adults take care of grandchildren. Research has also shown that caregiving for grandchildren may deteriorate the mental health of grandparents (Blustein, Chan, & Guanais, 2004).

Alternatively, some research has suggested that parenting benefits the health of parents, as parents are able to obtain rewards through the fulfillment received from caregiving (Schwartz & Gidron, 2002). In addition, some research suggests that caregiving is beneficial for caregivers' health, as caregivers are able to obtain rewards and fulfillment through caregiving (Pruchno & McKenney, 2002).

The impacts of altruistic behavior toward children and grandchildren on the mental health of parents/grandparents might vary due to differences in the sense of obligation to children and grandchildren: Mothers/grandmothers tend to have a high sense of obligation to children, while fathers/grandfathers may have a lower sense of obligation to children (Rossi, 2001). Thus, we hypothesized that the interaction between sense of obligation to children and altruistic behavior for children might have different associations with psychiatric morbidity among caregivers. The interaction can be investigated by stratification of the caregivers dichotomized on sense of obligation and altruistic behavior. First, some may not have a high sense of obligation but nonetheless show high altruistic behaviors because they are motivated by altruistic concerns. Second, those who have a high sense of obligation but are not providing altruistic behavior may feel guilty (guilt group). Third, those who have a high sense of obligation and provide altruistic behavior might have a kind a kind of preoccupation to provide altruistic behavior based on their sense of obligation, regardless of whether children or grandchildren are asking them for something or whether they consider their altruistic behavior as sufficient (obsession model). Finally, those who have a low sense of obligation and low altruistic behavior can be construed as the reference group. By comparing these four groups, the interaction effect of sense of obligation and altruistic behavior on mental health of caregivers can be investigated.

In summary, the issues of causal directionality in studies of social capital and health, including which dimension of (cognitive or structural) social capital matters for health and whether altruistic behaviors toward others or children/grandchildren have an impact on mental health, remain unclear and call for additional inquiries that utilize longitudinal designs. In addition, unmeasured confounders such as genetic factors or early life environment conditions, which may determine health behaviors and social activities, need to be addressed. To address these limitations, refined study designs need to be advanced, such as fixed-effect models using twin samples that can take into account the effect of genetic and early life environment. Thus, studying twins discordant for social capital offers a unique opportunity to determine whether the associations between social capital and health outcomes are consistent after addressing unknown predisposing factors.

## Findings From MIDUS

To elucidate the association between social capital and altruistic behaviors, including parenting altruism and health, especially mental health, six studies were performed using different features of MIDUS data. First, altruistic behaviors and mental health were examined with cross-sectional data, second, it was expanded with longitudinal data, and third, types of social capital and mental health were investigated. A fourth twin study was then investigated to show more robust causal association between social capital and health. Fifth, altruistic behaviors toward children/grandparents were investigated; sixth, these analyses were expanded to incorporate longitudinal data.

### Altruistic Behaviors and Mental Health (Cross-Sectional Analyses)

Using MIDUS cross-sectional data ($N$ = 4,242), associations between altruistic behaviors and mental health were examined (Fujiwara, 2007). The focus was on generalized anxiety disorder and major depression, as
p. 194 measured by telephone on the basis of ↳ the Composite International Diagnostic Interview Short Form (CIDI-SF) (Fujiwara, 2007).

In this study, altruistic behavior was calculated as the sum of scored responses to four hypothetical questions (Rossi, 2004). Respondents rated the degree of obligation they would feel if asked to (a) pay more for their own healthcare so that everyone had access to healthcare; (b) volunteer time or money for the social causes that they support; (c) collect contributions for heart or cancer research if asked to do so; and

(d) vote for a law to help others who are less privileged than them knowing that the introduction of such a law would increase their taxes. Responses to each question were scaled from 0 to 10, with 10 denoting the highest degree of altruistic behavior, for a maximum score of 40.

Altruistic behaviors tended toward a protective effect on generalized anxiety disorder, but it was not statistically significant. In multiple logistic regression analysis that adjusted for gender, age, working status, and marital status, a weak protective effect on the lower intermediate altruistic behaviors group was observed ($p < .1$). In contrast, for major depression, an adverse effect of altruistic behavior was observed: The shift of one quartile to a higher altruistic behaviors quartile group increased the odds of major depression by 14%. The association became stronger and increased to 16% when gender, age, working status, and marital status were adjusted. More specifically, the highest altruistic behaviors group was 1.59 times more likely to have major depression than the lowest altruistic behaviors group (95% confidence interval [CI] [1.07, 2.38]).

Such findings suggest that altruistic behaviors may tend toward lower levels of generalized anxiety disorder but, alternatively, constitute a risk factor for experiencing major depression. The mechanism by which the differential effect of altruistic behavior acts on generalized anxiety disorder and major depression is unknown. Possibly, altruistic behavior may increase the risk of major depression, perhaps because it is stressful. Alternatively, people with high altruistic behavior may feel that they are not doing enough for others compared with their expectation.

## Altruistic Behaviors and Major Depression (Longitudinal Design)

As the preceding cross-sectional study may be biased by reverse causation (i.e., mental health status leads to altruistic behavior), the association needed to be confirmed using data from a longitudinal design. Thus, the MIDUS longitudinal study (a nationally representative sample of 724 English-speaking, noninstitutionalized adults aged 25–74 years old who participated in the MIDUS study in 1995–1996 and the MIDUS Psychological Experience Follow-Up study in 1998) data were analyzed (weighted $N = 563$) (Fujiwara, 2009). In this study, in contrast to a previous study (Fujiwara, 2007), altruistic behaviors were measured as actual behavior via a questionnaire in three domains: unpaid assistance, emotional support, and financial support. Information was obtained on the frequency of each behavior per month. Unpaid assistance was assessed by asking the following question: "On average, about how many hours per month do you spend providing unpaid assistance, such as help around the house, transportation, or child care, to anyone else other than family members or close friends?" Emotional support was assessed by the following question: "On average, about how many hours per month do you spend giving informal emotional support, such as comforting, listening to problems, or giving advice to anyone else other than family members or close friends?" For the question of unpaid assistance and emotional support, respondents answered in terms of number of hours. Financial support was measured by the following question: "On average, about how many dollars per month do you or your family living with you contribute to any individuals other than family members or close friends, including people on the street asking for money? If you contribute food, clothing or other goods, include their dollar value." Respondents answered in terms of amount of dollars. Based on distribution, unpaid assistance was categorized as 0, 1–2, and 3 or more hours/month; emotional support was categorized as 0, 1–4, and 5 or more hours/month; and financial support was divided into $0, $1–$9, and $10 or more per month. Major depression was assessed in both the original and follow-up study using the CIDI-SF.

Results showed that unpaid assistance, emotional support, and financial support were not associated with major depression in an unadjusted model. However, in an adjusted model, financial support was significantly associated with major depression onset: Those who provided $10 or more /month to anyone else other than family member or close friends were 2.6 times significantly more likely to develop major

depression in 2–3 years (odds ratio [OR] 2.64, 95% CI [1.05, 6.62]). Unpaid assistance was not associated with major depression onset in an adjusted model, although a point estimate showed a protective direction:
p. 195 Providing unpaid assistance of 3 or more hours showed an OR of ↳ 0.38 (95% CI [0.12, 1.16]) in comparison with the group not providing unpaid assistance. Emotional support was not associated with major depression onset, although a point estimate showed a harmful direction: The group providing emotional support for 5 or more hours showed an OR of 2.04 (95% CI [0.83, 5.03]) in comparison with the group not providing emotional support.

Thus, the findings suggested that the effect of altruistic behavior on the development of major depression varied by type of altruistic behavior. Financial and emotional support were harmful in terms of major depression onset, while unpaid assistance may have worked as a protective factor.

## Cognitive and Structural Social Capital and Mental Health (Longitudinal Analyses)

The association between social capital and mental health was further investigated using MIDUS longitudinal data (weighted *N* = 563) (Fujiwara & Kawachi, 2008). Major depression, the mental health outcome, was again measured by the CIDI-SF. Social capital, however, was assessed within both cognitive and structural domains. Cognitive social capital indicators included social trust, sense of belonging, and mutual aid. Social trust was assessed with a single item: "People in my neighborhood trust each other" with Likert-scale responses ranging from *not at all, a little, some*, and *a lot*. Sense of belonging was a three-item scale derived as the weighted average of responses to the following items: (a) "I don't feel I belong to anything I'd call a community," (b) "I feel close to other people in my community," and (c) "My community is a source of comfort." Responses to each question were recorded on a 7-point Likert scale, with higher scores denoting a higher sense of belonging.

As the resulting sense of belonging index was relatively normally distributed, we analyzed it as tertiles (high, medium, and low). The internal consistency reliability of the sense of belonging index was acceptable (Cronbach $\alpha$ = .73). Mutual aid was a three-item index calculated as the weighted mean of the following three statements: (a) "People who do a favor expect nothing in return"; (b) "People do not care about other people's problems"; and (c) "I believe that people are kind." Responses were scaled 1 to 7, with higher scores denoting higher perceptions of mutual aid. The internal consistency reliability of the mutual aid scale was not as high (Cronbach $\alpha$ = .42). The mutual aid scale was also categorized into tertiles.

Structural social capital was assessed by inquiring about volunteer work and community participation. Volunteer work was calculated as the sum of reported hours per month in volunteer work at a hospital, nursing home, or other health-related settings; school or other youth-related activities; political organizations or causes; or any other local organizations or charity. Based on the distribution of responses, volunteer work was categorized into three groups: no volunteer work, volunteering 1–9 hours per month, and volunteering 10 or more hours per month. Community participation was calculated as the sum of reported frequency of participation per month in religious services, meetings of religious groups, meetings of unions or other professional groups, meetings of sports or social groups, or meetings of any other groups (not including those required by the respondent's job). Based on the distribution of responses, community participation was categorized into four groups: no participation, participation one–three times per month, participation four–seven times per month, and participation eight or more times per month.

Results in the multivariate adjusted model showed that major depression was significantly associated with social trust and sense of belonging. Even after controlling for baseline major depression; socioeconomic status (education, working status); and other covariates (gender, age, race, marital status), high levels of social trust were associated with an OR of major depression of 0.44 (95% CI [0.20, 0.95]) compared to low

levels of trust. The corresponding OR for high versus low sense of belonging was 0.49 (95% CI [0.24, 0.99]), with a trend *p* of .045. In the model further adjusting for baseline physical health status and the trait of extraversion, the association between trust and major depression remained significant (OR = 0.43, 95% CI [0.20, 0.93]). The *p* value for trend across categories of trust was .036, suggesting a "dose–response" effect. However, the association between sense of belonging and major depression became statistically nonsignificant. No associations were found between mutual aid and major depression or between the structural dimensions of social capital and major depression.

As a further robustness check, we repeated the analyses after excluding those who reported major depression at baseline. In the fully adjusted model, the point estimates of the OR for high social trust in comparison with low social trust was 0.46, although not significant (95% CI [0.18, 1.15], weighted *N* = 544).
p. 196 Similarly, sense of belonging ↳ was marginally associated with major depression; the point estimate of the OR for the high sense of belonging group in comparison with those with a low sense of belonging was 0.45 (95% CI [0.19, 1.02], weighted *N* = 546). The findings suggested a marginally significant dose–response relation (0.057). Other social capital variables were not associated with major depression.

Thus, using the MIDUS longitudinal data, perceptions of higher levels of cognitive social capital (trust of neighbors) were associated with lower risk of developing major depression 2–3 years later. However, after excluding participants with major depression at the baseline, the association between trust and major depression became nonsignificant. Structural dimensions were not associated with major depression.

## Social Capital and Health (Twin Study)

To sharpen understanding of the causal association between social capital and health, the MIDUS twin sample, with 944 twin pairs (37.2% monozygotic [MZ] and 62.8% dizygotic [DZ)]) was used (Fujiwara & Kawachi, 2008). Fixed-effects regression was used to examine health status (perceived physical and mental health and major depression) among twin pairs who were discordant on levels of social capital (social trust, sense of belonging, volunteer activity, and community participation).

In MZ twins, social trust was significantly positively associated with perceived physical health after considering unknown predisposing factors shared within twin pairs, such as genetic and early family environment ($\beta$ = .183, 95% CI [0.038, 0.327]). In DZ twins, the association was also significant ($\beta$ = .148, 95% CI [0.027, 0.270]). However, none of the remaining indicators of social capital (sense of belonging, volunteer activity, or community participation) were associated with perceived physical health among MZ or DZ twins.

With regard to perceived mental health, among DZ twins, a significant association was found between sense of belonging ($\beta$ = .148, 95% CI [0.034, 0.261]), while a marginally significant association was found with social trust ($p < .1$; $\beta$ = .104, 95% CI [-0.015, 0.222]). However, no significant association was found among MZ twins. The number of depressive symptoms was significantly associated with sense of belonging and community participation in DZ twins ($\beta$ = -0.240, 95% CI [-0.476, -0.004]; $\beta$ = -.161, 95% CI [-0.321, -0.0004], respectively). Similar to perceived mental health, no significant association was found among MZ twins. Major depression was not associated with social capital measurements in either MZ or DZ twins.

The results of fixed-effects models among twins thus suggested that the association between social capital and physical health status is not explained by unobserved confounds, such as personality or early childhood environment.

## Altruistic Behaviors Toward Children and Health (Interaction Effect With Sense of Obligation)

To investigate how altruistic behavior for children might affect the mental health of providers, we examined the MIDUS cross-sectional sample that was limited to those who had children or grandchildren (*N* =2,193; 1,162 women and 1,031 men). Further, the sample was stratified into four groups (motivated, obsession, guilt, and reference) using both altruistic behaviors and sense of obligation (Fujiwara & C. Lee, 2008).

Again, altruistic behaviors for children were measured by a mail-in questionnaire in three dimensions: informal assistance, emotional support, and financial support. Sense of obligation was assessed by a mail-in questionnaire using the following three questions: "How much obligation do you feel if the following hypothetical situations happened to you: (1) to drop your plans when your children seem very troubled; (2) to call, write, or visit your adult children on a regular basis; and (3) to take your divorced or unemployed adult child back into your home." Respondents answered by a 0–10 Likert scale (0 denoted lowest degree of care and 10 denoted highest degree of obligation). These questions were used as part of a scale of family obligation in previous studies (Grzywacz & Marks, 1999).

Among women, high sense of obligation with no informal assistance group (guilt group), low and high informal assistance, emotional, and financial assistance groups (obsession group) were associated with major depression; however, low sense of obligation with high informal assistance groups (motivated group) was not associated with major depression, suggesting that altruistic behavior is not a risk factor for major depression, but sense of obligation matters for major depression. These groups' data were not statistically significant for generalized anxiety disorders.

p. 197 Among men, high sense of obligation with high informal assistance groups (obsession group) was ↳ highly associated with generalized anxiety disorder. Similarly, those with a high sense of obligation and providing high financial support (obsession group) were about 15 times more likely to have generalized anxiety disorder after adjusting for covariates. These groups were not statistically significant for major depression.

In summary, among women, altruistic behavior toward children showed higher risk of depression only if sense of obligation was high. Similarly, men with high altruistic behavior and high sense of obligation showed higher risk on generalized anxiety disorder. These findings suggest that altruistic behavior toward children may have a negative impact on the mental health of caregiver, although reverse causation may explain the association.

## Altruistic Behaviors Toward Children and Health (Longitudinal Analyses)

Building on the findings given previously, the associations between three types of altruistic behavior for children or grandchildren (informal assistance, emotional support, financial support) were assessed using MIDUS longitudinal data (*N* = 724) (Fujiwara & C. K. Lee, 2008). In this study, altruistic behavior for children was assessed as self-reported behaviors per month by mail-in questionnaire in three dimensions: informal assistance, emotional support, and financial support. Major depression was assessed by the CIDI-SF in both the baseline and the follow-up study.

Overall, altruistic behavior toward children was not associated with major depression among women. However, men who provided shorter informal assistance (1–10 hours/month) were 72% less likely to have major depression in 2–3 years. Financial supportive behavior also had a protective effect on major depression: Men who gave $1–$50 per month were 96% less likely to have major depression 2–3 years later. Interestingly, a dose–response result was not observed for both altruistic behavior (i.e., informal assistance and financial support) toward children: fathers who provide longer informal assistance (11+ hours/month) and higher amounts of financial support ($51 or more/month) were not significantly

associated with major depression. On the contrary, longer emotional support (13+ hours/month) by men had a harmful effect, as they were approximately three times more likely to develop major depression (crude OR 3.16, 95% CI [1.18, 8.48]). However, this association became nonsignificant after adjusting for children's covariates (OR 2.52, 95% CI [0.68, 9.33]).

In summary, among fathers/grandfathers, providing a moderate amount of informal assistance or financial support toward children/grandchildren, but not emotional support, had a protective effect on the onset of major depression, while the same was not true among mothers/grandmothers. The gender difference on the protective effect of altruistic behaviors toward children on major depression may provide insight into underlying mechanisms in the development of major depression, known to be more common among women. That is, if altruistic behavior toward children is seen as a kind of normative (expected) behavior (Eagly, 1997), particularly for women, it may not be protective against experiencing major depression. However, in situations in which such behaviors are not construed as a social norm and therefore expected, such as for men, moderate altruistic behaviors toward children may have a protective effect against onset of major depression.

## Conclusion and Future Directions

Whether social capital is causally associated with mental health is difficult to establish. Data from longitudinal studies as well as evidence from twin samples can help in the effort to establish causal directionality. To elucidate a possible mechanism, we hypothesized that one component of social capital, altruistic behavior, may have beneficial effects on health, but failed to show the association or even showed a harmful effect on mental health, especially for major depression. That is, sense of obligation might be provoked due to social capital (known as the dark side of social capital), which can be harmful. The gender difference on the association between altruistic behavior toward children and major depression may support the explanation. That is, the protective effect of altruistic behavior on major depression was found only among men, but not among women. Further research is needed to show how a sense of obligation toward neighbors might illustrate a contextual effect of social capital.

It is important for future studies to elucidate the mechanism through which altruism might affect health. For example, it would be beneficial to analyze whether positive emotions or well-being mediate the links between social capital, altruism, and health. Investigating how social capital or altruistic behavior has an effect on health via biological pathways could be another possible future direction, focusing on behavior-related hormones, such as oxytocin (Fujiwara, Kubzansky, Matsumoto, & Kawachi, 2012), or inflammation
p. 198 biomarkers ↳ such as C-reactive protein (Holmes & Marcelli, 2012). In addition to elaborating mediators, future investigations on the differential impact among social subgroups of the association between social capital, altruism, and health would be of interest. For example, gender, socioeconomic status, majority/minority status, or cultural context such as that of the United States and Japan might show different associations, which would deepen understanding of the association between social capital, altruism, and health. Another possibly interesting direction is to examine whether the association between social capital, altruistic behaviors, and health becomes more or less pronounced during periods of major economic hardship, such as the Great Recession, or during natural disasters such as the great east Japan earthquake. MIDUS data, in addition to data from the Midlife in Japan study, offer useful platforms to examine these future research questions.

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