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Variations in Daily Cognitive Affective States as a Function of Variations in Daily Generative Activity

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Abstract Greater perceived and actual generative, or contributory, engagement predicts more favorable psychosocial and physical well-being with advancing age. Although theoretical formulations of prosocial behavior suggest self-enhancement, social connectedness, and positive emotion pathways might underlie such links, empirical examination of these connections remains limited. These associations were examined using data from the National Study of Daily Experiences ($n = 1747$) in the National Survey of Midlife Development in the United States. Multilevel regression models examined person-level and day-level indicators of three forms of generative activity (volunteering, emotional support, informal help) as predictors of daily self-enhancement, social connectedness, and positive affect states over an 8-day period, controlling for sociodemographic factors. At the daily level, both volunteering and giving informal help were found to be associated with greater feelings of self-enhancement and social connectedness. Though the between-person effects of informal help were not significant, individuals who volunteered more, on average, also experienced greater average feelings of positive affect and social connectedness than those who volunteered less or not at all. In contrast, giving emotional support to others was associated with slightly lower levels of these cognitive–affective correlates on a given day, and on average. Observed daily cognitive–affective correlates of different generative activities suggest potential pathways through which such activities may be linked to well-being over time.

Keywords Volunteering · Psychological well-being · Activities, contribution, civic engagement

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1 Introduction

In the words of Booker T. Washington, "If you want to lift yourself up, lift up someone else." Indeed, research has supported the observation that in giving to others, one may also benefit him or herself. One theoretical framework through which researchers have investigated this occurrence is the construct of generativity. Generativity is defined as concern and activity devoted to the promotion of the well-being of others, including friends, family, and the community (Erikson 1950; Gruenewald et al. 2012). The developmental psychologist Erik Erikson proposed generativity as a key milestone of psychosocial development in midlife. While the focus on caring for others and guiding the next generation is postulated to attain greatest significance in midlife, generative strivings have been found to remain important into older age as well (Erikson 1963; McAdams et al. 1993; Villar 2012). Individuals can be generative in a variety of different ways, including through work and professional activities, volunteer efforts, religious or political involvement, parenting, caregiving, and even friendship (McAdams and de St Aubin 1992). Generative engagement surfaces as a key component across many definitions of successful aging, supporting the idea that socially contributory activities lead to better health and well-being in later life (Depp and Jeste 2006; Rowe and Kahn 1998; Villar 2012).

1.1 Benefits of Generativity

Undoubtedly, individuals and the communities in which they live benefit immensely from the generative contributions of their citizens, but an accumulating body of research also suggests that generative individuals reap the benefits as well. Researchers have examined both engagement in generative activities, such as volunteering or caregiving, as well as individuals' self-perceptions of generativity, in relation to health and well-being. Individuals who have greater self-perceptions of generativity have been found to experience more favorable social, psychological, and physical well-being over time (Gruenewald et al. 2007, 2009; Grand et al. 1988). For example, Gruenewald et al. (2012) found that older adults with greater self-perceptions of generativity had lower risk of the development of disability and lower mortality than those who perceived themselves as less useful to others. Others have found similar links between greater feelings of usefulness and reduced morbidity and mortality (Grand et al. 1988; Okamoto and Tanaka 2004; Pitkala et al. 2004). Those with greater self-perceptions of generativity have also been found to experience enhanced levels of subjective well-being in later life, including fewer depressive symptoms, as compared to those who feel less generative (Gruenewald et al. 2007, 2009; McAdams et al. 1993).

Actual engagement in generative activities has also been found to be linked to better health and well-being. Volunteering, for example, is associated with countless personal benefits, including improved physical health and less functional dependency in older adulthood, increased psychological well-being and fewer depressive symptoms, greater quality of life, improved cognitive ability and slower cognitive decline, and lower mortality (O'Neill et al. 2011). Helping others has also been found to be associated with greater levels of happiness, life satisfaction, and self-esteem (Ellison 1991; Weinstein and Ryan 2010). Importantly, there is support for the beneficial effects of volunteerism and other types of helping behaviors across age groups. For example, older adults taking part in Experience Corps, a program in which seniors volunteer to help elementary school students with academic achievement and personal development, reported higher levels of social, cognitive, and physical activity compared to non-participants (Fried et al. 2004).

Specifically, studies have found that after 2 years of participation in the program, volunteers experienced fewer depressive symptoms and functional limitations (Hong and Morrow-Howell 2010). Participation in the program has also been found to lead to enhanced self-perceptions of generativity (Gruenewald et al. 2016) and a greater sense of purpose in life (Gruenewald et al. 2016). There has also been evidence suggesting short-term neurocognitive plasticity as a result of older adults' participation in the Experience Corps program (Carlson et al. 2009, 2015). Yet, older adults are not the only individuals who have been shown to benefit from engagement in contributory activities. Teenagers who help others have also been found to derive benefits, such as more positive social relationships, greater feelings of purpose in life, and increased self-acceptance (Schwartz et al. 2009), suggesting that generative activities may be beneficial across age groups. To date, however, little research has directly compared the strength of associations between generative engagement and specific indicators of well-being. Additionally, although this growing body of research suggests widespread benefits of generativity, less is known about *how* generativity might lead to such positive outcomes.

1.2 Potential Mechanisms Underlying the Benefits of Generativity

Theoretical and empirical formulations of prosocial behavior suggest several benefits of contributory behavior that may explain why more generative individuals experience better psychological and physical well-being, including specific cognitive–affective correlates of generative activity. The current study probes hypothesized cognitive and affective states posited to be linked to engagement in generative behavior including self-enhancement (self-esteem), positive affect, and social connectedness cognitions and emotions (McAdams et al. 1993; Post 2005). One theory that supports these empirical connections is role enhancement theory. An adaptation of role theory, role enhancement is a theory that has often been used to explain the positive link between volunteering and health. Role enhancement theory suggests that by assuming a productive role, such as volunteering, individuals (especially older adults) attain more resources, including larger social networks, as well as more power and prestige, which lead to better mental and physical health (Lum and Lightfoot 2005; Moen et al. 1992; Morrow-Howell et al. 2003). This theory supports the link between generative activities and stronger social connections as well as greater self-esteem ("power and prestige").

Empirical studies also suggest a positive relationship between contributory activities and positive affect, self-esteem, and social connectedness (Brown et al. 2012; Huta and Zuroff 2007; Kahana et al. 2013). For example, generative perceptions and generative activities (i.e. volunteering) have been shown to be associated with greater levels of positive affect (e.g. Greenfield and Marks 2004), a link that is also supported by individuals' reports that helping others makes them "feel good" (Musick and Wilson 2003). Greater self-esteem and social connectedness have been found to mediate the positive relationship between volunteering, a typically generative activity, and well-being (Brown et al. 2012). Research also supports an association between formal volunteering and greater positive affect (Greenfield and Marks 2004) and happiness (Dulin et al. 2012). To date, however, there has been little empirical examination of these hypothesized cognitive and affective correlates of generativity and little to no direct investigation at the daily level. This study makes an important contribution to the literature by employing daily diary surveys to test these hypothesized associations and gain a more in-depth understanding of the relationship between generativity and cognitive–affective well-being. Although collected data are observational in nature, examining these links on a tighter temporal level

than has been achieved by prior research may also provide more support for a potential causal role of generative activity on the three hypothesized cognitive–affective states.

1.3 Daily Experience Designs to Examine Correlates of Activity

Most of the observational studies examining the links between generative activity and well-being have relied on reconstructive accounts, assuming accurate memory and reporting among participants. Daily experience sampling methods, which obtain multiple assessments of behavior and experiences over short periods of time, are designed to capture experiences on a more proximal level (Hektner et al. 2007). The use of daily reports of both activity and affect reduces recall biases and increases reliability by providing more observations per subject. Daily experience sampling methods also allow for the opportunity to gain a more focused understanding of the relationship between generativity and cognitive–affective states by investigating these links at both the day- and person-level. Researchers have employed similar experience sampling methods to study other types of positive thoughts or activities, such as gratitude, optimism, acts of kindness, or writing about life goals, and they have found that engaging in positive or prosocial activities can have immediate and long term beneficial effects on well-being. These methods also allowed them to better understand some of the cognitive–affective mechanisms underlying the connections between their activity of interest and well-being (Emmons and McCullough 2003; King 2001; Lyubomirsky et al. 2011). For example, in a study on counting blessings in daily life, daily gratitude exercises were found to be associated with higher levels of positive affect, potentially one of the underlying cognitive–affective pathways linking feelings of gratitude to improved well-being (Emmons and McCullough 2003). Though researchers have utilized these methods to investigate cognitive–affective states linked to several different behaviors, to our knowledge, this methodology has not yet been employed to study generative activity and its associated cognitive–affective correlates. Examining these connections at the daily level can help promote a more focused understanding of the aforementioned larger scale positive associations between generativity and well-being.

1.4 Present Analysis

The primary aim of the current study was to capitalize upon the opportunity to utilize daily data to better understand whether cognitive–affective correlates vary with daily variations in generative activity. The current study provides an important addition to this realm of research in its in-depth examination of potential cognitive–affective correlates of generative activity at the daily level. The opportunity to examine these associations in a repeated-measures dataset allows for this unique contribution to the generativity literature. Limitations of prior studies have included the reliance on reconstructive accounts of participants' activities and feeling states, as well as wide-ranging, non-specific time scales. For instance, participants are often asked to recall their activities and feelings "over the past year" or "in general," which is subject to bias and inaccuracies. This study addresses these prior limitations by examining these associations on a more proximal time scale, facilitating a tighter temporal coupling between activity and feeling states. By providing a more in-depth understanding of the thoughts and feelings that flow from engagement in specific generative activities, this study contributes to a better understanding of how engagement in these activities might shape health and well-being in a positive direction, as prior research overwhelmingly suggests. We expect that on days when individuals have a

greater level of generative engagement, they will also experience greater feelings of self-worth, positive affect, and social connectedness.

2 Methods

2.1 Data and Participants

Data for this study come from the National Study of Daily Experiences (NSDE), a sub-study of the National Survey of Midlife Development in the United States (MIDUS). The MIDUS survey was designed with the goal of promoting the investigation of the role of psychological, social, and behavioral factors in shaping health and well-being with aging across the life course (www.midus.wisc.edu). The first wave of the MIDUS survey collected data from 7108 participants ages 25–74 and was administered in 1995/1996. Subjects were recruited to participate in the study through national random digit dialing and oversampling of 5 metropolitan cities in the United States. MIDUS II is the 10-year follow-up to the original MIDUS study in 2004/2006 (n = 4963 initial phone survey and n = 4041 for subsequent mail survey; see www.midus.wisc.edu). The present study utilized data from the NSDE II (from the second wave of the MIDUS Study) (2004–2006), as it contained a more comprehensive measurement of the cognitive–affective states of interest. The respondents were a sub-sample of 2022 participants from the larger MIDUS Study, ages 33–84. The NSDE involved collection of data via nightly phone interviews over a period of 8 days to assess respondents' daily experiences, activities, and affect (www.midus.wisc.edu), yielding up to 8 total measurement occasions.

2.2 Measures

2.2.1 Generative Activity

Each night, participants were asked about the activities in which they engaged that day. Three types of generative activity were assessed in the NSDE that are included as predictors in the present study, as they represent different ways individuals tend to contribute to the well-being of others. These include whether participants volunteered, gave informal help, or provided emotional support to others each day. For each type of activity, respondents were provided specific examples of activities that meet the criteria for each question.

2.2.2 Volunteering

Volunteering status was assessed with a Yes/No question asking whether participants spent any time on formal volunteer work. Specifically, they were asked, "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?" They were informed that formal volunteering experiences could include working on behalf of community organizations, local sports organizations, or any kind of voluntary work with an organization (e.g. coaching a softball team).

2.2.3 Informal Help

Informal help was measured similarly with another Yes/No question. Participants were asked, "Since (this time/we spoke) yesterday, did you spend any time giving any unpaid assistance to people who do not live with you, such as free baby-sitting or help with shopping?"

2.2.4 Emotional Support

Participants were also asked whether they provided emotional support to others each day (Yes/No). Specifically, they were asked, "Not counting work you might do as part of your job, did you spend any time giving emotional support to anyone, like listening to their problems, giving advice, or comforting them, since (this time/we spoke) yesterday?"

Dichotomous indicators were utilized to represent the continuous measures of time spent engaged in volunteering and informal help, as the distribution of hours for each variable was highly skewed, mostly due to a preponderance of individuals indicating little to no volunteer and informal helping activity.

2.2.5 Cognitive–Affective States

Daily psychological well-being measures of positive affect, self-enhancement, and social connectedness were examined as cognitive–affective correlates of generative activities. The items comprising these scales were drawn from individual thought and feeling items included in the repeated assessments each night. A factor analysis was conducted to confirm the fit of specific items to each scale.

2.2.6 Positive Affect

The positive affect scale asked participants for how much of the day they felt "cheerful," "satisfied," "enthusiastic," "full of life," "extremely happy," "calm and peaceful," and "in good spirits." All of these items were rated on a 5-point scale, ranging from 0 indicating "None of the time, to 4 indicating "All of the time." The item ratings were then averaged to compute a scale score for positive affect ($\alpha = 0.91$) (min: 0, max: 4).

2.2.7 Self-Enhancement

The self-enhancement scale consisted of the two questions assessing individuals' feelings of self-worth, specifically querying how much of the time each day they felt "confident" and "proud." Again, respondents were asked to rate their response to these questions on a 5-point scale measuring frequency of these feelings, and their ratings were averaged to create a self-enhancement scale score ($\alpha = 0.72$) (min: 0, max: 4).

2.2.8 Social Connectedness

The social connectedness scale was comprised of two questions querying respondents' feelings of social integration or connectedness. The scale consisted of the questions, "How much of the time did you feel close to others?" and "How much of the time did you feel

like you belong?" Again, these items were rated on a 5-point scale. Their ratings were then averaged to comprise a social connectedness score ($\alpha = 0.81$) (min: 0, max: 4).

2.2.9 Covariates

The analyses controlled for age, sex, race, and education. For race, a dummy variable was created to represent white or non-white race/ethnicity. Educational attainment was coded into a categorical variable with three categories, including "high school or less," "some college," and "4 years college degree or greater."

As well-being can differ based upon the day of the week (e.g. weekdays vs. weekends), we also controlled for day of the week in the each of the models. Additionally, the analysis controlled for marital status (dummy variable), work status (dummy variable), functional limitations (1–4 scale, with a higher score indicating greater limitations), and frequency of social contact (1–8 scale, from 1 representing "several times a day" to 8 representing "never or hardly ever").

2.3 Analytic Strategy

All analyses were performed using STATA (Version 13.1). Before examining the effects of daily generative activities on daily cognitive–affective correlates, descriptive statistics were examined. The analytic model employed for the present study was a multilevel regression model used to separate the between-person and within-person variability to investigate the associations between daily generative activity and daily cognitive–affective correlates over the 8-day period. Within-person analyses examined whether daily cognitive–affective states varied alongside variations in generative activity on a given day within people. Between-person variability encapsulated how individuals who generally differ from one another in their average levels of generative activity vary, on average, in their levels of examined cognitive–emotional states. Failure to explicitly consider both between- and within- person sources of variation when modeling repeated measures data (e.g. daily diary data) could lead to biased results and potentially false conclusions regarding within-person relationships over time (Hoffman and Stawski 2009). Although longitudinal data is typically collected with the goal of measuring within-person associations, it is important to recognize that within-person processes do not occur "in a vacuum", and the effects of more stable individual differences in the longitudinal measures also need to be modeled explicitly, as is accomplished with assessment of between-person associations (Hoffman and Stawski 2009). In these models, the coefficients account for the other association. For example, the within-person parameter coefficient is derived from a model accounting for between-person association and vice versa. For the technical details of implementing these models, see Hoffman (2015).

An additional advantage of the multilevel approach to repeated measures data is that it does not require equally spaced measurements. It allows individuals to vary in their number of completed assessments, as sometimes occurs in multi-day investigations. Assessment of the missing at random assumption was conducted to ensure that those individuals with missing data did not differ in a meaningful way from those who were not missing data. The equations below represent the association between a specific daily cognitive–affective state and engagement in generative activity:

Level 1

$$Cognitive\,Affective\,States_{ti} = \beta_{0i} + \beta_{1i}\big(Gen\,Activity_{ti} - \overline{Gen\,Activity_i}\big) + e_{ti}$$

Level 2

Intercept :

$$\beta_{0i} = Y_{00} + Y_{01}(Sociodemo\,graphics) + Y_{02}\big(\overline{GenActivity_i} - \overline{GenActivity_{group}}\big) + U_{0i}$$

Within-person generative activity:

$$\beta_{1i} = Y_{10}$$

Composite

$$CognitiveAffectiveStates_{ti}$$
$$= Y_{00} + Y_{01}(Sociodemographics) + Y_{02}\big(\overline{GenActivity_i} - \overline{GenActivity_{group}}\big)$$
$$+ Y_{10}\big(GenActivity_{ti} - \overline{GenActivity_i}\big) + U_{0i} + e_{ti}$$

Given dichotomous activity predictors, the person mean for generative activity in the Level 1 equation represents the proportion of days in which the individual engaged in that activity (e.g. volunteering). β_{0i} represents the intercept. The individual within-person effect of generative activity is defined by β_{1i} for within-person Cognitive–Affective States$_{ti}$. β_{1i} is then defined by the Level 2 equation, which includes just the fixed effect, Y_{10}. In the Level 1 equation, e_{ti} stands for the residual variance. In the Level 2 equation, Y_{00} represents the fixed intercept, or the expected value of the well-being outcome when all predictors have a value of 0. Y_{01} represents the main effects of the sociodemographic controls, including age, sex, race, and education. Y_{02} denotes the between-person main effect of generative activity. The group mean, in the case of dichotomous predictors, indicates the *total* proportion of days, or observations, that generative activity occurred (across all individuals). And lastly, U_{0i} represents the individual level residuals.

3 Results

Descriptive statistics were generated for all of the variables included in the analysis (Table 1). Daily survey participation was high with respondents completing an average of 7.2 out of the 8 daily surveys. The analytic sample contained 1747 respondents, excluding those missing data on key variables. The average age of the respondents was 57, with ages ranging from 33 to 83. The sample was comprised of 57% female respondents and 43% male respondents. MIDUS contains a largely racially homogeneous sample, and the majority of the study sample was white (92%). Individuals in the sample had varied levels of educational attainment, with 41% of respondents having attained a 4-year college degree or beyond, 30% having completed some college, and 29% of the sample having a high school education or less.

An examination of the average frequency of experience of the examined cognitive–affective states over the 8-day period also indicated variability across the sample (Table 2). On the positive affect scale, the average score was 2.66 (SD = .84), which represents an average frequency of feelings of positive affect falling between "some of the time" and "most of the time." Similarly, the average response on the social connectedness scale was

Table 1 Characteristics of analytic sample ($n = 1747$)

	n	%	M (SD)	Possible range
Age	1747		56.58 (12.1)	33–83
Female	987	56.5		
White	1604	91.8		
Education				
< High school	514	29.4		
Some college	520	29.8		
≥ 4 year college	709	40.7		
Married	1260	72.1		
Working currently	873	50.0		
Functional limitations (ADL)			1.31 (0.63)	1–4
Social contact frequency			5.67 (1.69)	1–8

Table 2 Independent variables: generative activities

	n	%	M (SD)	Range
Volunteering (any)	625	30.9		
Informal help (any)	846	41.8		
Emotional support (any)	1591	78.7		
Volunteering (days)			0.66 (1.3)	0–8
Informal help (days)			0.85 (2.0)	0–8
Emotional support (days)			2.33 (1.3)	0–8

2.94 (SD = .89), meaning that most participants reported feeling connected to others "most of the time," on average. Lastly, the average score on the self-enhancement scale was 2.74 (SD = .94), meaning that on average, respondents reported feeling proud and confident somewhere between "some of the time" and "most of the time." In terms of activity engagement, 30.9% of individuals reported engaging in volunteering at least 1 day during the assessment period, 41.8% reported providing informal help during at least one of the 8 days, and a larger proportion of 78.7% reported giving emotional support to others at least once during the study time frame (Table 3).

Table 3 Dependent variables: cognitive–affective states

	n	M (SD)	Range
Positive affect	1747	2.66 (.84)	0–4
Social connectedness	1747	2.94 (.89)	0–4
Self-enhancement	1747	2.74 (.94)	0–4

Items are rated on a scale of 0–4, with 0 indicating "None of the time" and 4 indicating "Most of the time."

3.1 Between-Person Associations of Generative Activity and Cognitive–Affective States

Results from the multilevel regression model analyses examining cognitive–affective correlates of generative activity, including *positive affect*, *social connectedness,* and *self-enhancement* states, are displayed in Table 4. As documented in Table 4, multilevel model analyses revealed several significant between- and within-person effects. The between-person effects of informal help on the cognitive–affective states were not significant. However, those who volunteered more, on average, experienced higher average levels of social connectedness ($p < 0.01$) and positive affect ($p < 0.05$) compared to those who volunteered less or not at all. Conversely, those who reported providing more emotional support to others reported lower levels of self-enhancement ($p < 0.01$) and positive affect ($p < 0.001$), on average, compared to those who provided less of this kind of assistance.

3.2 Daily Within-Person Associations of Generative Activity and Cognitive–Affective States

On days when individuals provided informal help to others, they felt greater levels of social connectedness ($p < 0.001$) and self-enhancement ($p < 0.01$), compared to days when they did not provide such help. Similarly, on days when individuals engaged in volunteer activity, they also reported experiencing greater feelings of social connectedness ($p < 0.05$) and self-enhancement ($p < 0.05$) compared to their feelings on non-volunteer days. The findings for emotional support were less positive. On days when they provided emotional support, respondents reported lower levels of positive emotionality or affect ($p < 0.01$), compared to days they did not give emotional support to others (see Table 4). Though the within-person effect sizes are smaller than the between-person effects, it is important to note that the within person associations control for the between-person effects and represent the daily variation in each cognitive–affective state from individuals' own average levels of each state as a function of level of engagement in generative activity. In other words, the within-person effects represent how individuals vary from their own characteristic levels of a given cognitive–affective state as a function of variations in generative activity engagement.

4 Discussion

These findings suggest several potential cognitive–affective states, including social connectedness, positive affect, and self-enhancement, are influenced by engaging in generative, or socially contributory, activities. Specifically, at the daily level, both volunteering and giving informal help were found to be associated with greater feelings of self-enhancement and social connectedness. In other words, on days when individuals volunteered or provided informal help to others, they felt better about themselves compared to days when they did not engage in these activities. On these days, they additionally benefited by feeling more socially connected to others, compared to days they did not volunteer or provide informal help to others. The data also provided the unique opportunity to compare the average cognitive–affective states of individuals who engaged in varying levels of these generative activities. Though the between-person effects of informal help were not significant, findings did suggest that individuals who volunteered more, on average, also

Table 4 Results from multilevel regression models examining effects of daily generative activities on daily cognitive–affective states

	Positive affect B	Self-enhancement B	Social connectedness B
Informal help			
Within-person (day-to-day)	0.025	0.049**	0.059***
Between-person	− 0.059	0.014	0.056
Age (centered)	0.014***	0.012***	0.011***
Female	0.011	− 0.024	0.155***
Nonwhite	0.068	0.140*	0.037
≤ High school	0.084*	0.141**	0.067
Married	0.071	0.132**	0.265***
Currently working	0.023	0.062	0.008
Functional limitations	− 0.175***	− 0.161***	− 0.115***
Social contact frequency	0.040***	0.047***	0.063***
Volunteering			
Within-person (day-to-day)	0.020	0.046*	0.043*
Between-person	0.233*	0.133	0.270**
Age (centered)	0.014***	0.012***	0.011***
Female	0.004	− 0.026	0.152***
Nonwhite	0.071	0.141*	0.038
≤ High school	0.090*	0.145**	0.076
Married	0.066	0.130**	0.260***
Currently working	0.031	0.065	0.014
Functional limitations	− 0.170***	− 0.158***	− 0.109***
Social contact frequency	0.037***	0.046***	0.060***
Emotional support			
Within-person (day-to-day)	− 0.028**	− 0.015	0.002
Between-person	− 0.287***	− 0.234**	0.059
Age (centered)	0.014***	0.012***	0.012***
Female	0.045	0.006	0.151***
Nonwhite	0.067	0.137	0.037
≤ High school	0.060	0.122**	0.072
Married	0.071	0.133**	0.266***
Currently working	0.025	0.061	0.006
Functional limitations	− 0.176***	− 0.161***	− 0.115***
Social contact frequency	0.045***	0.052***	0.063***

All well-being outcomes are scored on 0–4 scales

Both STATA and SPSS only generate the unstandardized estimates for these models

*$p < .05$, **$p < .01$, ***$p < .001$

experienced greater average feelings of positive affect and felt more socially connected than those who volunteered less or not at all. In contrast, the activity of giving *emotional* support to others seems to be associated with slightly lower levels of these cognitive–

affective correlates on a given day, and on average, which fits within the mixed findings in the social support literature. While helping or giving support to others has generally been regarded as advantageous for health and well-being (Brown et al. 2003; Liang et al. 2001), providing too much emotional support to others can be mentally draining and stressful, a pattern seen throughout the vast caregiver burden literature (e.g. Adelman et al. 2014; Green 2007).

These results regarding emotional support should be treated as equally important and informative as the more positive findings in this study as they may begin to help increase the understanding of why giving to others might be health-promoting in certain circumstances and health-damaging in others. Some researchers have distinguished between compassion and empathy, a distinction that may help explain why giving emotional support shows an opposite pattern from the other generative activities in the current study. Singer and Klimecki (2014) argue that empathy involves sharing the actual feelings (e.g. suffering) of others, whereas compassion is characterized by warmth and concern for others and the prosocial motivation to help. In other words, compassion is "feeling *for* and not feeling *with* the other" (p. 875). They present evidence suggesting that whereas compassion is often beneficial for health and well-being, empathy can actually promote greater feelings of distress, as it is characterized by a greater sense of attachment (Klimecki et al. 2013; Singer and Klimecki 2014). This distinction may provide one useful framework to help unravel the varying associations between different types of generative activity and well-being. One hypothesis is that emotional support provision may involve empathy, whereas volunteering and informal help may be more compassionate in nature.

Another theoretical rationale through which one might understand the relationship between daily generative activities and cognitive–affective states can be found in the mental capital literature. Mental capital has been defined as an individual's cognitive and emotional resources, including cognitive capability, emotional intelligence, flexible and efficient learning, and social resilience (Beddington et al. 2008; Kirkwood et al. 2010; 2014). Mental capital is accumulated through habit formation, during which activities repeatedly reinforce activated neural pathways. Greater mental capital has been argued to spur the production of "mental goods," such as self-esteem, social connectedness, and positive affect, which are hypothesized to contribute to higher levels of well-being. In this light, the within-person findings in this study may provide one mechanism through which generative engagement at the daily level might enhance cognitive–affective states and reinforce the incentive to make continued social contributions, strengthening one's overall mental capital and well-being over time.

Importantly, the daily experience sampling methodology provided the valuable opportunity to delve in and gain a more in-depth understanding of these relationships at a more proximal level than prior research; Our findings allow us to understand how the associations between generative activities and cognitive–affective states may operate in individuals' everyday lives. This study also promotes a greater understanding of how generativity may be related to more favorable health and well-being outcomes. However, there are several limitations to the current study and analysis that should be acknowledged. Although the MIDUS survey is conducted with a national sample, survey respondents were primarily white, suggesting these findings may not be generalizable to other racial/ethnic groups in the United States. In addition, even though this study contains tighter temporal coupling than has been achieved in past observational designs, cognitive–affective states were still not assessed in direct relation to specific activities, but instead respondents were asked to recount these feelings across each day. It has been argued that techniques that query individuals' cognitive–affective states in relation to specific activities are likely to

help researchers better elucidate the association between the two (Reis et al. 2000). Lastly, single end-of-day reports did not allow for a careful parsing of the causal direction in the relationship between activity and affect. Though we predict that engagement in generative activities influences cognitive–affective states in a positive direction, the possibility of reverse causal ordering cannot be ruled out in this analysis. In addition, it would have been preferable to examine daily self-perceptions of generativity in addition to daily generative activities, however this data was not collected in the current study but would be an important area for future research. Lastly, it should be noted that some daily diary studies collect data over a longer time period (e.g. 14 days). A longer data collection period may have provided richer information.

Despite these limitations, this study also has notable strengths that support its value and unique contribution to the literature. First, the current study utilized a repeated measures study design to employ a daily experience sampling methodology, which allowed the opportunity to examine within-person as well as between-person associations between generative activity and affect. Again, this allowed for the examination of both how individuals differed from each other on average as well as how they differed from their own average tendencies each day. Although the data are observational in nature, the daily within-person analyses provide greater confidence in the potential causal linkage of generative behavior and the affective states that flow from such engagement. This unique aspect of the data enabled us to gain a valuable understanding of how generative activities like volunteering can affect individuals in their day-to-day lives. This analysis also used a large, population-based sample to examine these connections and contained fairly comprehensive assessment of cognitive–affective states, both of which can be regarded as additional advantages of this study. Most importantly, this work furthered the understanding of how generative activities seem to shape health and well-being in a positive direction, elucidating some of the potential pathways underlying this widely-supported connection.

There are several important future directions that arise from this research. As findings suggest that *instrumental* generative activities may be more beneficial than *emotional* generative activities, future research should continue to explore the distinction between empathic distress and compassion to better understand the differential effects of emotional support provision. Another important future direction will be to assess these cognitive affective states in more direct relation to specific activities—facilitating an even tighter temporal coupling of activities and affective states to further strengthen the understanding of these complex associations. Studies that continue to probe these associations are important in several ways, one being that they have the potential to inform the future development and implementation of an intervention that might employ generativity enhancement as a tool for health promotion. Similar interventions rooted in positive psychology have been implemented with promising success. For example, interventions aimed at cultivating positive feelings, behaviors, or cognitions have been found to be effective at enhancing well-being and alleviating depression (Sin and Lyubomirsky 2009). Similar efforts with a focus on generative activities would be expected not only to improve the well-being of those who are generative, but also those on the receiving end of their contributions. This study represents an early step toward such innovative and promising possibilities for health and well-being promotion.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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