

Original Article

Stress-Buffering Effects of Volunteering on Daily Well-Being: Evidence From the National Study of Daily Experiences

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Received: September 3, 2018; Editorial Decision Date: April 30, 2019

Decision Editor: Deborah Carr, PhD

Abstract

Objectives: Building on theoretical frameworks and empirical evidence linking volunteering and well-being in later life, we investigated the associations between daily engagement in formal volunteering, stressors, and negative and positive affect, focusing on the stress-buffering effect of volunteering.

Methods: We used 8 days of daily diary data from the second wave of the *National Study of Daily Experiences* (NSDE II), a national survey of middle-aged and older adults (participant $N = 1,320$; participant-day observation $N = 8,277$). A series of multilevel models were estimated to assess the within-person associations between daily volunteering, stressors, and affect.

Results: A direct link between daily volunteering and affect was not discovered. However, we found that the association between daily stressors and negative affect (but not positive affect) was weaker on days when volunteering was performed compared to days volunteering was not performed.

Discussion: Our findings suggested that the stress-buffering effect of volunteering contributes to improved emotional well-being for participants who volunteered on a daily basis. Future studies should investigate whether such stress-buffering effects are present for other forms of helping behaviors.

Keywords: negative affect, positive affect, MIDUS, caregiving system model

The scientific literature is replete with research on the benefits of formal volunteering (Carr, Fried, & Rowe, 2015). Such scholarly interest corresponds well with the growing number of older volunteers in the United States and elsewhere, and also fits well with the considerable efforts made by policy makers and practitioners to take advantage of this growing trend (Foster-Bey, Dietz, & Grimm, 2007; Johnson & Mutchler, 2014). The reasons for the continued interest in volunteering among the older population are manifold, which can be summarized by the observation that volunteering poses a win–win–win proposition for individuals and organizations on both the giving and receiving ends of the volunteer activity, as well as for the society as a whole (Carr et al., 2015).

Researchers have paid considerable attention to the robust health benefits associated with volunteering among older persons who give their time and effort for the purpose of helping others (Anderson et al., 2014). To date, the mechanisms through which volunteering may benefit health have been most commonly explained by social and psychological factors. Volunteering is argued to generate greater social integration, role accumulation and identity, social support and social interaction, and reinforcement for engagement in healthy behaviors (Pilkington, Windsor, & Crisp, 2012; Thoits, 2012). Also, a greater sense of mattering, purpose, self-efficacy, and generativity is associated with engaging in volunteering (Müller, Ziegelmann, Simonson, Tesch-Römer, & Huxhold, 2014).

A recent development in this field focuses on the neurobiological mechanisms underlying the link between volunteering and better health (Burr, Han, & Tavares, 2016; Han, Kim, & Burr, 2018; Kim & Ferraro, 2014). Relatedly, researchers have shown that the health benefits associated with volunteering may be understood in the context of a stress-buffering process associated with the release of protective hormones in the brain (Brown & Okun, 2014; Okun, Yeung, & Brown, 2013). This neurobiological framework for understanding the link between volunteering and health complements other psychosocial explanations offered in earlier research. However, the extent to which a stress-buffering process is associated with formal volunteering remains understudied.

The aim of this study was to contribute to the literature on volunteering and well-being, focusing on the potential stress-buffering role of volunteering. Specifically, we utilized 8 days of diary data from the *National Study of Daily Experiences (NSDE) II* to examine within-person associations between daily volunteering, stressors, and emotional well-being, as assessed with negative and positive affect, thereby contributing to our understanding of the potential short-term benefits of volunteering. To the best of our knowledge, this is the first study based on a daily diary study design to treat volunteering as a buffer for the association between stressors and emotional well-being. By employing a within-person analytic approach, we are also able to partially address the issue of social selection processes that undermine findings from earlier studies on volunteering and well-being outcomes (Li & Ferraro, 2006).

Literature on Volunteering and Health

The robust health benefits associated with volunteering are widely attributed to a set of inter-related behavioral, cognitive, and psychosocial mechanisms (Anderson et al., 2014; Fried et al., 2004). The majority of evidence linking volunteering and better health comes from studies that focused on the psychosocial features, as researchers often draw from, and find support for, theories about social integration, role enhancement, and control beliefs (Müller et al., 2014; Pilkington et al., 2012; Thoits, 2012). These psychosocial mechanisms (often unobserved in these studies) were frequently offered as theoretical frameworks for explaining the various health outcomes, including mortality, associated with volunteering in later life (Anderson et al., 2014; Morrow-Howell, 2010). Regarding the direct effects of volunteering on well-being, however, the findings were more consistent for some outcomes compared to others. For emotional well-being outcomes, researchers found that volunteering was related to positive affect, but not negative affect. This may be the case because volunteering did not necessarily prevent individuals from experiencing negative emotions (Greenfield & Marks, 2004; Kahana, Bhatta, Lovegreen, Kahana, & Midlarsky, 2013; Pilkington et al., 2012; Windsor, Anstey, & Rodgers, 2008; but see

also Müller et al., 2014). In this study, we extend this body of literature by examining whether a direct link between volunteering and affect (i.e., positive as well as negative affect) is present on a daily basis.

Surprisingly few studies have investigated the potential stress-buffering effects of volunteering. In the small body of extant research, scholars referred to the psychosocial benefits of volunteering as a theoretical basis for why engaging in volunteering would protect individuals from the detrimental consequences of stressful life events (Carr, Kail, Matz-Costa, & Shavit, 2018; Greenfield & Marks, 2004; Li, 2007). However, findings from earlier research were inconsistent. On the one hand, volunteer participation was found to weaken the link between major stressful life experiences, such as spousal bereavement and loneliness (Carr et al., 2018), and depressive symptoms and self-efficacy (Li, 2007). On the other hand, volunteering did not alleviate the association between role loss, an assumed stressor, and negative and positive affect, although volunteering did show some buffering effects with regard to subjects' purpose in life (Greenfield & Marks, 2004). The findings from these studies were limited by shortcomings associated with use of data based on lengthy observation intervals (e.g., 2–5 years between observations) or cross-sectional designs, as well as likely social selection bias (Li & Ferraro, 2006).

The current study addressed these shortcomings by using daily diary data and a within-person analytic approach that treats study subjects as their own controls, ameliorating to a degree consequences of omitted variable bias. Also, bringing to bear day-to-day observations to examine the association between volunteering and well-being is rare. Finally, investigating the potential stress-buffering effects of volunteering for well-being helped address another shortcoming in the literature, namely whether volunteering provided protection against the detrimental effects of *daily* stressors. Taking into consideration the health effects of minor stressors experienced on a daily basis (e.g., spousal conflict, work deadlines) is important because research indicates that stress reactivity to minor stressors significantly contributes to physiological wear and tear (i.e., allostatic load), which in turn leads to short-term and long-term health consequences, including mortality (Chiang, Turiano, Mroczek, & Miller, 2018; Leger, Charles, & Almeida, 2018; Piazza, Charles, Sliwinski, Mogle, & Almeida, 2013). The key objective of this study was to investigate whether daily volunteering attenuated stress reactivity (i.e., the association between daily stressors and emotional well-being). Following earlier studies, stress reactivity was assessed with negative affect, which is a well-established indicator of emotional stress reactivity, as well as positive affect.

Volunteering and the Caring System Model

Previously, researchers who studied the association between volunteering and health have provided cogent arguments

about how the psychosocial benefits of volunteering help to explain the mid- to long-term health benefits (Thoits, 2012). However, these explanations did not lend themselves to providing a conceptual grounding for examining short-term benefits, such as those associated with *daily* within-person observations linking volunteering, stressors, and emotional well-being. This is in part because the assumed beneficial psychosocial features of volunteering (e.g., social integration, role identity, self-efficacy) are relatively stable over time and likely do not fluctuate on a daily basis when compared with biological and physiological processes related to more labile markers of well-being, such as mood and affect (Ertel, Glymour, & Berkman, 2009; Lachman, Neupert, & Agrigoroaei, 2011).

In this regard, we argue that a neurobiological conceptual framework of helping offers another plausible explanation for the volunteering-health nexus, complementing explanations based on psychosocial mechanisms (Brown & Brown, 2017; Inagaki, 2018). This relatively recent conceptual framework, referred to as the caregiving system by Brown and colleagues (2014; 2017), argued that helping behavior is an evolved and adaptive trait for human survival that has its foundations in parental caregiving provided to offspring, which over long periods of human history was extended to help and care provided to extended kin and non-kin who are identified as being in need (Brown & Brown, 2017). Researchers asserted that the neurobiological system underlying helping behaviors involves a stress-buffering mechanism in the brain, which downregulates self-serving motives that might otherwise inhibit individuals from helping others in need (Brown & Brown, 2017; Inagaki, 2018). Importantly, the proposed hormonal correlates of the stress-buffering mechanism, such as oxytocin, are known to provide downstream health benefits by suppressing autonomic responses to stress and thus reducing allostatic load; that is, neurobiological processes that guide helping behaviors further protect the helper's health by providing a stress-buffering mechanism for stressors in general (for a detailed discussion, refer to Brown & Brown, 2017; Inagaki, 2018). The neurobiological mechanism is unobserved in this study due to data limitations, but this potential mechanism provides an additional useful framework for understanding how engaging in volunteer work may downregulate stress reactivity.

Discretion on the part of helpers regarding when and how support is provided, and the other-oriented motivations underlying the helping behavior may be among the most important factors that influence the stress-buffering processes (Brown & Brown, 2017; Inagaki, 2018). Formal volunteering, a discretionary behavior, is often considered a form of other-focused helping behavior that satisfies the conditions for triggering the neural stress-buffering process (Brown & Okun, 2014). Such characterization may be especially relevant for volunteering conducted in later adulthood, as most of the volunteer endeavors by recent cohorts of individuals in later life are performed within

the context of religious organizations and health service agencies, and are likely to be motivated by the desire to help others (Foster-Bey et al., 2007; Morrow-Howell, 2010; Yamashita, Keene, Lu, & Carr, 2019). A recent study based on the NSDE data found that engaging in formal volunteering buffers hormonal reactivity to stressors, as measured with salivary cortisol, among a sample of older adults who volunteered monthly for healthcare and youth-related organizations, providing support for a neurobiological stress-buffering process associated with volunteer activities (Han et al., 2018). In addition, earlier studies that focused on other biomarkers associated stress regulatory systems also reported salubrious linkages with volunteering, such that middle-aged and older volunteers were shown to have lower levels of allostatic load, as indicated by levels of C-reactive protein (Kim & Ferraro, 2014), lipid metabolism (Burr et al., 2016), and systolic and diastolic blood pressure (Burr, Tavares, & Mutchler, 2011), when compared to non-volunteers.

Study Objectives

The current study extends the work of Han et al. (2018) by addressing the following questions: (a) was daily volunteer participation associated with negative and positive affect measured daily (main effect model)? and (b) did daily volunteering buffer the effects of daily stressors on negative and positive affect (moderation model)? We also explored whether previous day volunteering activity would yield similar main effects and stress-buffering effects as same day volunteering. This approach is motivated by an earlier study based on a sample of younger adults that showed the link between helping behaviors and stress-related cardiovascular activity was extended into the following day (Piferi & Lawler, 2006).

Design and Methods

Data and Study Sample

This study was based on data from the second wave of the *National Study of Daily Experiences* (NSDE II; Almeida, McGonagle, & King, 2009), a part of the *Midlife Development in the United States* Survey (MIDUS II; Brim, Ryff, & Kessler, 2004). The NSDE used daily diary methodology to examine daily stress, well-being, and other experiences among 2,022 study participants, who were contacted for daily telephone interviews for eight consecutive days (for detailed information, see Almeida et al., 2009).

The study sample was constrained to individuals who were 50 years old and older ($n = 1,352$); from this sample of middle-aged and older participants, we excluded those who did not complete the daily interviews for at least two consecutive days during the course of the 8-day observation period, this was necessary given the use of previous

day information in the analyses ($n = 28$). Participants with missing information on other study variables were also excluded ($n = 4$). The final analytic sample included 1,320 participants who provided data for 8,277 participant days.

Measures

Daily Well-Being

Negative and positive affect were assessed using scales developed for the MIDUS study (Ryff & Almeida, 2009). Negative affect was assessed by having participants rate how much of the time they experienced the following 14 negative emotions on the day of the interview: “restless or fidgety,” “nervous,” “worthless,” “so sad nothing could cheer me up,” “that everything was an effort,” “hopeless,” “lonely,” “afraid,” “jittery,” “irritable,” “ashamed,” “upset,” “angry,” and “frustrated.” Similarly, positive affect was assessed with the following 13 items: “in good spirits,” “cheerful,” “extremely happy,” “calm and peaceful,” “satisfied,” “full of life,” “close to others,” “like you belong,” “enthusiastic,” “attentive,” “proud,” “active,” and “confident.” Responses for each emotion were rated on a 5-point scale (0 = none of the time; 4 = all of the time). The average score for the respective items for negative and positive affect for each day was used in the models. Cronbach’s alpha ranged from .79 to .83 for negative affect and .92 to .94 for positive affect across the observation days.

Daily Stressors

The Daily Inventory of Stressful Events index (Almeida, Wethington, & Kessler, 2002) was used to assess daily stressors. Each observation day, participants were asked a series of stem questions regarding whether they had experienced each of the following seven stressors in the past 24 hr: arguments, potential arguments, work stressors, home stressors, network stressors (i.e., stressors that happened to other people in the participant’s network), discrimination stressors, and other stressors. Dichotomous responses (1 = experienced stressor; 0 = did not experience stressor) for the seven items were then summed, with higher scores indicating more daily stressors (i.e., total number of daily stressors).

Daily Volunteering

Daily volunteer work was assessed with the question, “Since (this time we spoke) yesterday, did you spend any time doing formal volunteer work at a church, hospital, senior center, or any other organization?” For participants who worked at such places as a church or nursing home, it was made clear that only unpaid voluntary work was counted as volunteer work. Based on the responses to this question, daily volunteering was coded dichotomously (1 = yes; 0 = no).

Daily Covariates

We considered several daily measures that could potentially confound the associations between stressors, volunteering,

and emotional well-being. These measures included (a) daily experiences of cutting back on the normal work day for various reasons (1 = yes; 0 = no) to account for effects of a potential role conflict caused by volunteer work (Thoits, 2012), (b) vigorous physical activity or exercise (1 = yes; 0 = no) to account for a physical activity function served by volunteering (Anderson et al., 2014), and (c) day of the week (1 = Monday through Friday, 0 = Saturday and Sunday) to account for systematic daily patterns of volunteer work engagement; these factors may in turn influence daily emotional well-being.

Another measure related to daily volunteering available from the NSDE captured whether the participant had an experience associated with their volunteer position (or at work) that most people would consider particularly positive (1 = yes; 0 = no). This measure of daily positive experience allowed us to better isolate the potential stress-buffering effects of volunteering associated with helping behaviors while accounting partially for the potential influences of social-psychological benefits of volunteering. We note that the key findings from the study remained consistent regardless of whether this measure was included in the analyses.

Background Characteristics

Several participant sociodemographic and health characteristics were also taken into consideration as time-invariant covariates. Sociodemographic covariates included age (in years), gender (1 = female; 0 = male), race (1 = White; 0 = other race categories; collapsed due to small sample size), marital status (1 = married; 0 = not married), education level (1 = some high school/high school graduate (reference); 2 = some college/college graduate; 3 = some graduate school or above), and employment status (1 = working for pay; 0 = not working for pay). Health was assessed with a measure for self-rated health (1 = poor; 5 = excellent).

Analytic Plan

We began by examining the characteristics of the study sample, and also performed bivariate analyses of daily affect and other daily covariates by daily volunteering to examine whether involvement in volunteering was associated with differences in daily characteristics. The research questions were addressed using a series of multilevel models (two-level), where observation days (level 1) were nested within persons (level 2). Specifically, we used a within-between random effects model approach, where each time-varying variable is decomposed into between-person (BP; level 2; person-mean across occasions) and within-person (WP; level 1; deviation from the person-mean at a given occasion) components (Bell & Jones, 2015; Schunck, 2013). This approach allowed for obtaining within-person effects that are independent of selection effects and omitted characteristics attributed to all stable inter-individual differences, both observed and unobserved (Bell & Jones, 2015).

First, we examined the associations between daily stressors, volunteering, and measures of daily affect, controlling for all daily (time-varying) and background (time-invariant) characteristics (Model 1A for negative affect; Model 1B for positive affect). Given the potential lagged effects of volunteering, previous day volunteering status was added as a level-1 variable; as well, we controlled for the effects of previous day stressors on daily well-being (Leger et al., 2018). The level-1 (WP) equation for the multilevel model was as follows:

$$\begin{aligned} \text{Daily well-being}_{it} = & b_{0i} + b_{1i} (\text{WP: Same day stressor}_{it}) \\ & + b_{2i} (\text{WP: Previous day stressor}_{t-1i}) \\ & + b_{3i} (\text{WP: Same day volunteering}_{it}) \\ & + b_{4i} (\text{WP: Previous day volunteering}_{t-1i}) \\ & + b_{5i} (\text{WP: Daily covariates}_{it}) + e_{it}, \end{aligned}$$

where daily well-being is person *i*'s negative or positive affect on day *t*, b_{0i} is the individual-specific intercept; b_{1i} and b_{3i} are the coefficients for daily stressors and volunteering (i.e., same day; day *t*), respectively; b_{2i} and b_{4i} are the coefficients for 1-day lagged effects of daily stressors and daily volunteering (i.e., previous day; day *t*-1). Daily covariates for person *i* on same day *t* (b_{5i}) were also added to the model as controls. At level 2, we added to the model all background characteristics, as well as BP effects of all daily covariates (i.e., person-mean of daily measures).

In subsequent models, we examined the buffering effects of volunteering for the associations between daily stressors and the affect measures by introducing an interaction term between daily stressors and same day volunteering (Model 2), as well as an interaction term for daily stressors and previous day volunteering (Model 3). The interaction terms were also decomposed into within- and between-components so that estimated interaction effects were unbiased relative to stable omitted characteristics (Schunck, 2013). For measures of model fit, we provided the level-specific R^2 statistics representing proportional reductions in modeled variance from the empty model, as calculated by the approach put forth by Snijders and Bosker (1999). All multilevel analyses were performed using the STATA MIXED procedure (StataCorp, 2017).

Results

Background characteristics of the study sample are presented in Table 1. The mean age of the study sample was approximately 63 years. Approximately 57% of the participants were female, and the majority of the sample was white (86%) and married (70%). Most of the participants had at least some college education (67%) and about half were working for pay (63%).

Bivariate differences in daily characteristics by daily volunteer status are presented in Table 2—volunteer days

Table 1. Background Characteristics of the Study Sample

Variables	M (SD)
Age (range: 50–84)	63.00 (8.75)
Female, %	56.7
White, %	85.5
Married, %	68.9
Education level, %	
Some high school/high school graduate	32.9
Some college/college graduate	48.4
Some graduate school and higher	18.7
Working, %	50.3
Self-rated health ^a	3.51 (1.01)

Notes: Person N = 1,320.

^aRated from 1 (*poor*) to 5 (*excellent*).

($n = 722$; 9% of total study days) versus non-volunteer days ($n = 7,555$; 91% of total study days). Participants reported better well-being on volunteer days compared to non-volunteer days, as indicated by lower levels of negative affect ($p = .001$) and higher levels of positive affect ($p < .001$). However, participants showed more stressors on volunteer days, compared to non-volunteer days ($p < .001$). Also, participants were more than three times more likely to report positive experiences on volunteer days compared to non-volunteer days ($p < .001$).

Results from the main effect models of stressors and volunteering for daily negative affect (Model 1A) and positive affect (Model 1B) are presented in Table 3. The number of same-day stressors was associated with increased levels of negative affect (Model 1A; $b = 0.11, p < .001$) and reduced levels of positive affect (Model 1B; $b = -0.10, p < .001$), holding other factors in the model constant. However, neither same day nor previous day volunteering were associated with either measure of daily affect.

The research questions regarding stress-buffering effects of volunteering were addressed in the moderation effect models that included the interaction terms between daily stressors and volunteering (Table 4). Models 2A and 3A examined stress-buffering effects of same day and previous day volunteering for negative affect, respectively. As indicated by the statistically significant coefficients for the interaction term involving daily stressors with same day volunteering ($b = -0.04, p = .001$) and previous day volunteering ($b = -0.04, p < .001$), we found support for a buffering effect of volunteering for the association between daily stressors and negative affect. That is, the association between the number of daily stressors and negative affect was weaker on days when an individual engaged in same day or previous day volunteering, compared to when the same person did not engage in volunteer work (see Figure 1 for a graphical representation of the results). As indicated in Models 2B and 3B, however, volunteering did not moderate the association between daily stressors and positive affect.

Table 2. Daily Characteristics by Volunteering Status

Variables	Days volunteered ($n_{\text{day}} = 722$)	Days not volunteered ($n_{\text{day}} = 7,555$)	t or χ^2
	M (SD)	M (SD)	
Negative affect	0.12 (0.22)	0.16 (0.29)	-10.84**
Positive affect	2.97 (0.65)	2.83 (0.78)	23.27***
Number of stressors	0.51 (0.75)	0.40 (0.64)	17.97**
Positive experience, %	26.2	7.9	254.78***
Cut-back on work, %	6.2	8.3	3.73
Vigorous exercise, %	23.4	25.3	1.25
Weekday, %	69.9	72.7	2.57

Notes: Person $N = 1,320$; Person-day observation $N = 8,277$. Differences in daily characteristics by volunteer status were tested using t -tests for continuous variables and chi-square tests for categorical variables.

** $p < .01$. *** $p < .001$.

In general, other daily and background characteristics were associated with measures of affect in the expected direction (Table 3). Participants reported higher levels of negative affect and lower levels of positive affect on days they reported cutting back on work (due to any reason, potentially due to time constraints) compared to days they did not reduce work activity, and also during weekdays compared to weekends (WP effects). Participants who, on average, reported lower levels of daily stressors, volunteered more, had more positive experiences, and reported cutting back on work less frequently during the observation period also showed better emotional well-being (BP effects). In addition, those who were older, married, and rated their health more positively reported better daily emotional well-being compared to their counterparts.

Discussion

Drawing on scientific literature regarding the benefits of volunteering for health and the theoretical foundations regarding the stress-buffering processes underlying helping behaviors (Brown & Brown, 2017; Inagaki, 2018), we sought to contribute to the literature by investigating the within-person associations between volunteering, stressors, and emotional well-being. Using daily diary data from the NSDE II, we found that reactivity to daily stressors was significantly attenuated by engagements in daily formal volunteering but did not find any evidence for a direct association between volunteering and emotional well-being. Thus, one key contribution of this study was that we extended the research literature on volunteering and well-being by highlighting the often-overlooked stress-buffering process for this specific type of helping behavior using daily observation data (Anderson et al., 2014; Guiney & Machado, 2018). The study findings are also in line with the neurobiological stress-buffering process framework as theorized in the caregiving system model; however, we did not directly evaluate the underlying biological components of this theory (Brown & Brown, 2017).

Our findings suggested a robust association between previous and same day volunteering and dampened emotional stress reactivity as related to negative affect only. Contrary to our expectations, we did not find evidence for the main effect of volunteering and emotional well-being; that is, there were no direct associations between volunteering (both previous day and same day) and emotional well-being, as assessed with negative and positive affect. However, our results demonstrated that those who volunteered more during the observation period had better emotional well-being compared to those who volunteered less, including non-volunteers (i.e., between-person effects), which is consistent with findings from the broader literature on volunteering and health (Anderson et al., 2014).

Taken together, our findings suggested that short-term benefits associated with daily volunteering were largely based on the stress-buffering effects of helping others, rather than through a direct effect. The small but statistically significant stress-buffering effects of volunteering found in this study should be interpreted in light of a growing body of evidence indicating that volunteering is associated with a number of biomarkers related to stress response processes, including the activation of C-reactive protein, lipid markers, and salivary cortisol (Burr et al., 2011; Han et al., 2018; Kim & Ferraro, 2014).

In this context, it is plausible that the association between volunteering and dampened daily stress reactivity observed in this study is an additional pathway through which short- and long-term health were related. More research is needed to verify this possibility. Nevertheless, recent studies found that small differences in affective stress reactivity had significant implications for future health in terms of developing mental disorders and chronic health conditions, as well as mortality, over a 10- to 20-year observation period (Chiang et al., 2018; Leger et al., 2018; Piazza et al., 2013). This was especially the case when the stress reactivity was not mitigated and the adverse effects carried over to the following day. Thus, engagement in formal volunteering may

Table 3. Multilevel Models for Daily Affect: Main Effect Models

Variables	Negative affect		Positive affect	
	Model 1A		Model 1B	
	<i>b</i>	(SE)	<i>b</i>	(SE)
Fixed effects				
Intercept	0.15***	(0.04)	2.87***	(0.15)
Daily characteristics				
<i>Within-person effects</i>				
Stressors: Same day	0.11***	(0.00)	-0.10***	(0.01)
Stressors: Previous day	0.01***	(0.00)	-0.01	(0.01)
Volunteering: Same day	-0.01	(0.01)	0.02	(0.02)
Volunteering: Previous day	-0.00	(0.01)	-0.01	(0.02)
Positive experience: Same day	0.01	(0.01)	0.04*	(0.02)
Positive experience: Previous day	-0.01	(0.01)	0.03*	(0.01)
Cut-back on work	0.13***	(0.01)	-0.37***	(0.02)
Vigorous exercise	-0.01*	(0.01)	0.06***	(0.01)
Weekday	0.03***	(0.00)	-0.03***	0.01)
<i>Between-person effects</i>				
Stressors	0.22***	(0.01)	-0.46***	(0.05)
Volunteering	-0.08*	(0.03)	0.24*	(0.10)
Positive experience	-0.08*	(0.04)	0.30*	(0.12)
Cut-back on work	0.30***	(0.03)	-0.62***	(0.10)
Vigorous exercise	0.00	(0.02)	0.15*	(0.06)
Weekday	-0.07	(0.05)	0.19	(0.17)
Background characteristics				
Age ^a	-0.01***	(0.00)	0.01***	(0.00)
Female	0.00	(0.01)	0.07	(0.04)
White	0.01	(0.01)	-0.18***	(0.05)
Education^b				
Some college/college graduate	-0.03*	(0.01)	-0.03	(0.04)
Some graduate school and higher	-0.01	(0.02)	-0.11*	(0.05)
Married	-0.02*	(0.01)	0.08*	(0.04)
Working	-0.02	(0.01)	0.07	(0.04)
Self-rated health ^a	-0.04***	(0.01)	0.14***	(0.02)
Random effects				
Intercept variance (Level 2)	0.03***	(0.00)	0.36***	(0.01)
Residual variance (Level 1)	0.03***	(0.00)	0.13***	(0.00)
Model fits				
-2 log-likelihood	-2,165.80		10,321.70	
Level 1 R ²	24.7%		17.5%	
Level 2 R ²	32.6%		19.7%	

Notes. SE = standard error. Person N = 1,320; Person-day observation N = 8,277.

^aGrand mean-centered.

^bReference category = some high school/high school graduate.

p* < .05. *p* < .01. ****p* < .001.

have served as an important protective factor against the harmful effects of everyday stressors on long-term health. It is also possible that the long-term health benefits of volunteering consistently reported in the literature based on observational and randomized control trial studies with lengthy intervals between observations were in part driven by protective effects of volunteering for mitigating day-to-day, wear and tear of stressors over an extended duration

of time (Anderson et al., 2014). More studies are needed to confirm these possibilities.

Although not central to the study objectives, it is worth mentioning that participants reported experiencing more stressors on days they volunteered compared to days they did not volunteer. This suggested the possibility that volunteering serves as a unique stressor. However, given the pronounced buffering effects of *previous day volunteering* on the association

Table 4. Multilevel Models for Daily Affect: Moderation Effect Models

Variables	Negative affect				Positive affect			
	Model 2A		Model 3A		Model 2B		Model 3B	
	<i>b</i>	(SE)	<i>b</i>	(SE)	<i>b</i>	(SE)	<i>b</i>	(SE)
Fixed effects								
Daily characteristics								
<i>Within-person effects</i>								
Stressors: Same day	0.11***	(0.00)	0.11***	(0.00)	-0.10***	(0.01)	-0.10***	(0.01)
× Volunteering: Same day	-0.04**	(0.01)	-		0.01	(0.02)	-	
× Volunteering: Previous day	-	-	-0.04***	(0.01)	-		-0.01	(0.02)
Volunteering: Same day	0.01	(0.01)	-0.01	(0.01)	0.01	(0.02)	0.02	(0.02)
Volunteering: Previous day	-0.00	(0.01)	0.01	(0.01)	-0.01	(0.02)	-0.01	(0.02)
Random effects								
Intercept variance (Level 2)	0.03***	(0.00)	0.03***	(0.00)	0.36***	(0.01)	0.36***	(0.01)
Residual variance (Level 1)	0.03***	(0.00)	0.03***	(0.00)	0.13***	(0.00)	0.13***	(0.00)
Model fits								
-2 log-likelihood		-2,184.52		-2,180.70		10,316.16		10,313.66
Level 1 <i>R</i> ²		25.0%		24.9%		17.7%		17.9%
Level 2 <i>R</i> ²		32.9%		32.8%		20.1%		20.2%

Notes: SE = standard error. Person *N* = 1,320; Person-day observation *N* = 8,277. Models were adjusted for the full set of daily characteristics (previous day stressors, positive experience, cut-back on work, vigorous exercise, and weekday; both within-person and between-person effects) and background characteristics (age, race, education, marital status, employment status, and self-rated health).

p* < .05. *p* < .01. ****p* < .001.

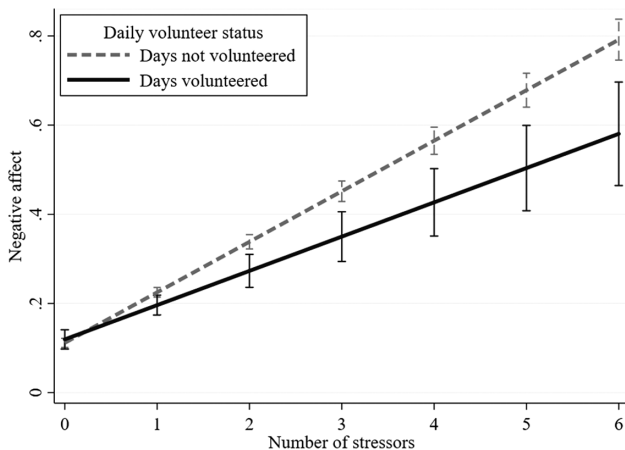


Figure 1. Predicted negative affect (and 95% confidence interval) by same day volunteer status for varying numbers of daily stressors, holding covariates constant at their mean values. The plots are based on estimated parameters from the multilevel model (Model 2A). Given that the estimates for stress-buffering effects are very similar for same day and previous day volunteering, interaction plots are nearly identical for Model 2B (not shown).

between stressors and daily emotional well-being, our main findings were unlikely to have been driven by stressors potentially caused by the experience of volunteering. Also, the positive association between volunteering and stressors raised a question about whether the act of providing help and support to others in need can be considered a “challenge” stressor, rather than a “hindrance” stressor contributing to individuals’

emotional well-being (Cavanaugh, Boswell, Roehling, & Boudreau, 2000). Exploring whether volunteering provides stressful, yet positive experiences of challenge and responsibility in relation to health outcomes would be a fruitful area for future research.

Limitations

There are limitations to this study. First, information regarding daily volunteering available from the NSDE was limited, and we were not able to consider such factors as the nature and type of volunteer work, the relationship between the volunteer and those who were helped, or the motivations for volunteering. Further, the findings regarding the stress-buffering effects of daily volunteering for emotional well-being were only suggestive of support for the proposed neurobiological stress-buffering process because we did not have access to the candidate hormones identified in the caregiving system model. Where possible, future studies should consider detailed information regarding volunteer work, as well as the hormonal correlates hypothesized to be activated through the provision of helping behaviors (e.g., oxytocin; Brown & Brown, 2017; Inagaki, 2018). Also, the key measures (i.e., volunteering, stressors, emotional well-being) used in this study relied on retrospective self-reports of events and emotions experienced during the previous day and we were not able to verify the temporal order among the key measures. Using more objective measures with detailed information on timing of events and key measures would provide further insight into the complex stress-buffering processes

posited here. Despite the within-person analytic approach taken in this study, we were not able to discuss the findings in causal terms due to the observational nature of the data. Although our main findings on “within-person” associations are unaffected by unobserved person-level characteristics (Bell & Jones, 2015; Schunck, 2013), it is not possible to rule out omitted variable bias associated with unmeasured characteristics that vary on a daily basis. Also, we note that sample selectivity common in large national studies such as the NSDE and MIDUS may limit the generalizability of our findings (Abraham, Helms, & Presser, 2009).

Contributions and Future Research Directions

This was among the first studies based on a daily diary framework to examine the main effects and stress-buffering effects of volunteering on emotional well-being. More studies are needed to assess whether the neurobiological framework helps us understand why helping others may yield health benefits (Brown & Brown, 2017; Inagaki, 2018). As formal volunteering is only one of many consequential ways in which older adults provide help and support to other people in their social network and in the community (Burr, Mutchler, & Caro, 2007), future studies should examine whether similar stress-buffering effects are present for other forms of helping behaviors, such as caregiving, grandparenting, and informal helping. This study also contributed to the literature on volunteering and emotional well-being by using a within-person analytic approach, directly addressing the issue of social selection that undermines findings from earlier studies. In future research, relevant theoretical frameworks that help explain the salutary effects of volunteering should be expanded to include stress-buffering, which was largely absent in recent elaborations of theoretical models linking volunteering and health (Anderson et al., 2014; Guiney & Machado, 2018).

Author Contributions

S. H. Han planned the study, performed statistical analyses, and wrote the article. K. Kim and J. A. Burr helped to plan the study and contributed to the writing and revision of the article.

Funding

The MIDUS study has been funded by the following: John D. and Catherine T. MacArthur Foundation Research Network National Institute on Aging (P01-AG020166) National Institute on Aging (U19-AG051426).

Conflict of Interest

None reported.

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