Emotion

The Grateful Are Patient: Heightened Daily Gratitude Is Associated With Attenuated Temporal Discounting

Leah Dickens and David DeSteno

BRIEF REPORT

The Grateful Are Patient: Heightened Daily Gratitude Is Associated With Attenuated Temporal Discounting

Leah Dickens and David DeSteno
Northeastern University

Past research has regularly linked the experience of affect to increased impatience and, thereby, decreased self-control. Given emerging work identifying the emotion gratitude as a fairly unique affective state capable of enhancing, rather than inhibiting, patience, the present study examined the association between chronically elevated gratitude and individual differences in temporal discounting. Participants' levels of gratitude were assessed in response to a standardized lab induction and then over a 3-week period prior to measurement of their financial patience in the form of an incentivized delay discounting task. Analyses revealed a strong relation between lab-based and naturally occurring gratitude levels, thereby confirming the validity of the daily online measures. Of import, mean levels of daily gratitude were significantly associated with increased patience in the form of decreased temporal discounting. As expected, no similar relation emerged for daily levels of happiness, thereby confirming the relative specificity of the positive state of gratitude.

Keywords: gratitude, self-control, patience, intertemporal choice, temporal discounting

The predominant view of self-control identifies emotion as the bane of patience; affective "hot" responses must be suppressed or, at a minimum, ignored if individuals are to resist temptations for immediate gratification (Berns, Laibson, & Loewenstein, 2007; Loewenstein, Read, & Baumeister, 2003; Metcalfe & Mischel, 1999; Mischel & Ayduk, 2011; Mischel, Shoda, & Rodriguez, 1989). Although, at times, this view correctly captures the dynamics underlying self-control, the identification of emotion solely as an inhibitor of patience or perseverance is likely erroneous (DeSteno, 2009; DeSteno, Li, Dickens, & Lerner, 2014). That is, although certain emotions can underlie cravings for immediate gratification (Kober et al., 2010; Lerner, Li, & Weber, 2013; Metcalfe & Mischel, 1999), others should foster patience if emotions serve as adaptive mechanisms for social life (Frank, 1988; Keltner, Haidt, & Shiota, 2006).

Gratitude—the positive state one feels when another has intentionally given, or attempted to give, one something of value (Mc-

Leah Dickens and David DeSteno, Department of Psychology, Northeastern University.

Leah Dickens is now at the Department of Psychology, Mount Holyoke College, South Hadley, MA.

Correspondence concerning this article should be addressed to David DeSteno, Department of Psychology, Northeastern University, 360 Huntington Avenue, Boston, MA 02115. E-mail: d.desteno@gmail.com

Cullough, Kilpatrick, Emmons, & Larson, 2001; McCullough, Tsang, & Emmons, 2004)—has recently been identified as a candidate emotion that supports self-control (DeSteno, 2009; DeSteno et al., 2014). Given its established ability to nurture the development and maintenance of social relationships through its encouragement of costly reciprocal responses (Algoe, 2012; Algoe, Fredrickson, & Gable, 2013; Algoe & Haidt, 2009; Bartlett & DeSteno, 2006; Emmons & McCullough, 2003), its links to more basic facets of self-control make good sense. After all, the success of relationships often depends upon a willingness to accept short-term costs in the form of aiding others in order to accrue longer term gains in social capital.

As is well recognized, impatience often stems from the human mind's tendency to overly devalue the benefits offered by future rewards relative to immediate ones, a phenomenon known as temporal discounting (Ainslie, 1975; Loewenstein & Thaler, 1989). Although processes involving executive function can be used to counter discounting-induced preferences favoring short-term satisfaction, our previous work revealed that inducing feelings of gratitude could similarly combat temptations for immediate reward. That is, an experimental induction of gratitude was shown to reliably attenuate temporal discounting (DeSteno et al., 2014), thereby identifying gratitude as an emotional mechanism that can foster, as opposed to inhibit, self-control. Of import, this work also demonstrated that the effect of gratitude was differentiable from that of the related positive state of happiness, thus confirming that positive affect in general is not sufficient to enhance patience.

The Present Research

The linking of gratitude to increased patience in an experimental context raises an intriguing question: Do individuals who experience heightened gratitude during daily life demonstrate greater self-control

in the form of decreased temporal discounting? Given past work linking naturally occurring negative states such as anxiety and fear to decreased self-control, it might well be the case that naturally occurring gratitude could be associated with the opposite. For example, just as increased distress has been associated with overeating (Heatherton & Polivy, 1992) and relapse of cigarette use (Brownell, Marlatt, Lichtenstein, & Wilson, 1986), naturally occurring gratitude might be associated with greater patience in the face of temptation.

The present study examined this possibility. It consisted of three distinct phases: a laboratory induction of gratitude, measurement of naturally occurring gratitude over a 3-week period, and a final measure of temporal discounting. Our primary prediction was that increased mean levels of gratitude (as opposed to happiness) in daily life would be associated with enhanced financial patience. Moreover, to increase confidence in the validity of gratitude measures obtained outside of the lab, we had all participants complete a well-validated, lab-based gratitude induction (cf. Bartlett & DeSteno, 2006; DeSteno, Bartlett, Baumann, Williams, & Dickens, 2010). We expected that, all else being equal, individuals who responded with elevated gratitude to the standardized induction should also demonstrate elevated gratitude levels in response to elicitors experienced in their normal environs. If true, this finding would not only speak to the reliability of the external, daily measures of gratitude, but be among the first to demonstrate concordance between one-off lab-based and experience sampling measures of gratitude—a finding that would be useful to gratitude research in its own right.

Method

Participants

A total of 126 participants recruited from the Northeastern University Undergraduate Participant Pool and flyers posted across campus took part in this study.[1] Of these, three were dropped because of participants reporting suspicion of the lab-based gratitude induction (see Phase 1 of the Procedure Section), five were dropped due to computer or experimenter error, and 13 were lost due to attrition over the 3 weeks. This left 105 participants (79 women; 60% Caucasian; mean age = 19.31 years, SD = 2.63). All participants gave informed consent before participating. Participants were either compensated monetarily for both their lab visit and 3-week study period, or were given course credit for the lab visit and then paid for the 3-week study period.

Procedure

This study occurred in three phases. Phase 1 involved the use of a confederate and an in vivo gratitude induction. Phase 2 involved a 3-week period during which gratitude and happiness were assessed using daily Internet-based questionnaires. Phase 3 involved completion of an economic temporal discounting measure.

Phase 1. Participants were run individually. Each was paired with a female confederate trained to follow a scripted procedure to induce gratitude (cf. Bartlett & DeSteno, 2006; DeSteno et al., 2010). The pair was brought into the lab for a study ostensibly about problem solving in teams, seated at computers next to each other, and given instructions and consent forms. The two next completed a 5-min general knowledge task together, in which they attempted to answer general trivia questions to receive a joint score. This task was admin-

istered solely to uphold the cover story and legitimize emotional manipulation checks to be completed later on.

After this task, the participant and confederate received instructions for a lexical decision task (LDT) and questionnaire, to be completed individually at their own computers. This LDT task was designed to be tedious and repetitive. Participants had to repeatedly decide whether strings of letters appearing on a computer screen were English words. After working for 10 min on this task, the participant's computer was rigged to appear to short-circuit and go black. Meanwhile, the confederate—who appeared to have finished her tasks—stood up and started to leave the room, when she "noticed" that the participant was having a computer issue. She then volunteered to get the experimenter. Upon entering the room, the experimenter explained that this malfunction had happened before, and that she would have to call a technician to come fix the computer, after which the participant would need to start the onerous task over from the beginning.

After the experimenter left to ostensibly make that phone call, the confederate stayed behind to help the participant determine what had happened with the computer. Following a scripted set of comments and behaviors, the confederate hit a key that, after a 30-s delay, was programmed to bring the computer screen back to normal. The computer appeared to be fixed as the confederate was tightening loose cords, making it seem as though the confederate was responsible for solving the problem, thereby saving the participant from having to redo the tedious task. The experimenter then told the participant that they could continue with the next questionnaire.

After this episode, participants completed a number of questions on the computer, including an affective state measure (which included measures of gratitude and happiness), filler items, and demographic information. Using a 7-point Likert scale (from 1 = *not at all* to 7 = *extremely*), participants identified how well different emotion descriptors represented their current emotional state as well as feelings toward their general knowledge partner (the confederate). Gratitude was assessed as the mean response to two questions: "How *grateful/appreciative* do you feel toward your partner on the general knowledge task?" Happiness was assessed by responses to the question "How *happy* do you feel?" Once all questions were completed, the lab session appeared to come to a close.

Phase 2. Over the course of 3 weeks following the day of initial participation, participants' emotional states were assessed through completion of daily online questionnaires. Specifically, we assessed gratitude and happiness using the Qualtrics platform to send short online questionnaires to participants every evening (which could be completed via smartphone or computer). On these questionnaires, participants reported the intensities of various emotional states they had experienced during the past 24 hr. Any participant failing to complete three or more of the seven surveys per week was dropped from the study; late surveys were counted as misses. Similar to the lab-based measure, gratitude was assessed based on responses to two questions: "How *grateful/appreciative* have you felt in the last 24 hours?" Happiness was assessed based

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[1] Sample size was determined a priori based upon an effect size of R^2 = .07 for regressing discount factors on gratitude intensity derived from the one previous study investigating a similar issue (DeSteno et al., 2014). Analysis revealed a need for 112 participants to achieve a power = .80 with an alpha level = .05. As some participants were likely to be excluded for data quality or suspicion issues, we recruited an additional number. The final sample size of 105 corresponded to an expected power = .77.

on the response to "How *happy* have you felt in the last 24 hours?" Both measures utilized a 7-point scale ranging from 1 (*not at all*) to 7 (*extremely*). Note that given the relative infrequency of feeling gratitude at any given moment compared with feeling more basic states like happiness or sadness, we utilized this daily reflection measure rather than a randomly timed experience sampling methodology in which states would be assessed at any given moment.

Phase 3. The day following completion of the 3-week measurement period, participants were given instructions to complete a standard temporal discounting task online; the task had to be completed within 48 hr of receiving the instructions. Following procedures from DeSteno et al. (2014), we had participants complete a series of questions taking the form of "Would you rather have \$X now, or \$Y in Z days?"—with Y always exceeding X, and Z varying over days to months. That is, people were required to choose whether they would rather receive a smaller reward immediately (ranging from \$11 to \$80) or a larger reward in the future (ranging from \$25 to \$85; cf. Kirby, Petry, & Bickel, 1999). In this way, this financial choice measure constitutes something of an adult version of the marshmallow test; it allows determination not only of whether individuals can resist immediate temptation but also of the degree of devaluation of future rewards.

Although we had intended to provide participants with such 27 questions (as in DeSteno et al., 2014), a programming error resulted in one of the questions being omitted. Consequently, data from the remaining 26 were used to calculate individual discounting scores. In order to motivate participants to report their true preferences, we informed them that one person each week would be randomly selected to receive one of his or her monetary choices. That is, if they indicated a preference for immediate cash, they would be paid at the time of selection. If they indicated a preference for a future reward, they would be paid at that time.

Results

Before examining the relation, if any, between average gratitude intensities in daily life and financial patience, we sought to determine whether a systematic relation existed between gratitude responses in the lab and mean levels of gratitude in participants' natural environs. The logic here was that individual differences in gratitude in response to a standardized eliciting condition should positively covary with individual differences in reported gratitude in participants' daily lives. If true, it would lend empirical support to the validity of the repeated external measures. That is, assuming a fairly random distribution of gratitude eliciting events in participants' daily lives, those who responded with more intense gratitude to the lab-based measure should also respond more intensely to gratitude eliciting conditions that naturally occur. To the extent that a strong predictive relation exists between the lab-based and daily-life-based measures of gratitude, we can be certain that both are picking up on valid tendencies to experience this discrete positive emotion under appropriate eliciting conditions.

To examine this hypothesis, we analyzed participants' daily gratitude levels using a random-intercepts multilevel model in which daily gratitude (*i*) at Level 1 was nested within individuals (*j*) at Level 2. The following equations denote the model:

$$\hat{y}_{ij} = \beta_{0j} + r_{ij} \tag{1}$$

$$\beta_{oj} = \gamma_{00} + \gamma_{01}LabGrat + u_{0j} \tag{2}$$

In Equation 1, $\hat{y}_{ij}$ represents daily gratitude intensities for a given participant, β_{oj} represents the mean gratitude intensity for said participant, and r_{ij} represents deviations from his or her mean level on a given day. In Equation 2, each participant's mean gratitude level (β_{oj}) is modeled as a function of his or her gratitude intensity in response to the lab-based inducer.

Supporting predictions, we found that mean gratitude levels in daily life were strongly associated with gratitude responses in the lab, $\gamma_{01} = 0.31$, $\gamma_{std\ error} = .11$, $p = .005$. To further show specificity, we also examined the relation between daily happiness levels and lab-based gratitude responses using the same model, with $\hat{y}_{ij}$ now representing daily levels of reported happiness. As expected, in-lab gratitude responses did not predict mean daily happiness levels even though variability in happiness across individuals was quite evident, $\chi^2 = 1400.38$, $p < .001$.

Having demonstrated consistency in gratitude responses under controlled and "real world" conditions, we next sought to examine whether those who experienced more intense gratitude in their daily lives also demonstrated decreased temporal discounting and, thereby, increased self-control in the face of financial temptation. To do this, we used maximum-likelihood estimation to fit each participant's financial choices to an exponential discounting function, $D(t) = \delta^t$, in which larger values of δ (the annual *discount factor*, as opposed to the *discount rate*) indicate less discounting and, thus, more patience. An annual discount factor reflects the degree to which a fixed amount to be received 1 year from now would be valued relative to the same amount received immediately. In other words, a discount factor of .40 would imply that \$100 today is perceived as worth only \$40 in 1 year's time. Put differently, it means one would be willing to accept \$40 today as opposed to \$100 a year from now. As such, the discount factor can range from 0 (*extreme impatience*) to 1 (*extreme patience*).

We next regressed participants' discount factors on their mean gratitude levels during the 3-week period. As anticipated, increased mean levels of gratitude were associated with greater patience (i.e., increased annual discount factors), $b = .053$, $\beta = .21$, $p = .032$, 95% confidence interval [.005, .102].[2] Figure 1 depicts predicted discount factors across a continuum of chronic gratitude levels. As shown in this figure, participants whose mean gratitude levels in daily life were one standard deviation below the mean would require only \$21 now to forgo \$100 in year's time. However, those experiencing gratitude at greater levels (i.e., one standard deviation above the mean) showed greater patience. They would require \$33 to forgo the \$100 reward a year from now, thereby evidencing decreased discounting.

Finally, to show that the effect was specific to gratitude as opposed to daily experiences of positive emotion in general, we regressed discount factors onto mean happiness levels across the 3-week period. As expected, no significant covariation was observed ($p > .12$), thereby confirming earlier work that showed an absence of a link between happiness and patience (DeSteno et al., 2014).

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[2] Inverting the regression model so that discount factor becomes a predictor and mean gratitude level becomes an outcome variable allows fitting using a multilevel model. Here again, the covariation between the two variables proved significant, $p = .039$. As in bivariate regression, inversions are equivalent as they test the significance of the correlation coefficient linking the two variables in question.
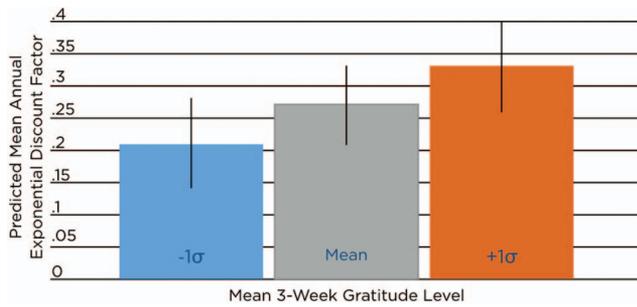
Figure 1. Predicted annual discount factors as a function of mean 3-week gratitude levels at ±1 standard deviation. Error bars denote ±1 standard error. See the online article for the color version of this figure.

Discussion

Although previous findings have linked naturally occurring negative affect to failures of self-control (Baumeister, Zell, & Tice, 2007), the present data, to our knowledge, are the first to document that elevated levels of an emotional state in daily life are associated with enhanced self-control and patience. It is important to note, however, that the present design is correlational in nature, and, therefore, any claims regarding the causal effects of gratitude must be tempered. The possibility that a third variable of a dispositional nature might explain the covariation between gratitude and self-control cannot be ruled out. That is, it is possible that the link between gratitude and self-control found here stems from a third variable related to a specific outlook or orientation toward life (e.g., an orientation to value possessions one has; cf. Lambert, Graham, & Fincham, 2009). However, given past experimental work demonstrating the causal link between induced gratitude in randomly assigned participants and increased patience (DeSteno et al., 2014), the likelihood that fairly chronic elevations in gratitude might directly impact self-control is high. Nonetheless, it may well be the case that underlying dispositional differences directly affect the levels of gratitude individuals experience in response to a specific eliciting event.

The association between elevated gratitude and self-control reported here is likely to extend beyond the financial realm. As such, it may suggest avenues for novel interventions in other areas in which self-control failures often play a problematic role. For example, health-relevant behaviors such as exercise and reduced fat consumption are partly characterized by the need to accept short-term costs in hedonic pleasure in order to realize longer term gains in well-being. Accordingly, healthy behavior in these domains might be facilitated by frequent engagement in simple gratitude-inducing tasks (e.g., counting blessings) during daily life (cf. DeSteno, Gross, & Kubzansky, 2013). Such strategies might prove especially resilient, as, unlike those relying on willpower or related aspects of executive function, they have the potential to directly increase the valuation attached to future rewards and might, therefore, be more resistant to depletion effects based on the withdrawal or reduction of motivation to persevere.

Finally, on a methodological note, the findings reported here demonstrate a strong concordance between experienced levels of gratitude in response to a standardized behavioral elicitor in the lab and those stemming from interactions with others in daily life.

Accordingly, use of confederate-based, real-time gratitude inductions similar to that used here can be relied upon to capture valid gratitude responses even though deception is utilized to construct the lab-based situation.

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