Short Communication

Gratitude pays: A weekly gratitude intervention influences monetary decisions, physiological responses, and emotional experiences during a trust-related social interaction

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ABSTRACT

Gratitude interventions assist individuals in the pursuit of greater personal and social well-being. Yet, little is known about whether these interventions increase interpersonal trust. In the current study, we tested whether a weekly gratitude-promoting intervention enhances the decision to trust a stranger in a monetary game several days later. Furthermore, we tested whether this intervention influences emotional and physiological reactions during the trust-making decision. After completing a gratitude journaling intervention or a control condition, participants engaged in a laboratory-based trust game. Continuous self-reports of emotional valence and physiological reactivity were recorded throughout the game. Compared with the control group, participants completing the gratitude intervention experienced more positive emotions and this mediated their greater willingness to entrust more money to a stranger. Participants who received the gratitude intervention experienced higher respiration rates and systolic blood pressure responses during trust making decisions – indicative of greater motivational intensity.

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1. Introduction

Previous studies have documented how individuals achieve greater satisfaction with life after practicing gratitude interventions (experiencing and/or expressing gratitude; e.g. Emmons & McCullough, 2003; Sheldon & Lyubomirsky, 2006). Yet, there are few studies examining if and how gratitude improves interpersonal functioning (e.g., trust); a core feature of prosocial models of gratitude (DeSteno, Bartlett, Baumann, Williams, & Dickens, 2010; McCullough, Kimeldorf, & Cohen, 2008). Exploring gratitude interventions and trust experimental manipulations in the same research study offer an opportunity to move beyond studies that are limited to self-reported interpersonal correlates of gratitude (e.g. Emmons & McCullough, 2003; Sheldon & Lyubomirsky, 2006), and trust (Dunn & Schweitzer, 2005); explicitly measuring the behavioral or physiological reactions during an actual social interaction. We aimed to provide causal evidence, that gratitude activity influences trust behaviors as a function of subjective and physiological components of emotional experiences during a social interaction. Unlike the majority of gratitude intervention studies that rely on self-reports (e.g. Emmons & McCullough, 2003), in the current investigation, we

examined whether practicing a gratitude intervention leads to a greater willingness to entrust a stranger with personal monetary resources (a behavioral outcome).

1.1. Enhancing trust via positive emotions

Trust manifests in situations characterized by an important goal with a highly uncertain outcome, when reliance on another person is expected to increase the probability of a desirable outcome (Agneessens & Wittek, 2008). Individuals are more trusting after experiencing positive affect. Dunn and Schweitzer (2005) found that gratitude increases trust, negative emotions decrease trust, and gratitude has a greater influence on trust when individuals are unfamiliar with the trustee. Similar to prior work, we expected gratitude interventions to boost positive affect (Emmons & McCullough, 2003; Sheldon & Lyubomirsky, 2006) which would serve to mediate a greater willingness to trust strangers.

1.2. Physiological responses in trust situations

There is some evidence suggesting that being grateful promotes health, in terms of self-endorsement of less physical health problems, better sleep quality, and more time spent exercising (Emmons & McCullough, 2003; Hill, Allemand, & Roberts, 2013). People need to

efficiently mobilize their energy to tolerate and/or circumvent obstructions to desired goals (Mendes & Park, 2014). The willingness to view obstacles as challenges (as opposed to threats), where strength deployment and growth opportunities are increasingly probable, is characterized by a particular profile of cardiovascular and respiratory activity (Brindle, Ginty, & Conklin, 2013; Phillips, Ginty, & Hughes, 2013). From this work, we argue that more trusting individuals are more likely to experience arousal during their social interactions as a function of their approach orientation and risk taking propensities; less trusting individuals tend to disengage, concerned about the potential costs rather than the benefits of being vulnerable and reliant with other people.

1.3. Current study

We examined the behavioral and physiological effects of a gratitude intervention during an actual social interaction. We expected gratitude intervention recipients to show more trusting behaviors (as indicated by the objective transfer of money to the trustee in the "trust game"; Berg, Dickhaut, & McCabe, 1995), and experience and communicate greater gratitude when their trust is rewarded by the trustee. As gratitude is an emotion with multiple components, beside behavioral outcomes, gratitude intervention recipients were also expected to experience subjective, positively valenced emotions throughout the "trust game" and their physiological arousal would increase as a function of having a greater approach orientation to trust. Building off of existing theories and empirical findings, we expected greater positive emotions during the social interaction to account for why a gratitude intervention elicits a greater willingness to trust another person.

2. Method

2.1. Participants

Participants were 61 undergraduates in Poland (50.8% female) between 18 and 32 years old ($M = 22.05, SD = 2.28$). We recruited an additional participant because one individual disbelieved the cover story for the trust game during debriefing. Two individuals, one from the control group and the other from the experimental group, with abnormal resting blood pressure (systolic >160 mm Hg; diastolic >90 mm Hg), were excluded from blood pressure analyses. We excluded one participant from respiration rate analyses because his resting respiratory rate was above a healthy threshold of 27 breaths/min (Cretikos et al., 2008). Upon conducting a power analyses with G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009), with up to five repeated assessments, a sample size of 44 was deemed appropriate to detect an effect size of 0.15 with an alpha of 0.05 and power of 0.80. Each participant received a cinema ticket for their involvement. The study was approved by the Institutional Ethics Committee.

2.2. Procedures

Gratitude intervention. After recruitment, participants reported their baseline trait gratitude, trait trust, and satisfaction with life. One day after recruitment participants were e-mailed a link to a dedicated website with further instructions either for the gratitude intervention or active-placebo control activities (randomized) (Emmons & McCullough, 2003). After visiting the intervention website, participants received the following information: "In recent years, research in psychology has established that performing certain activities can result in increased well-being." Following this, they were given condition-specific instructions.

Gratitude condition: "There are many things in our lives, both large and small, that we might be grateful about. Think back over the past three days and write down on the lines below up to five things in your life that you are grateful for."

Control condition: "There are many things in our lives, both large and small, that we do in our lives. Think back over the past three days and write down on the lines below up to five things in your life that you did."

The complete intervention involved writing a total of three journal entries. Three days after each entry, participants received an automatic reminder prompting the completion of the next exercise. Following the completion of the last entry, participants were telephoned and scheduled a visit in the laboratory (an average of 4 days after completing the website intervention).

Laboratory session. Upon arrival volunteers reported their levels of gratitude, trust, and satisfaction with life. Next they received information that they were about to participate in a financial experiment. Biosensors were attached and participants were given information on how to use the affect rating dial for continuous assessments of how they feel. The experiment began with a 5-min baseline while participants reported their affect continuously using the rating dial (see Fig. 1). Participants read how to play 'the trust game' and had 70 s to decide how much money to send to player B (the trustee). After their monetary decision they waited 70 s for the player B decision regarding the repayment. After they received information about the repayment (double the amount of money they trusted) participants waited 70 s and reported how grateful they felt toward player B for the repayment. Next participants sent a message to player B to express their gratitude using predefined messages from a list and they again waited 70 s. During all four 70 s long periods of time participants reported their affect continuously using the rating dial. Finally, participants completed a suspicion probe, so that we could retain in the sample those participants who found the cover story credible, i.e. player B is a real person participating in the research (Johnson & Mislin, 2011).
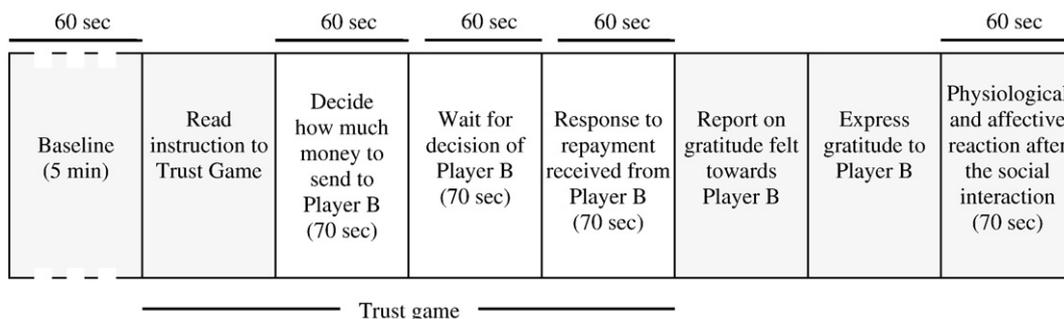

60 sec		60 sec	60 sec	60 sec			60 sec
Baseline (5 min)	Read instruction to Trust Game	Decide how much money to send to Player B (70 sec)	Wait for decision of Player B (70 sec)	Response to repayment received from Player B (70 sec)	Report on gratitude felt towards Player B	Express gratitude to Player B	Physiological and affective reaction after the social interaction (70 sec)

Trust game

Fig. 1. Experimental procedure. During each 60-s phase we recorded affect, systolic and diastolic blood pressure, and respiration rate.

2.3. Measures

Trust game (Berg et al., 1995). In a cover story, participants were told that they were randomly and anonymously paired with a second player who was in another room. Participants were informed that they would be Player A and that they would never meet their counterpart face-to-face (Player B). Two players, Player A and B, were each given an endowment of PLN16 (equivalent of $5 in the local currency) to start the game. Player A could send whatever amount (0 – PLN16) they wanted to Player B. The amount sent to Player B was tripled and the amount not sent to the Player B was to be kept by Player A. If Player A sent 0, 2, 4, 6, 8, 10, 12, 14 or PLN16 then Player B would receive 0, 6, 12, 18, 24, 30, 36, 42 or PLN48, respectively. Player B then decided how much of the tripled amount to repay to Player A. Participant A was informed that the amount returned would not be tripled on its way back to them. As Player B was fictitious, Player A always received double the amount that he/she transferred to Player B. Consequently, both players at the end of the game always had an equal amount of money in their account, and Player A always doubled what he/she invested. For instance, if Player A sent their whole endowment, i.e. PLN16, Player B would receive PLN48 and return PLN32. Thus, both players had PLN32 at the end of the game. At the end of the study participants received what they had left in their account. The amount sent is operationally defined as a behavioral measure of trust.

Gratitude feelings. After each participant received double the amount of what they initially sent to Player B, they assessed their gratitude to Player B. Gratitude toward Player B was measured with three questions ("To what extent do you appreciate the behavior of the Player B?"; "How grateful do you feel toward Player B?"; "How grateful do you feel?"), using a scale from 1 = "strongly disagree" to 7 "strongly agree" ($\alpha = 0.93$).

Gratitude response. Next participants received information that they could send a message to Player B. They chose a response from a list that spanned increasing levels of gratitude, 1 = "Do not send any message" and from "Send the following note to Player B: 2 = <Thank you!>; 3 = <Thank you, I am grateful to you!>; 4 = <Thank you, I am very grateful to you!>; 5 = Thank you! I am extremely grateful to you!>; 6 = <Thank you, I am grateful to you like never in my life!>".

Trait gratitude was measured with the 6-item Gratitude Questionnaire-6 (Kossakowska & Kwiatek, 2014; McCullough, Emmons, & Tsang, 2002), with answer responses on a scale from 1 = "strongly disagree" to 7 "strongly agree" ($\alpha = 0.84$).

Trait trust was measured with the six-item General Trust subscale form the Trust Questionnaire (Skarżyńska, 2002; Yamagishi & Yamagishi, 1994) that requires answers on a scale from 1 = "strongly disagree" to 7 "strongly agree" ($\alpha = 0.85$).

Life satisfaction was measured with the 5-item Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985; Juczyński, 1999) that requires answers on a scale from 1 = "strongly disagree" to 7 "strongly agree" ($\alpha = 0.85$).

Blood pressure. We recorded systolic and diastolic blood pressure of participants continuously using Finometer (Finapres Medical Systems, Holland). Finger arterial pressure waveform was recorded by finger cuffs with the use of photoplethysmography. Only recordings with <10% of artifacts in the 1-min period were used for analyses (missing data included four participants during all phases of trust game and an additional two participants during the "Response to repayment" phase).

Respiration rate. We measured thoracic and abdominal circumference changes during respiration with two piezo-electric belts Pneumotrace II (UFI, USA). The number of respiration cycles per minute provided the respiration rate. Increased respiration rate reflects sympathetic activation and/or vagal withdrawal.

Continuous subjective emotion ratings. Participant used a rating scale (ADInstruments, New Zealand) to continuously report on felt emotions. This device is a potentiometer that sends a signal in Volts to represents the position of the slider. The signal was sampled with a rate of 1000 Hz

by Powerlab 16/35 (ADInstruments, New Zealand) and further reduced using LabChart 8.02 software (ADInstruments, New Zealand). Participants were asked to adjust the scale position as often as necessary so that it always reflected how they felt in a given moment. The rating scale contains a self-reported rating of affect level from −5 (extremely negative) to 5 (extremely positive) with 0 in the middle (neutral). Electrical rating scales allowed for reliable and valid emotion ratings (Ruef & Levenson, 2007).

Physiological and affective data reduction. To give participants sufficient time to read the instructions for each stage of the experiment, we did not use the first 10 s of each 70-s block. We averaged blood pressure, respiration rate and affect across distinct 60-s segments: baseline (last 60 s of the total resting period), when making the decision to trust (how much money to send to player B), awaiting player B repayment, response to repayment, and sending a gratitude message to player B (Fig. 3).

2.4. Data analysis

We used repeated measures ANOVA to test group differences and used post-hoc tests to specify moments in the procedure when the experimental and control groups differed from one another. We ran repeated measures ANOVAs for trait gratitude trait trust, and satisfaction with life, with one between-subject factor (gratitude group vs active placebo control group) and one within-subject factors (before and after the intervention). We ran repeated measures ANOVA for systolic and diastolic blood pressure, respiration, and subjective affect with one between-subject factor (gratitude group vs active placebo control group) and one within-subject factors (consecutive periods: baseline, decision-making, waiting for repayment, received repayment, after gratitude expression). The *F*-ratios are reported using the Geisser-Greenhouse adjusted F-test that accounts for the circularity assumption. Mediation was tested with a bootstrapping approach available in the SPSS macro PROCESS (Hayes, 2013). We used 5000 bootstrapping samples to generate 95% confidence intervals (CI). Significant mediation effects were indicated by CIs that did not include zero.

3. Results

We found that recipients of the gratitude intervention sent more money to their trustees compared with controls (Table 1), $t(58) = 2.39$; $p < 0.05$; $d = 0.63$. Intervention recipients felt more grateful after they received the fair repayment compared to controls, $t(58) = 2.23$; $p < 0.05$; $d = 0.58$. Yet, both groups of participants communicated comparable level of gratitude to trustees for their repayment, $t(58) = 1.55$; $p < 0.05$.

The trust game resulted in an increased level of positive experiences in participants compared to their baseline (Fig. 2), $F(2.97, 172.48) = 22.51$, $p < 0.001$, $\eta^2 = 0.28$. Individuals who received the gratitude intervention experienced more positive emotions throughout the laboratory session, $F(1, 58) = 8.96$, $p < 0.005$, $\eta^2 = 0.13$. Pair-wise comparisons revealed that gratitude intervention recipients endorsed more positive emotions during the trust decision-making, $F(1, 58) = 10.30$, $p < 0.005$, $\eta^2 = 0.15$, when awaiting repayment, $F(1, 58) = 6.03$, $p < 0.05$, $\eta^2 = 0.09$, after receiving repayment, $F(1, 58) = 9.88$, $p < 0.005$, $\eta^2 = 0.15$, and after they thanked their trustee, $F(1, 58) =$

Table 1
Descriptive statistics for trust game, gratitude feelings and response, and age.

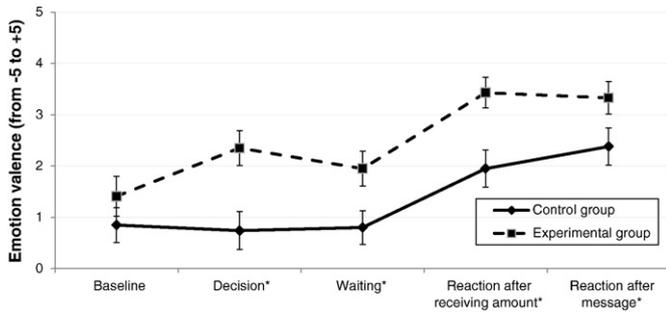|	Control group			Experimental group		
	M	(SD)	n	M	(SD)	n
Trust game	8.33	(4.10)	30	11.13	(4.95)	30
Gratitude feelings	4.82	(1.37)	30	5.54	(1.13)	30
Gratitude response	3.03	(1.12)	30	3.53	(1.28)	30
Age	22.07	(2.74)	30	22.07	(1.80)	30

Fig. 2. The effect of gratitude intervention on emotion valence as assessed by a rating dial. This figure depicts mean levels of affect in five 1-min intervals. A score of 0 is equivalent to neutral, a score of 5 extremely positive, and a score of -5 as extremely negative affect. Error bars represent standard errors. *$p < 0.05$.
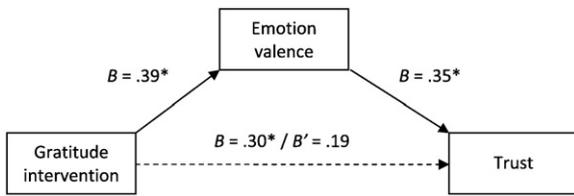

Fig. 3. The relationship between gratitude intervention and trust as mediated by subjective emotions felt upon making a decision about amount sent to Player B. * $p < 0.05$.

3.94, $p < 0.05$, $\eta^2 = 0.06$. Finally, we found that trait gratitude, $F(1, 58) = 2.63$, $p > 0.05$, $\eta^2 = 0.04$, trait trust, $F(1, 58) = 2.09$, $p > 0.05$, $\eta^2 = 0.035$, and level of satisfaction with life, $F(1, 58) = 0.28$, $p > 0.05$, $\eta^2 = 0.005$, did not change significantly after the intervention

in both the experimental and control group. Traits did not interact with the manipulation in predicting behavioral trust ($ts < 1.34$, $ps > 0.15$).

The mediational analysis examined positive emotion as a potential mechanism accounting for the relationship between the gratitude intervention condition effect and behavioral trust (Fig. 3). The overall model predicted a significant amount of variance in trust, $F(2, 57) = 5.19$, $p < 0.01$, $R^2 = 0.15$. A significant direct effect of intervention on trust, $t = 2.39$, $p < 0.05$, was reduced to non-significance, $t = 1.45$, $p > 0.05$ after controlling for affect. This indirect effect via affect was significant, $b = 0.11$, $SE = 0.05$, 95% CI[0.02, 0.25], suggesting that positive affect mediated the link between the gratitude intervention and behavioral trust.

As for the physiological responses, the trust game produced intense reactivity in systolic blood pressure (Fig. 4, Table 2), $F(2.49, 126.91) = 106.54$, $p < 0.001$, $\eta^2 = 0.68$, in both groups as indicated by a non-significant effect of intervention, $F(1, 51) = 2.42$, $p > 0.05$, $\eta^2 = 0.04$. Furthermore, there was a significant interaction of phase of study and intervention, $F(2.49, 126.91) = 2.89$, $p < 0.05$, $\eta^2 = 0.05$. A detailed inspection of this interaction with pair-wise comparisons indicated that participants who received the intervention had marginally higher systolic blood pressure while making decisions, $p = 0.06$, and while waiting for the trustee's repayment, $p = 0.05$. There were no significant differences during baseline measurements, during receiving repayment from the trustee, and after sending thankful message to the trustee, $ps > 0.05$. We found that the trust game also affected diastolic blood pressure as indicated by a main effect for the period of study, $F(2.38, 121.13) = 91.85$, $p < 0.001$, $\eta^2 = 0.64$. However, there were no differences between groups as indicated by a non-significant main effects of intervention, $F(1, 51) = 0.89$, $p > 0.05$, $\eta^2 = 0.02$ and a non-significant interaction of period of study and intervention, $F(2.38, 121.13) = 1.96$, $p > 0.05$, $\eta^2 = 0.04$. The trust game produced significant increases in respiration rates in the participants compared to their resting states (Fig. 5), $F(3.43, 195.30) = 9.23$, $p < 0.001$, $\eta^2 = 0.14$. Intervention recipients had higher respiration rate than the controls, $F(1, 57) = 3.39$, $p = $
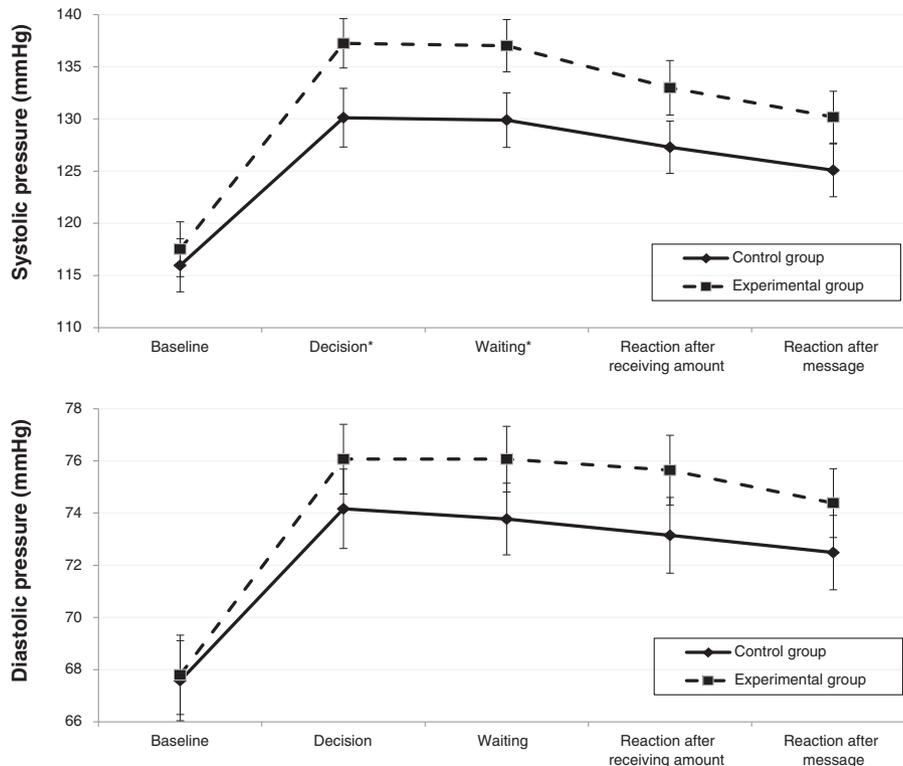

Fig. 4. The effect of gratitude intervention on systolic and diastolic pressure. These figures depict mean levels in systolic and diastolic blood pressure in five 1-min periods. Error bars represent standard errors. *$p < 0.05$.

Table 2
Descriptive statistics for physiology and emotion.

	Baseline		Decision		Waiting		Response to repayment		After 'thank you' message	
	M (SD)	n	M (SD)	n	M (SD)	n	M (SD)	n	M (SD)	n
Systolic pressure										
Gratitude	118.27 (13.95)	28	137.65 (12.25)	28	137.43 (12.95)	28	132.99 (13.56)	27	130.63 (12.86)	28
Control	115.97 (12.93)	28	130.12 (14.35)	28	129.89 (13.32)	28	127.29 (12.80)	27	125.08 (12.89)	28
Diastolic pressure										
Gratitude	68.43 (8.46)	28	76.68 (7.19)	28	76.51 (6.81)	28	75.64 (6.94)	27	74.79 (7.06)	28
Control	67.58 (7.84)	28	74.16 (7.76)	28	73.77 (7.02)	28	73.15 (7.40)	27	72.49 (7.26)	28
Respiration										
Gratitude	16.23 (3.63)	30	17.97 (3.87)	30	17.43 (4.00)	30	16.97 (3.27)	30	16.10 (4.06)	30
Control	14.97 (3.37)	29	16.59 (3.08)	29	15.21 (3.50)	29	15.03 (3.52)	29	15.10 (3.37)	29
Emotion										
Gratitude	1.41 (2.12)	30	2.35 (1.84)	30	1.95 (1.85)	30	3.43 (1.64)	30	3.33 (1.73)	30
Control	0.85 (1.85)	30	0.74 (2.02)	30	0.80 (1.80)	30	1.95 (1.99)	30	2.38 (1.99)	30

0.07, $\eta^2 = 0.06$, during awaiting repayment and after they received the repayment ($ps < 0.05$).[1]

4. Discussion

The present study examined how a gratitude intervention influences relevant objective behavior, subjective emotions, and physiological reactions during a trust-related social interaction. In the aftermath of a week-long gratitude journaling intervention (or a placebo journaling condition), participants took part in a laboratory social interaction. We found that gratitude intervention recipients experienced more positive emotions during the social interaction. This is the first study of gratitude to explore the exact contextual conditions of when positive emotions are experienced – a test that can only be explored by exploring emotions continuously over the temporal course of socializing. In addition to an emotional boost, gratitude intervention recipients entrusted more money to their game partners, and felt more grateful after receiving a fair repayment. Furthermore, we found higher systolic blood pressure and higher respiratory rates among intervention recipients.

Intervention recipients showed a greater willingness to trust while making monetary decisions, with more money sent to the trustee. A prior meta-analysis of 161 studies with the trust game indicated that senders pass an average of 52% of their initial endowment (Johnson & Mislin, 2011). In our control group, trustors sent 52.1% of the money at their disposal, yet the amount sent in the gratitude group averaged 69.6%, evidence of a meaningful behavioral increase in trust as opposed to an inhibition of trust in the control group. These findings extend recent theory and empirical work suggesting that gratitude is related to prosocial motives and behaviors (DeSteno et al., 2010; Dunn & Schweitzer, 2005; McCullough et al., 2008). These results also contribute to literature on the efficacy of psychological interventions that increase social resources (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008). The unique contribution of this study is that we provided participants with an opportunity to act on their inclination to trust as well as express gratitude in a context where there was a risk of losing or earning money. In doing so, we provided initial evidence that practicing gratitude intervention facilitates trusting.

Intervention recipients reported more positive emotions throughout the social interaction, corroborating theory suggesting that gratitude promotes a positive future outlook (Emmons & McCullough, 2003; Sheldon & Lyubomirsky, 2006). Mediation analyses provided evidence that positive emotions experienced were an active ingredient that motivated intervention recipients to be more trusting; supporting a conceptualization of emotion as input as to whether trust is warranted in social situations (Schwarz & Clore, 1988). Using a gratitude intervention, rather than an acute gratitude manipulation (e.g. Dunn & Schweitzer, 2005), we introduced positive emotions as a mechanism accounting for the effects on trusting behavior. Our work provides insights into mechanisms explaining how practicing gratitude can lead to increased interpersonal trust. Positive emotions experienced during the phase of making decisions about trust behavior enable greater trust with a stranger. This contextual finding suggests that the moment when specific emotional experiences occur matter in understanding the gratitude-trust link; a global increase in positive emotions fails to offer sufficient information to understand this link. Compared to baseline, large increases in systolic blood pressure and respiratory rate during the trust game suggest that the decision to trust another person is arousing, and that the act of trusting is even more arousing than being distrustful. Furthermore, we found that recipients of the gratitude intervention experienced higher systolic blood pressure and higher respiration rate during specific parts of the interaction: when deciding whether to trust, when waiting for the response from one's partner, and when discovering how one's partner responded. These physiological findings conflict with a prior study that found no effects of a gratitude intervention on cardiac responses (Rash, Matsuba, & Prkachin, 2011). Importantly, our study offered a more comprehensive evaluation of physiological responses during various phases over the course of a social interaction. An actual social interaction offers a stronger situation for the emergence of subjective and physiological arousal in deciding whether to trust another person. Our study offers a contextual lens to the psychophysiology of trust and gratitude, as the results were not uniform across the entire social interaction.

Higher cardiovascular reactivity to events is likely to result from greater motivational intensity (Brindle et al., 2013; Phillips et al., 2013). In contrast, negative mood has been linked to rigid physiological stress responses. Thus, the results suggest that gratitude intervention recipients were more reactive due to higher motivation throughout the social interaction. Second, the pattern of physiological responses that we observed in the experimental group (elevated blood pressure and increased respiration rate) is characteristic for enthusiasm (Shiota, Neufeld, Yeung, Moser, & Perea, 2011). Perhaps the physiological responses among gratitude intervention recipients may have been primarily determined by their enthusiastic expectations resulting from the decision to trust. Having invested more money, they might have expected higher repayment, which elicited more enthusiasm.

It is necessary to detail caveats. First, with the use of a student sample, additional research must determine the generalizability of effects to less educated peers and other age cohorts. Second, the experimental manipulation effects might have been influenced by demand characteristics, as participants were explicitly asked about gratitude and trust throughout the study. Third, future studies might address the specificity

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[1] An alternative explanation is that increased physiological experiences by those in the gratitude intervention might be a consequence of behavioral trust (i.e., money entrusted as in index of risk taken). Thus, we explored a model with the gratitude intervention leading to physiological changes as a function of behavioral trust. We ran a series of mediational models to test this alternative explanation. None of the indirect effects were significant ($p > 0.05$), thus we rejected this explanation.
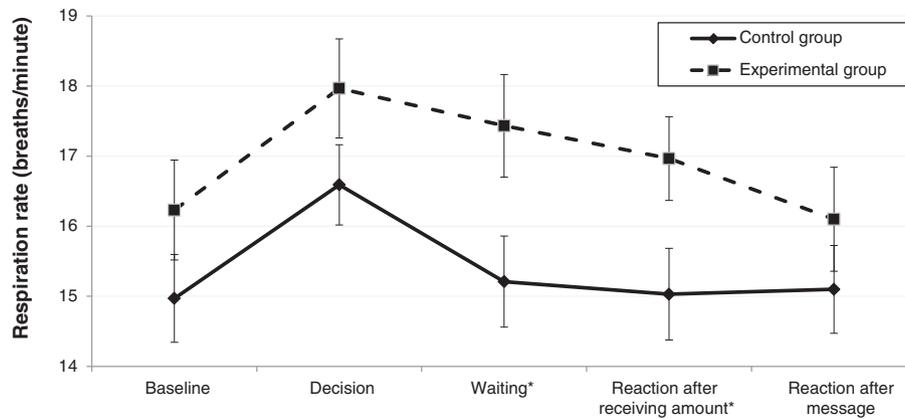
Fig. 5. The effect of gratitude intervention on respiration rate. This figures depicts mean levels in respiration rate in five 1-min periods. Error bars represent standard errors. $^*p < 0.05$.

of gratitude effects by including additional control groups where other positive emotions are experimentally induced. The issue of construct specificity is important, albeit a line of research that requires the initial establishment of an effect (and ours happened to be a complex interplay of gratitude interventions and trust experimental social interactions).

The strength of this study is that we used an experimental design that allows for causal inferences, and that we preceded the laboratory social interaction with a weekly activity performed in everyday settings. The ecological validity of our research was enhanced by granting participants an opportunity to gain or lose financially. Moreover, our study capitalized on a multi-method approach including continuous subjective ratings, behaviors, and physiological reactivity. This research program presents tangible benefits of a gratitude intervention, advancing the understanding of how gratitude and trust operate together to produce profitable experiences.

Acknowledgement

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