



The balance of giving versus receiving social support and all-cause mortality in a US national sample

Edith Chen^{a,b,1}, Phoebe H. Lam^{a,b}, Eric D. Finegood^{a,b}, Nicholas A. Turiano^c, Daniel K. Mroczek^{b,d}, and Gregory E. Miller^{a,b}

^aInstitute for Policy Research, Northwestern University, Evanston, IL 60208; ^bDepartment of Psychology, Northwestern University, Evanston, IL 60208; ^cDepartment of Psychology, West Virginia University, Morgantown, WV 26506; and ^dFeinberg School of Medicine, Department of Medical Social Sciences, Northwestern University, Chicago, IL 60611

Edited by Timothy D. Wilson, University of Virginia, Charlottesville, VA, and approved April 22, 2021 (received for review December 1, 2020)

While numerous studies exist on the benefits of social support (both receiving and giving), little research exists on how the balance between the support that individuals regularly give versus that which they receive from others relates to physical health. In a US national sample of 6,325 adults from the National Survey of Midlife Development in the United States, participants were assessed at baseline on hours of social support given and received on a monthly basis, with all-cause mortality data collected from the National Death Index over a 23-y follow-up period. Participants who were relatively balanced in the support they gave compared to what they received had a lower risk of all-cause mortality than those who either disproportionately received support from others (e.g., received more hours of support than they gave each month) or disproportionately gave support to others (e.g., gave many more hours of support a month than they received). These findings applied to instrumental social support (e.g., help with transportation, childcare). Additionally, participants who gave a moderate amount of instrumental social support had a lower risk of all-cause mortality than those who either gave very little support or those who gave a lot of support to others. Associations were evident over and above demographic, medical, mental health, and health behavior covariates. Although results are correlational, one interpretation is that promoting a balance, in terms of the support that individuals regularly give relative to what they receive in their social relationships, may not only help to strengthen the social fabric of society but may also have potential physical health benefits.

social support | mortality | helping

Social relationships are one of the most robust behavioral predictors of longevity in humans. In 1988, House et al. wrote a seminal paper that concluded that the relative risk ratio of mortality for those with few social contacts and/or infrequent contacts with their social network was higher than the relative risk of all-cause mortality reported for smoking (1). Since then, hundreds of studies have been conducted with multiple meta-analyses of these studies providing robust evidence of the detrimental effects of social isolation, divorce, infrequent social contact, and loneliness on mortality (2–5). The vast majority of this research has focused on the support that people receive from others (perceptions of support or number or frequency of contacts with supportive others), with several reviews concluding that the effects of few or poor social relationships on mortality is comparable to or exceeds that of other well-established risk factors such as smoking, obesity, high blood pressure, and elevated cholesterol (6, 7).

More recently, interest has developed in investigating the effects of giving social support on health. Giving to others is thought to promote better mental health and well-being. For example, spending money on others predicts greater happiness than spending money on oneself (8). Doing acts of kindness for others predicts greater psychological well-being than self-focused acts (9). Giving social support to others also has been found to have physical health benefits. With respect to mortality in older adults, giving social support has been associated with a lower risk

of mortality over 5 y, even after controlling for the effects of receiving social support (10). Similarly, giving social support had more robust associations with ambulatory blood pressure than did receiving social support (11). A recent study clarified that in particular, giving instrumental social support to others (e.g., help with errands or volunteering) predicted lower mortality over a 13-y follow-up (12). Consistent with this research, other types of behaviors that involve giving support to others, such as volunteering and caregiving, have been reported in meta-analyses to be associated with lower rates of mortality (13, 14). Giving to others is thought to be beneficial because it can lead to higher self-esteem, self-efficacy, and positive affect, activate neural pathways related to compassion, and reduce one's responses to stress (11, 15–17).

Yet most of this research has focused on either support received or support given, with very little research investigating how individuals balance the two in their lives. This is despite the reality that our everyday social relationships typically involve interchanges of giving and receiving support, rather than relationships that consist of only one or the other. Thus, to more fully understand the links between social support and physical health, research is needed on how the extent to which individuals balance the support they give compared to the support they receive in their lives relates to outcomes such as risk for mortality. Theories of equity postulate that there are norms of reciprocity in everyday social relationships and that an imbalance (receiving more than one gives or giving more than one receives) can leave

Significance

Social support is a key contributor to mortality risk, with effects comparable in magnitude (though opposite in direction) to smoking and obesity. Research has largely focused on either support received or support given; yet, everyday social relationships typically involve interchanges of support rather than only giving or only receiving. Using a longitudinal US national sample, this article elucidates how the balance of social support (amount of giving one does on a monthly basis relative to receiving support) relates to all-cause mortality over a 23-y follow-up period. Although correlational, one possible implication of the findings is that encouraging individuals to give support (e.g., helping others with errands) in moderation, while also being willing to accept support, may have longevity benefits.

Author contributions: E.C., P.H.L., E.D.F., and N.A.T. analyzed data; E.C., D.K.M., and G.E.M. wrote the paper; N.A.T. contributed to data interpretation and analysis; and D.K.M. and G.E.M. contributed to data interpretation.

The authors declare no competing interest.

This article is a PNAS Direct Submission.

Published under the PNAS license.

¹To whom correspondence may be addressed. Email: edith.chen@northwestern.edu.

This article contains supporting information online at <https://www.pnas.org/lookup/suppl/doi:10.1073/pnas.2024770118/-DCSupplemental>.

Published June 7, 2021.

individuals feeling distressed, guilty, or overburdened (18, 19). A review of the literature found that both disproportionate giving and disproportionate receiving of support were associated with worse mental health outcomes (though more strongly for disproportionate receiving) (20). With respect to physical health, the evidence is sparse, but one previous study found that nonreciprocity in support within close relationships (e.g., giving more than one receives or vice versa) was associated with poorer self-reported health and greater self-reported sleep disturbances (21). A second study documented that disproportionate receiving of support was associated with more short-term sickness-related work absences in women, whereas disproportionate giving of support was associated with more short-term sickness absences in men (22). However, overall there are very few studies on this topic, and no studies that we are aware of that have examined associations of support balance with hard endpoints such as mortality.

The present study tested whether levels of support giving relative to support receiving across social relationships predicts all-cause mortality rates. We utilized a national US sample of 6,325 adults from the National Survey of Midlife Development in the United States (MIDUS) who were administered a social support questionnaire at baseline and then followed for all-cause mortality for a 23-y period. We tested the hypothesis that the balance of social support in individuals' regular interactions with those in their social network would predict longevity. To do so, we compared the difference between the support that individuals gave versus the support that they received from others on a monthly basis. We hypothesized that those with a relatively equal amount of support given versus support received would have lower mortality compared to those who either disproportionately gave support or disproportionately received social support. In addition, we also documented associations between support giving and support receiving separately with mortality.

Results

Mortality data were collected from National Death Index reports, and Cox proportional hazards regression models were run predicting survival time over the 23-y follow-up period from social support variables collected at baseline. Covariates of participants' age, race, gender, socioeconomic status (SES, educational attainment), marital status, and history of major chronic diseases (cancer or heart disease) were included. The social support questionnaire probed both the number of hours of support that participants provided to others and the hours of support that they received from others on a monthly basis. Social support questions focused on close others typically outside of one's household (e.g., spouses/partners were not included). This allowed us to probe giving and receiving that happens in everyday social interactions. Both instrumental and emotional social support were probed, and these dimensions were scored separately. Instrumental support refers to concrete, unpaid help (e.g., providing assistance to others with transportation or childcare). Emotional support is defined as expressions of caring (e.g., comforting and listening to others). See Table 1 for descriptive information about the sample and *SI Appendix* for additional results.

Disproportionate Support and Mortality. Disproportionate social support was calculated as the giving score minus the receiving score. Because of the nonnormal distribution of hours, participants were stratified roughly into tertiles, corresponding to disproportionate receiving (the lowest group, including those who receive more support than they give), balanced support (those who give modestly more support than they receive; for most adults, the norm is to give more hours of support than one receives), and disproportionate giving (those who give many more hours of support than they receive every month).

Above and beyond covariates, the balance of instrumental social support predicted risk of mortality over the 23-y follow-up

Table 1. Descriptives of sample (n = 6,325)

	M	SD	Median	%
Age	46.92	12.94		
Gender (% male)				47.5
Race (% White)				90.3
Marital status (% never married)				11.7
Educational attainment	6.84	2.49		
Heart disease ever (% yes)				5.7
Cancer ever (% yes)				7.2
Mental health diagnosis (% yes)				13.5
Regular substance use ever (% yes)				65.7
Physical activity	15.16	8.69		
Provide instrumental support			7.0	
Receive instrumental support			0.0	
Provide emotional support			18.0	
Receive emotional support			7.0	
Mortality (% dead)				20.3
Years of survival	21.17	5.15		

Educational attainment is on a 1 to 12 scale, with 6.84 corresponding to some years of college. Mental health diagnosis refers to % meeting criteria for anxiety or depression in the past 12 mo. Regular substance use refers to % ever regularly smoking or drinking. Physical activity refers to the number of times per month spent doing moderate/vigorous physical activity. Support variables were not normally distributed, so median number of hours per month are presented. M, mean.

period (Wald test = 10.60, $P = 0.005$). Specifically, those who disproportionately received instrumental support had a higher mortality risk compared to those with relatively balanced support, adjusted hazard ratio (HR) = 1.28, CI (1.10, 1.48). Furthermore, those who disproportionately gave instrumental support (gave >9 more hours of support per month than they received) also had a higher risk of mortality compared to those with relatively balanced support, adjusted HR = 1.19, CI (1.02, 1.39). See Table 2 and Fig. 1.

Disproportionate emotional support had a marginal association with mortality (Wald test = 4.80, $P = 0.091$). Those who disproportionately received emotional support had a marginally higher mortality risk compared to those with relatively balanced support, adjusted HR = 1.14, CI (1.00, 1.30). Those who disproportionately gave emotional support had a marginally higher risk of mortality compared to those with balanced support, adjusted HR = 1.16, CI (0.99, 1.35). Reference *SI Appendix, Table S1*.

Giving and Receiving Social Support and Mortality. We also conducted separate tests of whether the number of hours per month participants spent giving support, as well as receiving support, were each associated with all-cause mortality rates. Because of the nonnormal distribution of hours, responses were stratified roughly into tertiles, which are referred to as low, moderate, and high giving or receiving of support.

Above and beyond covariates, giving instrumental social support to others predicted risk of mortality over the 23-y follow-up period (Wald test = 9.42, $P = 0.009$). Specifically, those who gave little or no support to others (0 to 1.99 h/mo) had a higher risk of mortality compared to those who gave a moderate amount of support to others (2 to 15 h/mo), adjusted HR = 1.22, 95% CI (1.06, 1.40). In addition, those who spent many hours a month giving support to others (>15 h/mo) also had a higher risk of mortality compared to those who gave a moderate amount of support, adjusted HR = 1.18, CI (1.02, 1.36) (Table 3 and Fig. 2).

The number of hours per month participants spent receiving instrumental social support was not associated with all-cause mortality rates (Wald test = 0.52, $P = 0.770$) (*SI Appendix, Table S2*).

We also tested the relationship between emotional support and all-cause mortality rates. Neither the hours of emotional

Table 2. Models predicting all-cause mortality from disproportionate instrumental support

	Model 1			Model 2		
	HR	(CI)	P	HR	(CI)	P
Age	1.10	(1.09, 1.11)	<0.001	1.10	(1.09, 1.11)	<0.001
Gender	1.32	(1.18, 1.49)	<0.001	1.32	(1.16, 1.49)	<0.001
Race	1.25	(1.02, 1.54)	0.033	1.22	(0.99, 1.50)	0.063
Marital status	1.62	(1.31, 2.00)	<0.001	1.53	(1.24, 1.90)	<0.001
Education	0.94	(0.91, 0.96)	<0.001	0.95	(0.93, 0.97)	<0.001
Heart disease	2.02	(1.73, 2.37)	<0.001	1.89	(1.61, 2.21)	<0.001
Cancer	1.33	(1.13, 1.56)	0.001	1.30	(1.10, 1.53)	0.002
Mental health				1.35	(1.13, 1.61)	0.001
Substance use				1.45	(1.26, 1.66)	<0.001
Physical activity				0.98	(0.97, 0.98)	<0.001
Support			0.005			0.026
DR versus balanced	1.28	(1.10, 1.48)	0.001	1.21	(1.05, 1.41)	0.010
DG versus balanced	1.19	(1.02, 1.39)	0.025	1.19	(1.02, 1.39)	0.025

DR = disproportionate receiving of social support. DG = disproportionate giving of social support. Balanced = giving a relatively balanced amount of social support relative to what one receives. Reference groups: gender = female; race = White; marital status = ever married; history of heart disease = no; history of cancer = no; mental health diagnosis = no; and regular substance use = no.

support given to others (Wald test = 0.81, $P = 0.666$) nor the hours of emotional support received from others (Wald test = 1.66, $P = 0.437$) were associated with mortality (SI Appendix, Table S2).

Secondary Analyses. Secondary analyses were conducted for significant findings above, related to disproportionate instrumental support and giving instrumental support, in order to test the robustness of findings.

Potential confounding by psychosocial variables. It is possible that other psychological or behavioral variables could be accounting for the associations observed. To address some of these possibilities, we added mental health (anxiety or depression) and health behavior (physical activity or substance use) variables as covariates. The associations for disproportionate instrumental support and giving instrumental support remained significant (Tables 2 and 3, Model 2).

Specific alternative explanations. Beyond general confounding psychosocial variables, there are some specific alternative explanations for the giving and disproportionate support findings that we addressed to the extent possible with these data. First is whether these effects overlap with volunteering and are potentially just a proxy for the beneficial effects that have been previously found with volunteering. To address this, we added the number of hours per month participants spent doing formal volunteer work for organizations or causes as a covariate. Patterns remained the same (SI Appendix, Supplemental Analyses).

Second, it is possible that the associations for giving social support reflect consequences of caregiving. We note that the intention behind the MIDUS social support questionnaire was to get at normative patterns of support giving; it did not explicitly probe providing help to a family member because of a chronic illness or disability or providing help with an activity of daily living (e.g., help with bathing, feeding, etc.), as many studies of caregivers do. Nonetheless, it is possible that caregiving factored into participants' responses to the support giving questions. To address this, we reconduted analyses using responses to the relationship probe that was least likely to involve caregiving—instrumental support given to close friends or other family members (who were not parents, spouses, children, or grandchildren). When only responses to this single probe were tested, the effect of giving instrumental support remained significant, with patterns paralleling the primary analyses. These findings suggest that the primary giving support analyses are

unlikely to simply reflect caregiving, because people less often serve as caregivers for close friends or family members who are not spouses, children, parents, or grandchildren (SI Appendix, Supplemental Analyses).

A third alternative is that individuals who were in poorer health at baseline were less able to give support. We tested this possibility by examining whether those in certain support groups (e.g., disproportionately receiving support) were more likely to have been diagnosed with a chronic illness at baseline. Overall, we found little evidence to support the notion that those in poorer health gave less support (SI Appendix, Supplemental Analyses).

Other cutpoints. In sensitivity analyses, we tested whether the observed associations remained significant if we utilized different cutpoints for support categories. Patterns remained similar (SI Appendix, Supplemental Analyses and Table S3).

Other support variables. We considered whether the associations for disproportionate support were independent of the absolute number of hours spent giving or receiving support. We also considered whether the associations for giving instrumental support were independent of receiving instrumental support as well as disproportionate support. When these support variables were included as covariates, patterns remained largely the same (SI Appendix, Supplemental Analyses).

Accounting for sibling dependencies. MIDUS enrolled a number of siblings, potentially creating dependencies in observations within families. Therefore, we conducted sensitivity analyses accounting for such clustering using a sandwich estimator [survival R package (23)] to estimate robust SEs for each predictor. Results of disproportionate instrumental support and giving instrumental support remained significant (SI Appendix, Table S4).

Discussion

This 23-y longitudinal study of a US national sample found that the balance of support given relative to support received predicted all-cause mortality. Those who had a relatively balanced amount of giving relative to receiving support had a lower risk of mortality compared to those who either disproportionately received social support (e.g., received more support than they gave) or those who disproportionately gave social support (gave over nine more hours of instrumental support each month than they received). Patterns were strongest for support that was

Table 3. Models predicting all-cause mortality from different levels of giving instrumental support

	Model 1			Model 2		
	HR	(CI)	P	HR	(CI)	P
Age	1.10	(1.09, 1.11)	<0.001	1.10	(1.09, 1.11)	<0.001
Gender	1.32	(1.18, 1.49)	<0.001	1.31	(1.16, 1.48)	<0.001
Race	1.26	(1.03, 1.55)	0.027	1.23	(1.00, 1.51)	0.051
Marital status	1.62	(1.31, 2.00)	<0.001	1.53	(1.24, 1.90)	<0.001
Education	0.94	(0.91, 0.96)	<0.001	0.95	(0.93, 0.97)	<0.001
Heart disease	2.02	(1.73, 2.35)	<0.001	1.88	(1.61, 2.20)	<0.001
Cancer	1.31	(1.11, 1.54)	0.001	1.28	(1.09, 1.51)	0.003
Mental health				1.35	(1.14, 1.61)	0.001
Substance use				1.46	(1.27, 1.67)	<0.001
Physical activity				0.98	(0.97, 0.98)	<0.001
Giving support			0.009			0.040
Low versus moderate	1.22	(1.06, 1.40)	0.004	1.16	(1.01, 1.33)	0.037
High versus moderate	1.18	(1.02, 1.36)	0.022	1.17	(1.02, 1.35)	0.025

Low = giving 0 to 1.99 h/mo of support to others. Moderate = giving 2 to 15 h/mo of support to others. High = giving >15 h/mo of support to others. Reference groups: gender = female; race = White; marital status = ever married; history of heart disease = no; history of cancer = no; mental health diagnosis = no; and regular substance use = no.

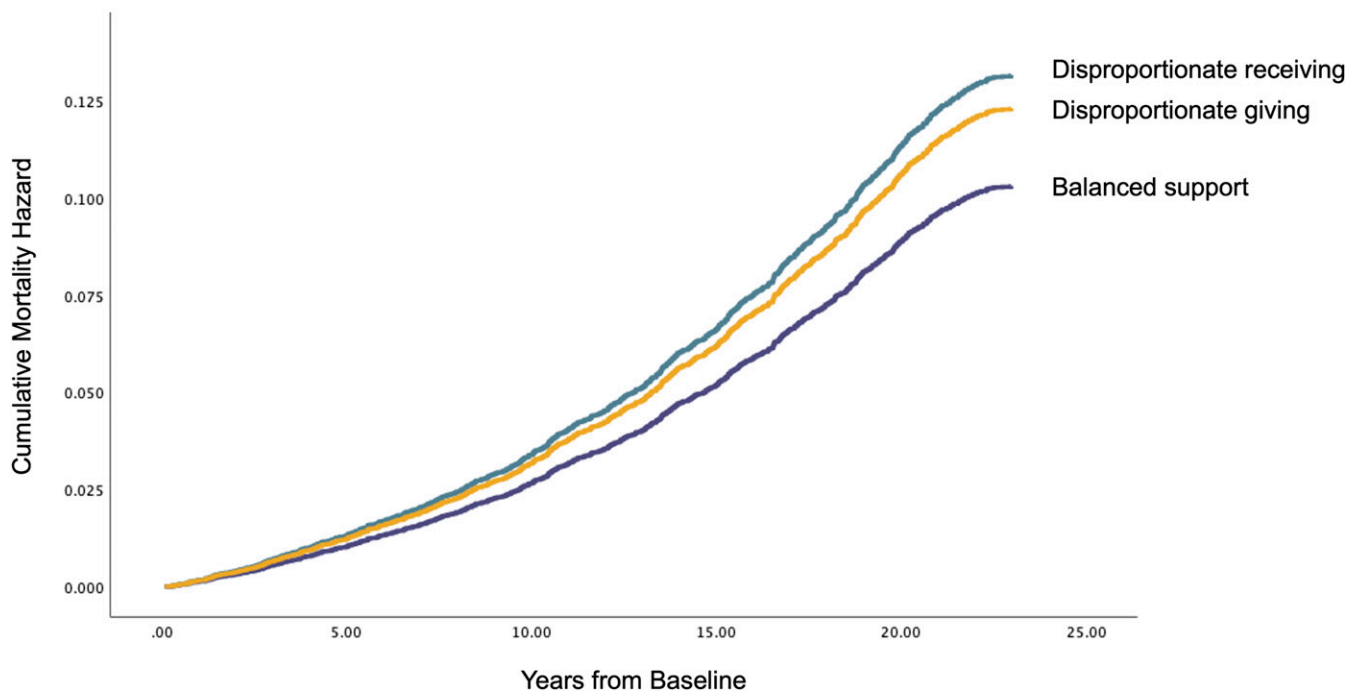


Fig. 1. Plot of cumulative mortality hazard by years since study entry for participants who disproportionately receive instrumental support (e.g., receiving more support than one gives), for those with balanced support (relatively balanced amount of support given to support received), and for those who disproportionately give support to others (giving many more hours of support per month than one receives). Analyses control for age, gender, race, marital status, education, history of heart disease, and history of cancer.

instrumental in nature (e.g., helping others with transportation or childcare). Second, those who gave a moderate amount of instrumental support to others (2 to 15 h/mo) had a lower risk of all-cause mortality compared to those who either spent very little time helping others (<2 h/mo) or those who spent a lot of hours helping others (>15 h/mo). All associations persisted net of demographic (age, gender, race, marital status, and education), medical (history of heart disease or cancer), and other psychological/behavioral (mental health problems or health practices) variables.

The support balance findings are in line with previous literature that has discussed the importance of reciprocity in social relationships (18, 24). Research has documented that reciprocity (relationships of mutual exchange) is associated with higher life satisfaction, more positive mood, and less negative affect (18, 25, 26). With respect to physical health outcomes, little evidence exists, but this study's findings are consistent, for example, with one report that nonreciprocity in support (e.g., giving more than one receives or vice versa) was associated with poorer self-reported health (21). There are also two studies that have found moderating effects of support balance with respect to physical health. One study found that the relationship between low SES and poorer metabolic outcomes was apparent only among adults who disproportionately received more instrumental support than they gave (27). Furthermore, the relationship between low SES and greater inflammation was found only among those who disproportionately gave more support than they received (27). Similarly, in another study, the relationship between life stressors and poorer self-reported health was only present among those who gave more support than they received (28). The patterns observed here also converge with the literature on unmitigated communion, which indicates that a focus on others—to the exclusion of the self—is associated with poorer health behaviors and worse metabolic control, presumably because of the neglect of the self that goes along with an extreme

focus on others (29, 30). In terms of explanations, we speculate that disproportionate giving (relative to receiving) in one's everyday social relationships may leave individuals feeling exhausted, overburdened, and resentful of these relationships, with previous literature documenting that constructs such as vital exhaustion and burnout are associated with reliable increases in risk of coronary heart disease and cardiovascular events (31, 32). Conversely, disproportionately receiving support from others may leave individuals feeling indebted to and dependent on others, perceiving low levels of control in their lives, as well as experiencing negative emotions related to guilt and shame. In turn, low levels of perceived control and high levels of shame have been linked in numerous studies to poorer physiological profiles and increased risk of cardiovascular and other diseases (33–35).

Associations for disproportionate emotional support were in the same direction but smaller in magnitude than those for disproportionate instrumental support. It may be that people have a more difficult time quantifying hours of emotional support they give and receive compared to being able to remember concrete instances of providing help to others. Additionally, it may be that effects of emotional support would emerge more clearly using measures that tap the quality of support (e.g., how available and helpful emotional support is from others), rather than quantifying time.

The giving support findings in this study are consistent with some previous research. Specifically, our finding that some giving is beneficial for longevity is consistent with other studies that link giving instrumental support to lower mortality (10, 12, 36). It is also in line with experimental studies that randomly assigned participants to provide support to another person and observed reductions in blood pressure and sympathetic nervous system responses to acute stressors (37); with studies that randomly assigned participants to spend money on others and observed reductions in blood pressure compared to spending money on

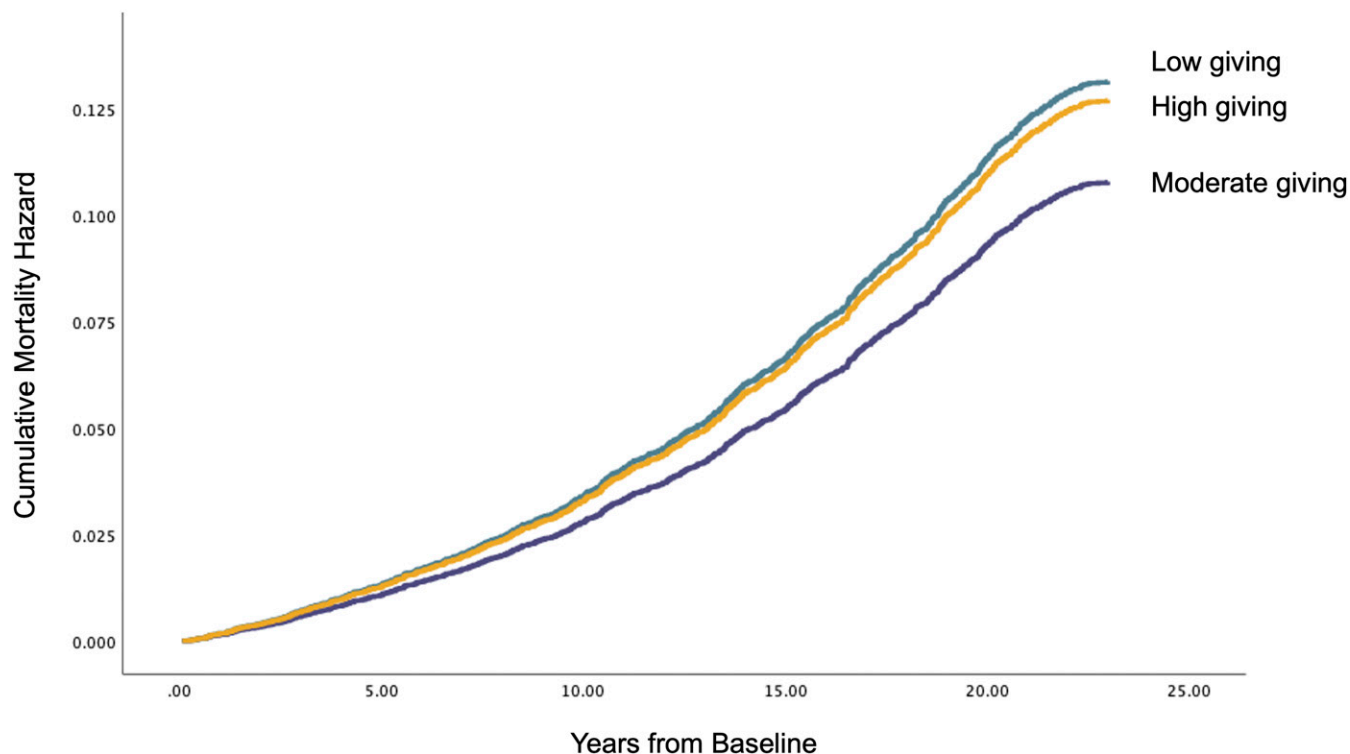


Fig. 2. Plot of cumulative mortality hazard by years since study entry for participants with low levels of giving instrumental support to others (<2 h/mo), moderate amounts of giving support to others (2 to 15 h/mo), and high levels of giving support to others (>15 h/mo). Analyses control for age, gender, race, marital status, education, history of heart disease, and history of cancer.

oneself (38); with studies that randomly assigned participants to perform acts of kindness toward others and found reduced expression of genes responsible for the transcriptional response to adversity (39); and with studies that randomly assigned participants to volunteer and observed lower cardiovascular risk (40). Furthermore, it is consistent with a body of research that has found another type of giving behavior—caregiving—to be associated with lower mortality rates (41–45); with research that has shown that volunteering also is associated with lower mortality rates (46–48); and with research that has shown that caregiving and volunteering each have independent protective effects on mortality (49). The present study adds to this body of literature by demonstrating that longevity benefits also are found for giving a moderate number of hours of support in everyday social relationships that may be distinct from volunteering or caregiving (*SI Appendix, Supplemental Analyses*).

Where this study may differ from previous research is in the finding that a high amount of giving support to others is associated with increased mortality, compared to a moderate amount of giving. In previous studies of caregiving, beneficial effects of caregiving, even at a higher number of hours, were found on mortality (41, 42, 49). At the same time, there is some evidence to suggest that higher levels of caregiving strain are associated with higher mortality rates (50, 51). This has led some researchers to theorize that the compassion associated with caregiving for a loved one has beneficial effects whereas watching a loved one decline is harmful and that these two processes have not always been clearly separated in the caregiving literature (41, 52).

While there are likely overlaps in some of the processes described above that would also apply to the sample in this study, the present study focused more on the everyday social relationships that individuals have with close others, rather than specific categories of giving relationships (e.g., caregivers) or other

literature on formal helping (e.g., volunteering). That is, in utilizing a social support questionnaire that probed close relationships more broadly defined, we were interested in how the everyday giving and receiving that individuals do in their social relationships relates to mortality. This could include behaviors such as taking care of other people's children for a day, giving rides to friends, cooking dinner for someone, bringing groceries over for someone, taking care of someone's house while they are away, etc. (and vice versa for receiving support from others). Thus, the support questions focused on close others, such as parents, grandchildren, and close friends that are typically outside of one's household (e.g., spouses and young children were not included in the instrumental support questions, presumably because giving and receiving are such a normative part of daily household life that it could overshadow individual differences in the tendency to give or receive in our other social relationships more generally). In this context, one interpretation may be that a high number of hours of giving increases the burden on top of core roles that individuals are already working to balance in their lives (e.g., their careers or their role as a spouse). These types of giving behaviors may also be occurring across multiple social relationships (in contrast to caregiving) and more intermittently, which may lead individuals to feel pulled in competing directions and a sense of unpredictability in knowing when requests for help are going to come and from whom. In addition, sometimes giving is done out of obligation to a relationship (not feeling that one can say no to a close other's requests for help), and this might lead to resentment or feelings of being taken advantage of if it occurs frequently, with some researchers theorizing that the benefits of giving support will be most apparent when that support is freely given (15). Future studies are needed that investigate the motivations and mechanisms behind the mortality effects of giving a high number of hours of instrumental support to close others who typically fall outside of one's household.

Limitations of this study include the types of social support that were not considered. For example, assessing the support that others provide in combination with the conflict that arises in a relationship (ambivalent social relationships) may be important in future studies (53). Considering the breadth, size, or web of connections characterizing one's social network might also be important for future work (54, 55). In addition, people may not always realize when they are receiving help from others ("invisible social support") (56), which may result in inaccurate estimates of support in these questionnaires. This study was also limited in not having additional details about the characteristics of others in participants' social networks in order to be able to clearly distinguish caregiving from other responses in the giving support prompts. Additionally, survey items were limited in gathering information only about numbers of hours of support. While the advantage of this approach is that it is easy and straightforward to calculate a balance score, the disadvantages include having no information about the nature of the support provided or received or about the quality of support. Thus, for example, it is difficult to draw conclusions about disproportionate emotional support from the results of this study, as quality may be as or more important to factor in as quantity. Other limitations include the fact that this sample was largely White, so it is unclear how these findings would generalize to populations of color, and that we did not have information about cause of death in this sample.

In sum, social relationships are hugely important to humans and are a key behavioral contributor to health and longevity. When people give support to others that is relatively in balance with what they receive from others, they have a reduced risk of all-cause mortality. These findings apply to giving concrete assistance with tasks (e.g., transportation or childcare) to close others who are typically outside of one's household (e.g., parents, grandchildren, or close friends). It is important to emphasize that these data are correlational, and hence, there will always be the possibility that unmeasured third variables are responsible for effects. Nonetheless, one potential implication is that efforts to encourage cultivating social relationships in which individuals regularly help close others in moderation may be important. At the same time, the findings raise the possibility that it may be important to also take care of one's own needs, for example by accepting concrete help from others even as one is providing this kind of help to others. Other research suggests that giving help to others could be an important value to foster in society, both for enhancing the cohesiveness of ties within a community and for promoting a more collective spirit in a society. With this study, we show that achieving a balance, in terms of the support that one gives relative to what one receives from one's social relationships, appears to also have longevity benefits.

Methods

Participants. Data for this study came from MIDUS (57), a national sample of 7,108 noninstitutionalized, English speaking adults (ages 25 to 74). A total of 6,325 participants completed the mail-in questionnaires in 1995 to 1996

(MIDUS I) and were included in these analyses. Mortality data were collected on all participants through October 2018. Ethics approval was obtained from the Institutional Review Boards of Harvard Medical School and the University of Wisconsin–Madison, with participant consent obtained by phone.

Measures. Data can be accessed from MIDUS Colectica Portal, <https://midus.colectica.org/>.

Social support. Four subscales of the Social Support Questionnaire were utilized from MIDUS I (58). Participants were asked how many hours per month they gave and how many hours per month they received social support. They estimated hours for both instrumental support (e.g., providing unpaid assistance such as with transportation or childcare) and emotional support (e.g., comforting and listening to others). Responses were limited to those typically outside of one's household (e.g., spouses/partners were not included). Given the nonnormal distribution of hours, responses were stratified roughly into tertiles, which are referred to as low, moderate, and high giving (or receiving) of support.

Disproportionate social support was calculated as the giving score minus the receiving score, similar to previous studies (59, 60). Separate scores were calculated for instrumental and emotional support. Given the nonnormal distribution, values were stratified roughly into tertiles, which are referred to as disproportionate receiving, balanced support, and disproportionate giving (*SI Appendix*).

All-cause mortality. By the censor date of October 31, 2018 there were 1,286 (20.3%) confirmed deaths from the sample that completed the mail-in questionnaires. Mortality data were obtained primarily from National Death Index reports (*SI Appendix*). Survival time for decedents was the interval (in years) from the date when MIDUS questionnaires were returned (1995 to 1996) to the date of their death. Participants that were still alive had survival times that equaled the length of the follow-up (censored on October 31, 2018).

Covariates. Covariates for primary analyses included participants' age, race, gender, SES (educational attainment), marital status, and history of major chronic diseases (cancer or heart disease). Chronic health conditions were included as covariates to account for the possibility that those in better physical health might be more able to give support. In secondary analyses, mental health problems (depression or anxiety), health behaviors (regular substance use or physical activity), and formal volunteering were added as covariates (*SI Appendix*).

Statistical Analyses. Cox proportional hazards regression models were estimated in SPSS (v26). Survival time in years was regressed onto social support variables. In our primary analyses, we regressed survival time onto the covariates described above (step one), then the main effect of the social support variable of interest (step two). We conducted analyses separately for instrumental versus emotional support. We conducted secondary analyses adding mental health and health behaviors as covariates, testing specific alternative explanations, testing various cutpoints, and investigating the effects of siblings.

Data Availability. Data are contained at the following websites, the Inter-university Consortium for Political and Social Research (ICPSR) and MIDUS (<https://www.icpsr.umich.edu/web/ICPSR/series/203> and <https://midus.colectica.org/>), accessible once registration has been completed. All study data described in this article and/or *SI Appendix* are contained there.

ACKNOWLEDGMENTS. The study and manuscript writing were supported by grants from the National Institute on Aging (AG020166 and AG018436) and National Heart, Lung, and Blood Institute (HL136676).

1. J. S. House, K. R. Landis, D. Umberson, Social relationships and health. *Science* **241**, 540–545 (1988).
2. J. Holt-Lunstad, T. B. Smith, M. Baker, T. Harris, D. Stephenson, Loneliness and social isolation as risk factors for mortality: A meta-analytic review. *Perspect. Psychol. Sci.* **10**, 227–237 (2015).
3. D. J. Roelfs, E. Shor, R. Kalish, T. Yogev, The rising relative risk of mortality for singles: Meta-analysis and meta-regression. *Am. J. Epidemiol.* **174**, 379–389 (2011).
4. D. A. Sbarra, R. W. Law, R. M. Portley, Divorce and death: A meta-analysis and research agenda for clinical, social, and health psychology. *Perspect. Psychol. Sci.* **6**, 454–474 (2011).
5. E. Shor, D. J. Roelfs, Social contact frequency and all-cause mortality: A meta-analysis and meta-regression. *Soc. Sci. Med.* **128**, 76–86 (2015).
6. J. Holt-Lunstad, T. B. Smith, J. B. Layton, Social relationships and mortality risk: A meta-analytic review. *PLoS Med.* **7**, e1000316 (2010).
7. M. Pantell et al., Social isolation: A predictor of mortality comparable to traditional clinical risk factors. *Am. J. Public Health* **103**, 2056–2062 (2013).

8. E. W. Dunn, L. B. Akin, M. I. Norton, Spending money on others promotes happiness. *Science* **319**, 1687–1688 (2008).
9. S. K. Nelson, K. Layous, S. W. Cole, S. Lyubomirsky, Do unto others or treat yourself? The effects of prosocial and self-focused behavior on psychological flourishing. *Emotion* **16**, 850–861 (2016).
10. S. L. Brown, R. M. Nesse, A. D. Vinokur, D. M. Smith, Providing social support may be more beneficial than receiving it: Results from a prospective study of mortality. *Psychol. Sci.* **14**, 320–327 (2003).
11. R. L. Piferi, K. A. Lawler, Social support and ambulatory blood pressure: An examination of both receiving and giving. *Int. J. Psychophysiol.* **62**, 328–336 (2006).
12. H. Qu, S. Konrath, M. Poulin, Which types of giving are associated with reduced mortality risk among older adults? *Pers. Individ. Dif.* **154**, 109668 (2020).
13. N. Mehri, J. Kinney, S. Brown, M. Rajabi Rostami, Informal caregiving and all-cause mortality: A meta-analysis of longitudinal population-based studies. *J. Appl. Gerontol.*, 10.1177/0733464819893603 (2019).
14. M. A. Okun, E. W. Yeung, S. Brown, Volunteering by older adults and risk of mortality: A meta-analysis. *Psychol. Aging* **28**, 564–577 (2013).

15. T. K. Inagaki, E. Orehek, On the benefits of giving social support: When, why, and how support providers gain by caring for others. *Curr. Dir. Psychol. Sci.* **26**, 109–113 (2017).
16. S. L. Brown, R. M. Brown, Connecting prosocial behavior to improved physical health: Contributions from the neurobiology of parenting. *Neurosci. Biobehav. Rev.* **55**, 1–17 (2015).
17. S. Konrath, S. L. Brown, "The effects of giving on givers" in *Handbook of Health and Social Relationships*, N. Roberts, M. Newman, Eds. (American Psychological Association, Washington, DC, 2013), pp. 32–48.
18. T. C. Antonucci, R. Fuhrer, J. S. Jackson, Social support and reciprocity: A cross-ethnic and cross-national perspective. *J. Soc. Pers. Relat.* **7**, 519–530 (1990).
19. E. G. Walster, W. Walster, E. Berscheid, *Equity: Theory and Research* (Allyn & Bacon, Boston, MA, 1978).
20. L. Fyrand, Reciprocity: A predictor of mental health and continuity in elder people's relationships? *Curr. Gerontol. Geriatr. Res.* **2010**, 340161 (2010).
21. T. Chandola, M. Marmot, J. Siegrist, Failed reciprocity in close social relationships and health: Findings from the whitehall II study. *J. Psychosom. Res.* **63**, 403–411 (2007).
22. A. Väänänen, B. P. Buunk, M. Kivimäki, J. Pentti, J. Vahtera, When it is better to give than to receive: Long-term health effects of perceived reciprocity in support exchange. *J. Pers. Soc. Psychol.* **89**, 176–193 (2005).
23. T. M. Therneau, T. Lumley, Package 'survival'. *R Top. Doc.* **128**, 112 (2015).
24. S. Abbott, D. Freeth, Social capital and health: Starting to make sense of the role of generalized trust and reciprocity. *J. Health Psychol.* **13**, 874–883 (2008).
25. M. E. J. Gleason, M. Iida, N. Bolger, P. E. Shrout, Daily supportive equity in close relationships. *Pers. Soc. Psychol. Bull.* **29**, 1036–1045 (2003).
26. B. P. Buunk, B. J. Doosje, L. G. J. M. Jans, L. E. M. Hopstaken, Perceived reciprocity, social support, and stress at work: The role of exchange and communal orientation. *J. Pers. Soc. Psychol.* **65**, 801–811 (1993).
27. M. K. Austin, J. N. Drage, J. Dezil, R. Siliezar, E. Chen, The relationship between disproportionate social support and metabolic and inflammatory markers: Moderating role of socioeconomic context. *Psychosom. Med.* **83**, 177–186 (2021).
28. D. Moskowitz, E. Vittinghoff, L. Schmidt, Reconsidering the effects of poverty and social support on health: A 5-year longitudinal test of the stress-buffering hypothesis. *J. Urban Health* **90**, 175–184 (2013).
29. V. S. Helgeson, H. L. Fritz, The implications of unmitigated agency and unmitigated communion for domains of problem behavior. *J. Pers.* **68**, 1031–1057 (2000).
30. V. S. Helgeson, O. Escobar, L. Siminerio, D. Becker, Unmitigated communion and health among adolescents with and without diabetes: The mediating role of eating disturbances. *Pers. Soc. Psychol. Bull.* **33**, 519–536 (2007).
31. D. Frestad, E. Prescott, Vital exhaustion and coronary heart disease risk: A systematic review and meta-analysis. *Psychosom. Med.* **79**, 260–272 (2017).
32. S. Melamed, A. Shirom, S. Toker, S. Berliner, I. Shapira, Burnout and risk of cardiovascular disease: Evidence, possible causal paths, and promising research directions. *Psychol. Bull.* **132**, 327–353 (2006).
33. S. S. Dickerson, T. L. Gruenewald, M. E. Kemeny, When the social self is threatened: Shame, physiology, and health. *J. Pers.* **72**, 1191–1216 (2004).
34. M. M. Skaff, "Sense of control and health: A dynamic duo in the aging process" in *Handbook of Health Psychology and Aging*, C. M. Aldwin, C. L. Park, A. Spiro, Eds. (Guilford Press, New York, NY, 2007), pp. 186–209.
35. T. Stürmer, P. Hasselbach, M. Amelang, Personality, lifestyle, and risk of cardiovascular disease and cancer: Follow-up of population based cohort. *BMJ* **332**, 1359 (2006).
36. S. Hilbrand, D. A. Coall, A. H. Meyer, D. Gerstorf, R. Hertwig, A prospective study of associations among helping, health, and longevity. *Soc. Sci. Med.* **187**, 109–117 (2017).
37. T. K. Inagaki, N. I. Eisenberger, Giving support to others reduces sympathetic nervous system-related responses to stress. *Psychophysiology* **53**, 427–435 (2016).
38. A. V. Whillans, E. W. Dunn, G. M. Sandstrom, S. S. Dickerson, K. M. Madden, Is spending money on others good for your heart? *Health Psychol.* **35**, 574–583 (2016).
39. S. K. Nelson-Coffey, M. M. Fritz, S. Lyubomirsky, S. W. Cole, Kindness in the blood: A randomized controlled trial of the gene regulatory impact of prosocial behavior. *Psychoneuroendocrinology* **81**, 8–13 (2017).
40. H. M. Schreier, K. A. Schonert-Reichl, E. Chen, Effect of volunteering on risk factors for cardiovascular disease in adolescents: A randomized controlled trial. *JAMA Pediatr.* **167**, 327–332 (2013).
41. S. L. Brown et al., Caregiving behavior is associated with decreased mortality risk. *Psychol. Sci.* **20**, 488–494 (2009).
42. D. O'Reilly, S. Connolly, M. Rosato, C. Patterson, Is caring associated with an increased risk of mortality? A longitudinal study. *Soc. Sci. Med.* **67**, 1282–1290 (2008).
43. L. Fredman, J. A. Cauley, M. Hochberg, K. E. Ensrud, G. Doros; Study of Osteoporotic Fractures, Mortality associated with caregiving, general stress, and caregiving-related stress in elderly women: Results of caregiver-study of osteoporotic fractures. *J. Am. Geriatr. Soc.* **58**, 937–943 (2010).
44. D. L. Roth et al., Family caregiving and all-cause mortality: Findings from a population-based propensity-matched analysis. *Am. J. Epidemiol.* **178**, 1571–1578 (2013).
45. D. L. Roth, S. L. Brown, J. D. Rhodes, W. E. Haley, Reduced mortality rates among caregivers: Does family caregiving provide a stress-buffering effect? *Psychol. Aging* **33**, 619–629 (2018).
46. M. A. Musick, A. R. Herzog, J. S. House, Volunteering and mortality among older adults: Findings from a national sample. *J. Gerontol. B Psychol. Sci. Soc. Sci.* **54**, S173–S180 (1999).
47. T. Y. Lum, E. Lightfoot, The effects of volunteering on the physical and mental health of older people. *Res. Aging* **27**, 31–55 (2005).
48. A. H. S. Harris, C. E. Thoresen, Volunteering is associated with delayed mortality in older people: Analysis of the longitudinal study of aging. *J. Health Psychol.* **10**, 739–752 (2005).
49. D. O'Reilly, M. Rosato, F. Ferry, J. Moriarty, G. Leavy, Caregiving, volunteering or both? Comparing effects on health and mortality using census-based records from almost 250,000 people aged 65 and over. *Age Ageing* **46**, 821–826 (2017).
50. M. Perkins et al., Caregiving strain and all-cause mortality: Evidence from the REGARDS study. *J. Gerontol. B Psychol. Sci. Soc. Sci.* **68**, 504–512 (2013).
51. R. Schulz, S. R. Beach, Caregiving as a risk factor for mortality: The caregiver health effects study. *JAMA* **282**, 2215–2219 (1999).
52. N. I. Eisenberger, An empirical review of the neural underpinnings of receiving and giving social support: Implications for health. *Psychosom. Med.* **75**, 545–556 (2013).
53. B. N. Uchino, T. W. Smith, C. A. Berg, Spousal relationship quality and cardiovascular risk: Dyadic perceptions of relationship ambivalence are associated with coronary-artery calcification. *Psychol. Sci.* **25**, 1037–1042 (2014).
54. L. F. Berkman, S. L. Syme, Social networks, host resistance, and mortality: A nine-year follow-up study of Alameda County residents. *Am. J. Epidemiol.* **109**, 186–204 (1979).
55. K. P. Smith, N. A. Christakis, Social networks and health. *Annu. Rev. Sociol.* **34**, 405–429 (2008).
56. K. S. Zee, N. Bolger, Visible and invisible social support: How, why, and when. *Curr. Dir. Psychol. Sci.* **28**, 314–320 (2019).
57. J. O. G. Brim, C. D. Ryff, R. C. Kessler, *How Healthy Are We? A National Study of Well-Being at Midlife* (University of Chicago Press, Chicago, IL, 2004).
58. A. S. Rossi, *Caring and Doing for Others: Social Responsibility in the Domains of Family, Work, and Community* (University of Chicago Press, Chicago, IL, 2001).
59. Y. H. Jou, H. Fukada, Stress, health, and reciprocity and sufficiency of social support: The case of university students in Japan. *J. Soc. Psychol.* **142**, 353–370 (2002).
60. B. Ingersoll-Dayton, T. C. Antonucci, Reciprocal and nonreciprocal social support: Contrasting sides of intimate relationships. *J. Gerontol.* **43**, S65–S73 (1988).