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To cite this article: John B. Nezlek, David B. Newman & Todd M. Thrash (2017) A daily diary study of relationships between feelings of gratitude and well-being, *The Journal of Positive Psychology*, 12:4, 323-332, DOI: [10.1080/17439760.2016.1198923](https://doi.org/10.1080/17439760.2016.1198923)

To link to this article: <http://dx.doi.org/10.1080/17439760.2016.1198923>



Published online: 19 Jun 2016.



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A daily diary study of relationships between feelings of gratitude and well-being

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ABSTRACT

Much of the research on relationships between gratitude and well-being has concerned between-person level relationships, and this research suggests that increasing people's feelings of gratitude can increase their well-being. To complement this research, we examined such relationships at the within-person level. Participants ($N = 130$) in the present study described their well-being and how grateful they felt each day for two weeks. MLM analyses found that at the within-person level, daily feelings of gratitude and hedonic and eudaimonic well-being were positively related. Lagged analyses found that feelings of gratitude on one day were positively related to hedonic (but not eudaimonic) well-being on the next day, and well-being on one day was not related to gratitude on the next day. These results complement existing research and suggest that causal relationships between gratitude and well-being may vary as a function of whether gratitude is measured in more affective or cognitive terms.

ARTICLE HISTORY

Received 12 July 2015
Accepted 3 June 2016

KEYWORDS

Gratitude; diary study; well-being; multilevel modeling; causal relationships

A growing body of research suggests that gratitude is associated with positive outcomes (e.g. Wood, Froh, & Geraghty, 2010). Such positive effects include reductions in stress (e.g. Krause, 2006), increases in subjective well-being (e.g. Watkins, 2004), and decreases in negative states such as depression and social anxiety (e.g. Kashdan & Breen, 2007). Moreover, the results of studies in which gratitude has been elicited experimentally suggest a causal link from gratitude to well-being. Increasing gratitude has been shown to increase well-being (Wood et al., 2010).

Levels of analysis in the study of gratitude

Most of the research on gratitude has conceptualized gratitude as a disposition, a trait-like characteristic. People are assumed to be more or less grateful, similar to traits such as conscientiousness, agreeableness, and so forth. It is important to note that gratitude has been conceptualized in trait terms even in studies in which gratitude has been measured on a state (e.g. daily) basis (e.g. Emmons & McCullough, 2003; Froh, Sefick, & Emmons, 2008; Kerr, O'Donovan, & Pepping, 2015; Rash, Matsuba, & Prkachin, 2011). In such studies, aggregates such as mean gratitude or mean well-being have been calculated, and the analyses have focused on these aggregates.

Although researchers have found it is useful to treat gratitude as a disposition, we believe that gratitude also

has an important state component (e.g. Roberts, 2004). How grateful people feel can vary across time and circumstances, and the present study examined such within-person variation. In part, we were motivated to do this because of the possibility that relationships between gratitude and other constructs (e.g. well-being) that have been found at the dispositional (or trait) level may not characterize relationships at the within-person level.

In technical terms, between-person relationships between aggregates of data collected on a repeated basis are mathematically independent of within-person relationships between these same measures (e.g. Nezlek, 2001). For example, if people who tend to be most grateful also tend to experience the highest levels of positive affect, it does not necessarily follow that, for the average individual, gratitude and positive affect fluctuate in the same way across days. In conceptual terms, relationships between constructs at different levels of analysis may represent meaningfully different psychological processes (Affleck, Zautra, Tennen, & Armeli, 1999).

The present study concerned within-person variability in gratitude. We measured how grateful people felt each day, and we collected measures of daily well-being, some eudaimonic and some hedonic. Our primary hypothesis was that gratitude and well-being, defined both eudaimonically and hedonically, would be positively related at the within-person level. In addition, because the within-person level of analysis is a good way to study causal

processes (Hamaker, Kuiper, & Grasman, 2015), we also examined possible causal relationships between gratitude and well-being using lagged within-person analyses. Such analyses address the question of whether within-person peaks in one variable predict lagged (subsequent) peaks (or troughs) in another variable, above and beyond the mean levels of either of the variables involved.

Hedonic and eudaimonic conceptualizations of well-being

When discussing relationships between gratitude and well-being, it is important to consider two different traditions or ways in which well-being has been defined: hedonic and eudaimonic (Ryan & Deci, 2001). Hedonic well-being refers to a pleasure-pain or happy-sad distinction (Kahneman, Diener, & Schwarz, 1999; Ryan & Deci, 2001) and has typically been measured with constructs such as life satisfaction, positive affect, and negative affect (Diener, 1984; Diener & Lucas, 1999). In contrast, the concept of eudaimonic well-being, which dates back to Aristotle's notion of the good life, has been defined in terms of personal growth, human actualization, and flourishing (Ryan & Deci, 2001; Ryff & Keyes, 1995; Waterman, 2008). Measures of eudaimonic well-being include autonomy, personal growth, self-acceptance, life purpose, mastery, positive relatedness (Ryff & Singer, 1998), and meaning in life (Steger, Frazier, Oishi, & Kaler, 2006). Nevertheless, differences among the constructs that have been used to define eudaimonic well-being have led some researchers to criticize the distinction between hedonic and eudaimonic well-being (e.g. Disabato, Goodman, Kashdan, Short, & Jarden, 2016; Kashdan, Biswas-Diener, & King, 2008).

Despite such concerns, numerous studies have found that it is useful to distinguish hedonic and eudaimonic well-being. For example, Oishi and Diener (2013) found that average satisfaction with life (hedonic well-being) was greater in wealthy nations than in poorer nations, whereas average levels of meaning in life (eudaimonic well-being) were higher in poorer nations than in richer nations. Hofmann, Wisneski, Brandt, and Skitka (2014) found that people were happier when they were treated in a more moral fashion although the purpose in life they perceived did not change, whereas acting toward others more morally was associated with a greater sense of purpose in life but no change in happiness. Similarly, Baumeister, Vohs, Aaker, and Garbinsky (2013) found that helping others was related more strongly (positively) to meaningfulness than it was to happiness. Finally, some have claimed that the regulatory systems of those who have high eudaimonic well-being are different from the regulatory systems of those who have high hedonic well-being (Fredrickson

et al., 2013), although this claim has been controversial (Brown, MacDonald, Samanta, Friedman, & Coyne, 2014; Cole & Fredrickson, 2014).

Although, much of the research on relationships between gratitude and well-being has focused on hedonic measures of well-being, eudaimonic well-being has also been examined. To date, researchers have found similar positive relationships between measures of aspects of both types of well-being and gratitude, and in the present study we examined both hedonic and eudaimonic well-being.

Relationships between gratitude and well-being at the dispositional or trait level

In studies of dispositional gratitude, research has consistently found that gratitude is positively related to well-being. In their review, Wood et al. (2010, p. 890) concluded that 'Gratitude is strongly related to well-being, however defined ...', and their review included 'psychopathology, personality, relationships, health, subjective and eudemonic well-being, and humanistically orientated functioning' as indicators of well-being. Moreover, Wood et al. concluded that gratitude was a cause of or precursor to well-being more than well-being was a cause of gratitude. Such a causal sequence is consistent with the results of intervention studies. In their review, Wood et al. (2010) concluded that the results of several studies 'clearly suggest that interventions to increase gratitude are effective in improving well-being' (p. 898). Although they made a series of recommendations to enhance the internal validity of studies, they did not suggest that gratitude was not a cause of well-being.

Watkins, Uher, and Pichinevskiy (2015) is a good example of a study that found a causal link from gratitude to well-being within the context of a gratitude intervention. Participants who wrote three things for which they were grateful each day over the course of a week, compared to those who wrote about things that increased pride or those in a memory placebo condition, experienced greater subjective well-being up to five weeks after the intervention. Note that although gratitude was made salient each day, the relationships this study concerned were at the between-person (trait or dispositional level).

Another study that exemplifies the types of causal relationships that have been examined at the trait level is Wood, Maltby, Gillett, Linley, and Joseph (2008). A measure of gratitude, Gratitude Questionnaire-6 (GQ-6; McCullough, Emmons, & Tsang, 2002), and a measure of hedonic well-being (depression) were collected at the beginning and end of an academic semester. The analyses found clear paths from gratitude at Time 1 to well-being at Time 2, with no suggestion of a reversed relationship.

Despite the consistent findings that increased gratitude leads to increased well-being, we know of no study that has examined causal relationships between gratitude and aspects of eudaimonic well-being. Although the zero-order relationships between gratitude and aspects of eudaimonic well-being are positive, this does not, in and of itself, indicate that causal relationships are the same as they are for relationships between gratitude and aspects of hedonic well-being.

Relationships between gratitude and well-being at the within-person level

We are aware of four studies in which within-person relationships between gratitude and well-being have been examined. Three of these studies measured gratitude in terms of how strongly people felt different emotions, whereas in the fourth study the measure of gratitude was more cognitively focused. All of these studies found that gratitude and well-being were positively related at the within-person level.

The types of intensive repeated measures designs that provide a strong basis for examining within-person relationships between well-being and gratitude can also provide a basis for examining causal relationships between these constructs. Causal relationships can be examined by comparing what are called lagged relationships. In a study in which data are collected each day, one can examine relationships between construct *A* on day *i* and construct *B* on day *i* + 1 and relationships between construct *B* on day *n* and construct *A* on day *i* + 1. The justification for these analyses is that temporal precedence is a proxy for causality. If a measure on day *i* – 1 predicts another measure on day *i*, whereas the reverse is not the case, this suggests that the construct assessed by the first measure is a cause of the second construct (e.g. West & Hepworth, 1991). Two of these four studies examined causal relationships between gratitude and well-being.

In a daily diary study of Vietnam War veterans (some with PTSD, some without), Kashdan, Uswatte, and Julian (2006) found that daily gratitude was positively related to both hedonic and eudaimonic measures of well-being, irrespective of PTSD status. Daily gratitude was measured by asking participants to indicate how grateful and appreciative they felt each day. At the dispositional level, they found that veterans who had experienced PTSD reported lower levels of dispositional gratitude compared to veterans who had not. At the dispositional level, gratitude was measured with the GQ-6 (McCullough et al., 2002). Kashdan et al. did not examine lagged relationships between gratitude and well-being.

In a daily diary study of romantic couples, Algoe, Gable, and Maisel (2010) found that feelings of gratitude

toward one's romantic partner were positively related to satisfaction with the relationship with this partner. Algoe et al. measured gratitude by asking participants to indicate how thankful, appreciative, and grateful they felt each day. They found that feelings of gratitude toward one's romantic partner on one day were positively related to satisfaction with the relationship with this romantic partner on the next day. Algoe et al. found no lagged relationships from relationship satisfaction to gratitude. Such a pattern suggests a causal relationship from gratitude to well-being and not from well-being to gratitude.

In a study in which participants provided reports twice a day, Thrash, Elliot, Maruskin, and Cassidy (2010, Study 4) measured gratitude by asking participants to indicate how thankful and appreciative they felt. In a series of mediational analyses, they found that gratitude was positively related to both hedonic (e.g. PA) and eudaimonic well-being (e.g. self-actualization). Although Thrash et al. measured gratitude and well-being at separate times of the day (midday and evening), their study was not designed to examine lagged effects controlling for initial level of an outcome.

More recently, Krejtz, Nezlek, Michnicka, Holas, and Rusanowska (2016), within the context of study of a gratitude intervention, examined within-person relationships between gratitude and well-being, and they found that gratitude and well-being were positively related at the within-person level. In contrast to the previous research on within-person variability of gratitude, they did not measure gratitude by asking about people's feelings. Rather, they measured gratitude using three items based on the trait level measure introduced by McCullough et al. (2002). These items did not concern feelings of gratitude *per se*; rather, they concerned constructs that were more cognitive in nature. The items they used were: How many things were there in your life today that you were grateful for? Today, how much were you able to appreciate people, events, and situations that have been part of your life story? Today, how much time passed before you felt grateful to someone or something? Krejtz et al. found significant lagged relationships (one day lag) from well-being to gratitude, but no significant lagged relationships from gratitude to well-being. Such a pattern suggests a causal relationship from well-being to gratitude and not from gratitude to well-being. It should be noted that Algoe et al. found support for a causal relationship in the opposite direction. i.e. from gratitude to well-being.

The present study

To extend our understanding of the relationships between gratitude and well-being, we collected data that allowed us to examine relationships between gratitude and

well-being at the within-person level. Participants in the present study maintained a diary for two weeks. Each day they described their well-being in terms of self-esteem, meaning in life, life satisfaction, and affect. They also described how grateful they felt each day. These data allowed us to examine how gratitude and well-being were related within-persons on the same day and to examine lagged relationships between gratitude and well-being across consecutive days.

Based on previous research at both the within- and between-person levels of analysis, we expected that same-day relationships between feelings of gratitude and well-being would be positive. On days when people felt more grateful we expected them to feel more positive and less negative affect, to think more positively about themselves, and to think their lives were more meaningful in comparison to days when they felt less grateful.

In terms of lagged relationships between gratitude and well-being, similar to the results of Algoe et al. (2010), we expected to find lags from gratitude on day i to well-being on day $i + 1$. This expectation was based in part on the fact that we used an emotion-based measure of gratitude similar to that used by Algoe et al. Moreover, such a casual sequence has been found in numerous studies at the trait level. Later, we present a more detailed discussion of why relationships between gratitude and aspects of well-being might vary as a function of whether gratitude is measured with a more affective or cognitive focus.

Previous research has not found differences in the relationships between gratitude and hedonic well-being and between gratitude and eudaimonic well-being, and so we expected that the relationships between gratitude and well-being described above would occur for both types of well-being. Nevertheless, given the lack of research on causal relationships between gratitude and eudaimonic well-being, we examined hedonic and eudaimonic well-being separately.

Method

Participants and procedure

Participants were 130 undergraduate students ($M_{(\text{age})} = 18.66$, $SD = 0.99$, 63.8% female) who received course credit for their participation. They attended information sessions (in groups of 10–20) during which the study was explained to them. They were told that they would use a secure website to complete a questionnaire every evening at 9 pm (or later) for 14 consecutive days. Follow-up emails were sent at 7 am the following morning to participants who did not complete their diary entries the night before.

Before analysis, the data were screened for errors. Of the original 1710 entries, 61 (3.6%) were eliminated because

they were duplicated entries, incomplete, completed after noon the following day, or the participant incorrectly answered an instructed response item or entered the same response across an entire page (Meade & Craig, 2012). The remaining 1649 entries were distributed with a mean of 12.7 entries per person ($SD = 1.66$). The minimum number of valid entries was 5.

Daily measures

Daily measures were based upon corresponding trait measures, following the recommendations of Nezlek (2012). All daily measures used 1–7 point scales that were scored so that higher numbers meant more of the construct being measured, and each daily measure was defined as the mean of items for that measure. The wording of questions explicitly focused on the day. Daily gratitude was measured with two items taken from the Gratitude Adjectives Checklist (Emmons & McCullough, 2003). Following the stem ‘Today I felt ...’ participants described how strongly they felt ‘grateful’ and ‘thankful’ each day (using a scale with endpoints labeled ‘Did not feel this way at all’ to ‘Felt this way very strongly’).

Daily well-being was measured in terms of hedonic and eudaimonic well-being. Hedonic well-being was defined in terms of life satisfaction and affect. Daily life satisfaction was measured using two items taken from Oishi, Diener, Choi, Kim-Prieto, and Choi (2007): ‘How was today?’ with a scale ranging from ‘terrible’ to ‘excellent’, and ‘How satisfied were you with your life today?’ with a scale ranging from ‘very dissatisfied’ to ‘very satisfied’. Daily affect was measured using a circumplex model (e.g. Feldman Barrett & Russell, 1998), and participants described how strongly they felt each emotion using the same scale as that used for the gratitude items. Positive activated affect (PA) was measured with enthusiastic, alert, happy, proud, and excited. Positive deactivated affect (PD) was measured with calm, peaceful, relaxed, contented, and satisfied. Negative active affect (NA) was measured with stressed, embarrassed, upset, tense, and nervous. Negative deactive affect (ND) was measured with depressed, disappointed, sluggish, bored, and sad.

Eudaimonic well-being was defined in terms of meaning in life and self-esteem. Meaning in life was measured using two subscales (presence and search) of two items each taken from Kashdan and Steger (2007). Meaning in life was measured with two items: ‘How meaningful did you feel your life was today?’ and ‘How much did you feel your life had purpose today?’ Search for meaning in life was also measured with two items: ‘How much were you searching for meaning in your life today?’ and ‘How much were you looking to find your life’s purpose today?’

Table 1. Descriptive statistics for daily measures.

Measure	Mean	Variance		Reliability
		Between	Within	
Gratitude	4.02	2.20	1.44	0.85
Life satisfaction	4.81	0.64	1.21	0.81
Mood PA	4.23	1.00	1.30	0.71
Mood PD	3.93	0.87	0.81	0.74
Mood NA	3.27	0.88	1.17	0.57
Mood ND	2.43	1.00	1.14	0.67
Self-esteem	5.23	0.92	0.92	0.62
Presence of meaning in life	3.95	1.60	1.04	0.86
Search for meaning in life	2.38	1.20	1.00	0.92

Response scales for these items had endpoints labeled 'not at all' to 'very much'.

Similar to Kashdan et al. (2006), we initially considered self-esteem as a measure of eudaimonic well-being because self-esteem can be thought of as a measure of self-acceptance. Kashdan et al. did not provide a detailed explanation for why self-esteem should be considered a measure of eudaimonic well-being, and we return to this issue in the discussion. Regardless, daily self-esteem was measured with four items from the original Rosenberg (1965), reworded for daily administration. Participants responded on a scale with endpoints labeled 'very uncharacteristic of me today' to 'very characteristic of me today'. The items were 'today I felt like a failure'; 'today, I felt that I had many good qualities'; 'today, I thought I was no good at all'; 'today, on the whole, I was satisfied with myself' (Nezlek, 2005).

NB: The measures we discuss in this paper were part of a larger study. In this paper, we report the results of the analyses of all daily measure of well-being and of gratitude. More details about the other measures collected in this study are available from the first author.

Results

We conceptualized the data as a two level structure in which days were nested within individuals, and following the guidelines and procedures described by Nezlek (2012), we used the program HLM to conduct a series of multilevel models. Before the primary analyses, we examined the reliability of the daily measures using three level models in which items were nested within occasions (days) and occasions were nested within persons. These analyses provided the multilevel equivalent of Cronbach's alpha, corrected for differences between persons and days (Nezlek, 2012, pp. 98–103).

These analyses indicated that our original daily measures of PA, NA, and ND were not as reliable as we desired (0.55, 0.45, and 0.50, respectively). To improve these reliabilities, we removed some items. The resulting measure of PA was defined in terms of enthusiastic, happy, and

excited, NA was defined in terms of stressed, upset, tense, and nervous, and ND was defined in terms of depressed, disappointed, and sad. The reliabilities for all measures are presented in Table 1.

The first analyses were null models (no predictors at either level of analysis) that estimated the mean and the within- and between-variances. There were i days nested within j persons. The within-person (level 1) variance is the variance of r_{ij} , and the between-person (level 2) variance is the variance of u_{0j} .

$$\text{Within-person: } y_{ij} = \beta_{0j} + r_{ij}$$

$$\text{Between-person: } \beta_{0j} = \gamma_{00} + u_{0j}$$

The results of these analyses are summarized in Table 1. Note that for all the measures at least 40% of the variance was within-persons. This suggests that it is important to consider each of our daily measures as a state-like construct as well as a trait-like construct. For example, although feelings of gratitude had a dispositional component (daily mean gratitude varied between persons), there was also meaningful within-person variability in feelings of gratitude. The total variance of feelings of gratitude was approximately 40% within-persons and 60% between-persons.

Same-day, within-person relationships between gratitude and well-being

Next, we examined within-person relationships between daily gratitude and well-being. One set of analyses examined same-day relationships, and a second set examined lagged relationships. The model we used to examine same-day relationships is presented below. In these analyses, daily gratitude was modeled as a random effect and was entered group-mean centered (Enders & Tofighi, 2007). Such analyses are conceptually equivalent to estimating a regression coefficient for each person and then analyzing these coefficients (Nezlek, 2001). Hypotheses about within-person relationships are tested at the between-person level. Whether the mean

Table 2. Relationships between gratitude and well-being.

Well-being	Same-day		Lag from gratitude		Lag to gratitude	
	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio
Life satisfaction	0.41***	15.96	0.11***	3.92	0.04	1.18
Mood PA	0.43***	14.80	0.08**	3.03	0.04	1.13
Mood PD	0.31***	12.33	0.07**	3.17	0.01	<1
Mood NA	-0.17***	5.45	-0.04	1.61	-0.01	<1
Mood ND	-0.20***	7.05	-0.07**	2.80	0.00	<1
Self-esteem	0.27***	10.57	0.05*	2.27	0.01	<1
Presence of meaning in life	0.30***	10.96	0.01	<1	0.03	<1
Search for meaning in life	0.10***	3.95	0.02	<1	-0.01	<1

Coefficients accompanied by *significant at $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

coefficient representing a relationship between feelings of gratitude and a measure of well-being was different from 0 was tested by determining whether the γ_{10} coefficient was significantly different from 0.

$$\text{Within-person: } y_{ij} = \beta_{0j} + \beta_{1j} \times (\text{Daily gratitude}) + r_{ij}$$

$$\text{Between-person: } \beta_{0j} = \gamma_{00} + u_{0j}$$

$$\text{Between-person: } \beta_{1j} = \gamma_{10} + u_{1j}$$

The results of these analyses are presented in Table 2. Consistent with our expectations, all same-day relationships between gratitude and well-being were significant. For all measures of well-being, on days when people felt more grateful, their well-being was higher than it was on days when they felt less grateful.

Lagged within-person relationships between gratitude and well-being

The next analyses examined lagged relationships. First, well-being on day i was modeled as a function of well-being and gratitude on day $i - 1$. Second, gratitude on day i was modeled as a function of well-being and gratitude on day $i - 1$. In the models below, 'Grat' represents daily gratitude, and 'WB' represents a measure of well-being. A one-day lag between observations was required for these analyses, and 1397 days were included in these analyses.

$$\begin{aligned} \text{WB}(\text{day } i)_{ij} &= \beta_{0j} + \beta_{1j} \times (\text{WB day } i - 1) \\ &+ \beta_{2j} \times (\text{Grat day } i - 1) + r_{ij} \end{aligned}$$

$$\begin{aligned} \text{Grat}(\text{day } i)_{ij} &= \beta_{0j} + \beta_{1j} \times (\text{WB day } i - 1) \\ &+ \beta_{2j} \times (\text{Grat day } i - 1) + r_{ij} \end{aligned}$$

Similar to the analyses of same-day relationships, hypotheses were tested at the person-level, and in the interests of brevity, the level 2 equations are not presented. The results of these lagged analyses are presented in Table 2, and the pattern of these results was quite clear. There

were significant lagged effects from gratitude to well-being for most of the hedonic measures of well-being (life satisfaction, and PA, PD, and ND). Greater gratitude on day $i - 1$ was associated with increased well-being on day i . Although the lagged coefficient in the analyses of NA was not significant ($p = 0.11$), it was in the same direction (negative) and of a similar order of magnitude to the coefficient for ND (NA = -0.04 : ND = -0.07), making it difficult to conclude with finality that the lagged relationship for NA was different from the lagged relationships for the other hedonic measures.

In contrast, there were no significant lagged effects from gratitude to well-being for the eudaimonic measures of well-being, presence of meaning in life and search for meaning in life. Interestingly, similar to the results for the hedonic measures of well-being, there was also a significant lagged coefficient from gratitude to self-esteem, which has been proposed as a measure of eudaimonic well-being. Finally, there were no significant (or near-significant) lagged effects from well-being to gratitude for any measure of well-being.

Discussion

At the zero-order, same-day level, we found that gratitude was positively related to well-being, irrespective of how well-being was defined. This research complements and extends the results of studies at both the between- and within-person levels. Regarding lagged relationships, our results suggest that feelings of gratitude lead to increased well-being, at least in terms of hedonic well-being. Such relationships are consistent with previous trait-level studies (e.g. Wood et al., 2010). Interestingly, there were no significant lagged relationships between gratitude and meaning in life.

The finding that feelings of gratitude on day i predicted feelings of hedonic well-being but not eudaimonic well-being on day $i + 1$ deserves particular attention. Although hedonic and eudaimonic well-being are related at both the between- and within-person levels (e.g. King, Hicks, Krull, & Del Gaiso, 2006), they are conceptually distinct

(Ryan & Deci, 2001). The present results suggest an additional difference between the two types of well-being that has not been considered before, a difference that we believe complements existing research about the differences between hedonia and eudaimonia.

As discussed by Baumeister et al. (2013), hedonic and eudaimonic well-being may differ in terms of temporal focus. Hedonic well-being tends to reflect or concern one's immediate circumstances or situation. In contrast, eudaimonic well-being tends to reflect or concern one's past and one's future, and well-being is greater when someone can integrate the past and the future. Consistent with this possibility, Waytz, Hershfield, and Tamir (2015) found that inducing participants to think about the past or future compared to the present increased feelings of meaning in life.

In the present study, participants described how grateful they felt each day, with an emphasis in these reports on the present day, not on the past or the future. Assuming the differences in temporal focus suggested by Baumeister et al. (2013) and Waytz et al. (2015), the reports of gratitude we collected probably reflected more hedonic sources of well-being than eudaimonic well-being, i.e. the present rather than an integration of past and future. If this was the case, the fact that we found that gratitude led to hedonic well-being but not eudaimonic well-being may reflect the temporal focus of the measure of gratitude we collected.

Gratitude as a cause and as an effect

The results of the present study are both similar to and different from the results of previous research on within-person relationships between gratitude and well-being. Similar to Krejtz et al. (2016) and Kashdan et al. (2006), we found positive same-day relationships between well-being and gratitude. Although Algoe et al. (2010) focused on romantic couples per se and used slightly different measures (relationship satisfaction and connectedness), our same-day relationships are similar in meaning to those they found. In contrast to Krejtz et al., who found a lagged relationship from well-being to gratitude, our analyses suggested a causal link from gratitude to well-being. Relationships from gratitude to well-being were also reported by Algoe et al., who also reported that they found no lagged effects from relationship measures to gratitude.

One possible explanation for the differences in the lagged relationships found in these studies may be due to differences between the studies in how gratitude was measured. In the present study and in Algoe et al., gratitude was measured affectively, whereas in Krejtz et al. it was measured more cognitively. We propose that gratitude may have both an affective component (I feel grateful) and a cognitive component (I am grateful for specific things),

and that differences between the studies in the lagged relationships between gratitude and well-being are due to differences in these types of measures of gratitude.

First, we assume that relationships between well-being and gratitude (both broadly defined) are bidirectional and that the causal relationship that exists in one situation may differ from the causal relationship in another. We propose that one of the factors that determines the causal sequence is the extent to which a measure of gratitude focuses on what elicited the gratitude (an object-focused or intentional state) or the extent to which it focuses on feelings of gratitude without explicit reference to anything in particular for which a person might feel grateful. To the extent that this difference exists, we presume that object-focused gratitude precedes the less-object-focused gratitude, because objects are elicitors. For example, thinking of another person as responsible for a good deed occurs early in the appraisal process, and this cognitive appraisal then leads to feelings of gratitude.

With this as a starting point, we envision the following sequence of events: (1) a positive action by another → (2) increased positive affect and other aspects of well-being based on a basic appraisal of the outcome → (3) appraisal of the other as responsible for the positive outcome (a more complex and slower appraisal) → (4) gratitude for the benefit (elicitor-focused, more cognitive) → (5) affective gratitude (less elicitor focused, more affective) → (6) further improvements in well-being (due to unmeasured effects of gratitude).

Within such a model, gratitude as studied by Krejtz et al. would concern steps 2, 3, and 4 – starting with enhanced well-being and moving to thoughts of gratitude. In contrast, the present results would concern steps 5 and 6 – feeling grateful which would then lead to enhanced well-being. Admittedly, this is a speculative explanation, but the two sets of results are internally consistent and quite different from each other, and we could not find another difference between the studies that could account for the differences in the results.

Regardless of the eventual utility of explanation for the causal sequences we have proposed, we believe that the present study and its results meaningfully expand our understanding of gratitude. To our knowledge, it is the first study to find a within-person lagged effect of gratitude on well-being, an effect that has been documented in between-person analyses. Such a demonstration is important for at least two reasons. First, it cannot be assumed that between-person relationships are the same as within-person relationships. Second, it cannot be assumed that the causal relationships that have been found between manipulated gratitude (e.g. asking some to think of the things for which he or she is grateful) and well-being are the same as relationships between naturally occurring

gratitude and well-being. Asking people to think about the things for which they are grateful may bring to mind qualitatively different thoughts than when people think about gratitude without an external prompt. In research examining the effects of manipulated gratitude, the emphasis has been on how grateful (in terms of amount or strength) people feel. Less attention has been paid to how asking people to think of the things for which they are grateful might change the things for which they feel grateful.

Moreover, when considered with other published results, our results suggest that gratitude has an affective and a cognitive component that may be related to well-being in different ways (and in similar ways), depending upon the temporal sequence being considered. If this is the case, there is also the possibility that people's naturally occurring experiences of gratitude may differ. In terms of dispositions, feelings of gratitude may be more important than thoughts of gratitude for some people, whereas the reverse may be true for others. Along these same lines, the affective and cognitive components of gratitude may become salient in response to different kinds of situations, different kinds of affective-cognitive mindsets (e.g. intuitive vs. rational processing), and so forth.

Finally, the findings and proposed causal sequence outlined above provide useful implications for gratitude intervention studies. In these studies, gratitude exercises have been more effective for those low in trait positive affect (Froh, Kashdan, Ozimkowski, & Miller, 2009), for those who put more effort into the intervention (Lyubomirsky, Dickerhoof, Boehm, & Sheldon, 2011), for those high in self-criticism (Sergeant & Mongrain, 2011), and for those high in depression symptoms (Harbaugh & Vasey, 2014). These moderators pertain to the link from cognitive states of gratitude to well-being, steps 4 through 6 in our model. There may be different moderators that relate more specifically to the link from affective gratitude to well-being, steps 5 through 6. For example, feelings of gratitude experienced by those high in extraversion might lead more strongly to hedonic well-being states compared to those low in extraversion. An understanding of how individual differences moderate relationships between gratitude and well-being could clarify the relationship between cognitive gratitude and well-being, as is typically measured in gratitude intervention studies. To improve our understanding of how gratitude interventions increase well-being, researchers may want to consider the possibility that there are different forms of gratitude, which may lead to a clearer delineation of the causal sequence of cognitive gratitude, affective gratitude, and well-being.

Limitations and future directions

The conclusions of any study are limited by the measures that were collected. Consistent with much previous research, we measured gratitude by asking people

to describe emotions or feelings reflecting gratitude. As such, we could not distinguish the specific entities or experiences that led people to feel grateful. It is possible that distinguishing the sources of people's gratitude may have provided a basis for understanding the differences in the relationships we found for hedonic and eudaimonic well-being.

As noted, the causal relationships we found are the opposite of those reported by Krejtz et al. (2016), and there are two important differences between our study and theirs: the samples and the measures of gratitude. Krejtz et al. studied adults living in the community; we studied collegians. Although we have no reason to think that this difference is responsible for the differences in our results, it is possible that it is. As we have discussed, the more likely reason for the differences in the results is the difference in how gratitude was measured. Assuming this, future research needs to be done in which gratitude is measured in terms of feelings of gratitude and in terms of the more cognitively focused measures that Krejtz et al. used.

Our results also suggest that relationships between gratitude and well-being vary as a function of how well-being is defined. Gratitude led to increased hedonic well-being but not to increased eudaimonic well-being. This may have been due to the fact that our measure of gratitude was affectively focused, and as such, it corresponded more closely to hedonic well-being, which has a strong affective component, than it corresponded to eudaimonic well-being, which does not have as strong an affective component.

There is also the fact that self-esteem covaried with gratitude in a fashion that was similar to the covariation between gratitude and measures of hedonic well-being (life satisfaction and affect). Some have argued that self-esteem is a measure of eudaimonic well-being because self-esteem reflects self-acceptance (e.g. Kashdan et al., 2006). Although we appreciate this perspective, we do not think that measures of self-esteem per se assess the self-critical aspect of self-acceptance that has been mentioned in discussions of eudaimonic well-being (e.g. Ryff & Keyes, 1995). This, in combination with the fact that self-esteem has been found to be positively related to various measures of hedonic well-being such as depression, life satisfaction, and affect (e.g. MacDonald & Leary, 2003) suggests that although self-esteem may tap eudaimonic well-being, it also taps hedonic well-being, perhaps more than it does eudaimonic well-being.

Clearly resolving the issues we have raised here will require research that is designed to address these questions specifically, and we hope that the present study provides a starting point for such efforts. Such studies should include various measures of gratitude and of well-being

to provide a basis for understanding more clearly the relationships between these two important constructs.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

Support for this research was provided by a grant to John B. Nezlek from the J. William Fulbright Foreign Scholarship Board, Council for International Exchange of Scholars.

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