Gratitude, Indebtedness, and Reciprocity

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Gratitude, Indebtedness, and Reciprocity:

An Extended Replication of Bartlett & DeSteno (2006)

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The data that support the findings of the study are openly available on the Open Science Framework page (https://osf.io/trvq3/).

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Abstract

In a landmark study in 2006, Bartlett and DeSteno found that receiving help promoted reciprocal behavior and that this effect was mediated by feelings of gratitude. Recent research, however, suggested that indebtedness is more closely associated with reciprocation than gratitude. Therefore, we examined whether reciprocal behavior could (also) be attributed to indebtedness. Specifically, we attempted to replicate and extend Bartlett and DeSteno's (2006) Study 1 by additionally including a measure of indebtedness. Surprisingly, the replication was not successful. We did not find support for the idea that receiving help promoted reciprocal behavior, and neither gratitude nor indebtedness was associated with reciprocal behavior. Finally, we call for attention that the extant literature may be inconclusive regarding the presumed prosocial effects of gratitude.

Keywords: Gratitude; Indebtedness; Reciprocity; Replication

Gratitude, Indebtedness, and Reciprocity:

An Extended Replication of Bartlett & DeSteno (2006)

The recent decade has seen an increasing focus on studying gratitude that promotes prosocial behavior (i.e., Bartlett & DeSteno, 2006; McCullough, Kimeldorf, & Cohen, 2008; Tsang, 2006a; for a review, see Ma, Tunney, & Ferguson, 2017), and social affiliation towards the benefactor (Algoe, 2012; Bartlett, Condon, Cruz, Baumann, & DeSteno, 2012; Lambert, Clark, Durtschi, Fincham, & Graham, 2010). In contrast, while it is clear that gratitude and indebtedness are distinct emotions that co-occur after receiving benefits (Algoe, Gable, & Maisel, 2010; Peng, Nelissen, & Zeelenberg, 2018; 2019; Tsang, 2006b; Watkins, Scheer, Ovnicek, & Kolts, 2006), indebtedness received far less attention in the literature. Meanwhile, recent insights also suggest that reciprocal behavior could actually be attributed to indebtedness rather than gratitude (Greenberg, 1980; Peng et al., 2018), or at least indebtedness has a complementary role in shaping reciprocal behavior (Algoe et al., 2010; Naito & Sakata, 2010; Tsang, 2007; Watkins et al., 2006).

More directly speaking to the distinct roles of both emotions, Peng and colleagues (2018) found that gratitude and indebtedness have distinct cognitive appraisals and functions in social exchange. They found that gratitude is elicited when receiving a favor signals an opportunity to build social relationships. According to this reasoning, gratitude responds to aspects of the favor that are associated with the giver′s concern of the receiver′s needs. Consequentially, gratitude promotes proximity seeking with the giver in order to build up and strengthen social bonds. Peng and colleagues (2018) further found that indebtedness is elicited when receiving a favor produces an inequity between the giver and the receiver. Thus, indebtedness responds to aspects of the favor that are associated with the costs of the favor and the resulting inequity it incurs.

Consequentially, indebtedness promotes reciprocal behavior so as to restore equity.

The findings of Peng et al. (2018) suggest that in previous research, effects of indebtedness may have been attributed to gratitude, because these emotions typically co-occur, and indebtedness is often not assessed. In three studies, they consistently found that when analyzing only gratitude, it was associated with both the motivation to seek proximity and the perceived obligation to reciprocate. Importantly, the latter effect disappeared when analyzing gratitude and indebtedness simultaneously. In that case, indebtedness, but not gratitude, was found to be associated with the perceived obligation to reciprocate.

Hence, we thought it necessary to re-examine the prosocial effect of gratitude while accounting for the effects of indebtedness. We did this by replicating the Study 1 of Bartlett and DeSteno (2006), which shows that gratitude impacts reciprocal behavior. This study has profoundly shaped the view that gratitude promotes reciprocal behavior (1075 citations on Google Scholar, November 2019). In this study, participants in the Gratitude condition encountered a (bogus) computer crash problem. The confederate, ostensibly another participant, helped solve the problem, saving the participant quite some time. When the study was believed to be over and participants were about to leave, the confederate asked them for help with a survey that would take about half an hour to finish. Participants were told that they could do as much as they wanted and quit anytime. The time participants spent on filling out the questionnaires was the measure of prosocial behavior. The results showed that participants who received help (vs. control and amusement conditions) spent more time on the survey. Moreover, the gratitude that participants reported to feel mediated the effect of receiving help on reciprocating help. In our replication, we set out to measure both gratitude and indebtedness to assess their unique effects on reciprocal behavior.

Before turning to our replication, let us reconsider the prosocial effects of gratitude, especially the reciprocal effect of gratitude. How much empirical support is there for this reciprocal effect of gratitude? In a meta analytic review (Ma et al., 2017), only four out of 91 studies qualify as studying direct reciprocity. For direct reciprocity, three criteria need to be met. First, the study measures real behavior rather than self-report intentions. Second, the reciprocity is targeted directly to the helper rather than involving a third person or charity (i.e., not indirect reciprocity or general prosociality). Third, the favor involves an actual investment in time and effort rather than a financial exchange. Many studies reported in Ma et al. applied economic game settings to investigate the prosocial effects of gratitude (e.g., Tsang, 2006a, Halali, Kogut, & Ritov, 2017). Crucially, in these studies, help was extended and reciprocated in the form of financial favors. As a result, findings from studies investigating reciprocity in economic games may end up overestimating the effect of gratitude on reciprocity. As our previous work (Peng et al., 2019) showed, receiving money has a unique effect in that it exacerbates feelings of indebtedness and the consequential urgency to repay. Consistent to this notion, the meta-analytic review of Ma et al. found that studies applying economic game settings revealed stronger effects of gratitude on reciprocity than studies applying non-economic settings. According to the three criteria mentioned above, only the three studies from Bartlett and DeSteno (2006) and the one from Goei and Boster (2005) can be qualified as studying direct reciprocity. Therefore, despite the notion that gratitude promotes reciprocity is widely accepted, evidence from behavioral measures is actually sparse. Hence, we thought that it was important to replicate this behavioral effect of gratitude.

We had three goals with this extended replication. First, we wanted to replicate the mediating effect of gratitude in eliciting help. Second, we wanted to test whether the computer

crash paradigm Bartlett and DeSteno (2006; also applied in Bartlett et al., 2012; DeSteno, Bartlett, Baumann, & Willilams, 2010; DeSteno, Duong, Lim, & Kates, 2019) would also induce indebtedness, in addition to gratitude. Third, because we wanted to examine whether gratitude or indebtedness promotes reciprocating help, we would include both emotions in the same mediating model. Our prediction was that the mediating effect of gratitude will decrease or even disappear when indebtedness would be included as a mediator.

Method

This was an extended replication of Study 1 in Bartlett and DeSteno (2006). We tried to stay as close as possible to the original study apart from the following differences. First, we had a different and larger sample size. We used an international student sample in the Netherlands (vs. a US student sample in the original study) that had more than twice the number of participants of the original sample size (N = 152, vs. N = 70 the Control and Gratitude conditions in the original). Second, we had only two conditions (Help vs. Control) that were identical to the Gratitude and Control conditions in the original study. We dropped the Amusement condition, as the original paper introduced it to distinguish the specific effect of gratitude from the mere effect of positive valence. Hence, this condition was not necessary to meet the aims of the present replication. Third, we made some changes to the feedback questions that were used as a manipulation check of gratitude. In an attempt to make the cover story more convincing, we added a list of questions about the experiment, the computer equipment, and the experimenter before we measured participants' feelings of gratitude towards their partner (i.e., the confederate). We also added three items that were constructed to measure indebtedness. Fourth, following communication with the original authors, we slightly changed the dependent measure of helping behavior. In the original study, participants were requested to help with a paper and

pencil problem-solving survey and were told to deposit the survey in an envelope when finished. The original materials could not be found anymore, so the authors recommended us to use a mental rotation task described in Williams and DeSteno (2008) and provided us with the materials. We will elaborate on the details below.

Participants

Based on the effect size we calculated from the original study, a power analysis indicated that we would need 164 participants (d = 0.563, based on the effect size of the original study, α = .05, 1-β= .95, pre-registered via Aspredicted.org #15615). Due to the complicated nature of the study (with the confederate and the alleged computer failure), we thought it was likely that we would need to exclude participants with issues of manipulation failure and suspicion. So, we decided that we would oversample, and we aimed for approximately 200 participants and would stop data collection after three weeks. We ended up with a total of 190 first-year international psychology students at Tilburg University that participated for course credit. Participants were randomly assigned to the Help condition (N = 104) or the Control condition (N = 86). We oversampled a bit more for the Help condition as we anticipated more exclusions would be necessary in this condition due to the greater complexity of the experimental procedure to manipulate help. We did not ask for participants' nationality, but because they were enrolled in a completely English-taught program, they can be assumed to fully comprehend the English materials. During the first two days, we followed the detailed procedure as the original authors provided (see http://www.davedesteno.com/resources) but found out soon that encouraging participants to talk and cooperate in the general knowledge test resulted in a ceiling effect of gratitude even in the Control condition. So, we decided to make the procedure identical to what was described in Bartlett and DeSteno (2006) and not include these first set of participants (n =

21) in the analyses. Before we examined the data, another 17 participants were excluded from the analyses because of procedural difficulties during the experiment (e.g., participants solved the problem themselves before the confederate could offer help, or participants expressed suspicion about the manipulation). We ended up with 152 valid participants (M_{age} = 19.73, *SD* = 1.96, 84.87% females), 79 participants in the Help condition and 73 participants in the Control condition.

Procedure

We followed the procedure described in Bartlett and DeSteno (2006) Study 1. Participants were informed that they were one of two participants in a study about social interaction and decision making. In reality, the other participant was a female confederate, blind to the hypothesis of the study. Both the participant and the confederate were seated at individual computer workstations in the same room. After collecting the consent form, the experimenter told the participants that this study consisted of three parts in total: A general knowledge test, a cognitive task on the computer, and a feedback questionnaire.

Participants were told that the first task was designed to test their general knowledge, and even though they would work on it independently, they and their partner would receive one score for their joint effort. The experimenter explained that this task was to test what kind of questions were familiar to people of this generation. However, the real purpose of this setting was to allow participants to feel comfortable at the presence of the confederate and establish friendly and benign contact. The task consisted of 15 multiple choice questions (see Appendix A for detailed questions). The experimenter said that she would come back after 4 minutes.

Upon completing this task, the experimenter introduced the next task, a lexical decision task (programmed in Inquisit 4). Participants were instructed to decide whether a string of letters

flashed on the screen was an English word or a non-word. Participants were told that this task consisted of a practice part (7 trials) and three blocks (80 trials per block) and took around 10 minutes to finish. Words and non-words were selected from the database of the British Lexical Project (Keuleers et al., 2012). Participants were instructed to do this as quickly and accurately as possible and were told that they would receive their score after each block of trials. In reality, the scores were created ahead of time and were identical for all participants. The task was aimed to be tedious and cognitively demanding so that it provided an aversive experience that would play a central role in the gratitude and indebtedness induction. The experimenter explained that participants would see a summary of all three scores at the end of the task. When both the participant and the confederate finished, they could come to find the experimenter and continue with the next part. At this point in the procedure, the common script diverged in the two conditions.

Manipulation

Help Condition: After participants finished the third block and before their scores displayed on the computer, the screen went blank. Actually, this computer crash was preprogrammed. When the participant reported it to the experimenter, the experimenter explained that this happened before and would call a technician to fix it. The participants learned that s/he would probably have to re-do the lexical decision task on another computer, as the experimenter still needed their data. While the experimenter left the room and pretended to call the technician (loud enough so that the participants in the other room could hear), the confederate asked the participants what happened and offered to have a look. The confederate, following a scripted set of comments and behaviors, tried to figure out the problem and the solution. The confederate pressed a few buttons on the keyboard, making sure to press F7* which had been

programmed to set off a 15s timer before bringing the screen back. Then the confederate proposed to check the cable and asked the participants to notice the screen. When the screen was back, presenting the scores, the confederate explained that the cable might be too loose. Just at this moment, the experimenter finished the call and entered the room. The experimenter explained that the technician would come after approximately 10 minutes until the participants alerted that the problem had been solved. The experimenter then checked the score and told participants that they did not need to start the task over again but could continue with the third task.

Control Condition: The participant and confederate both finish the lexical decision task without any interruption. The confederate carried on a brief conversation with the participant and suggested to find the experimenter together.

Measures

Gratitude and Indebtedness: Participants were instructed to finish the third task, a feedback questionnaire, which consisted of their experience about the experiment, the experimenter, and their partner (i.e., the confederate). Participants rated how well each statement described their experience on five-point scales. See Appendix B for the whole questionnaire). We measured gratitude with the same three items as the original study: *How grateful do you feel toward the other participant; How appreciative do you feel toward the other participant*; *How positive do you feel toward the other participant* ($\alpha = .82$). We will refer to this as the Original measure of gratitude. Arguably, the third item of the Original measure is not a very good measure of gratitude. Hence, we included an additional item *How thankful do you feel toward the other participant*, to replace the third item. We refer the set of three items with this last one instead of the original third item as the Adjusted measure of gratitude ($\alpha = .90$). Furthermore, we

added a measure of indebtedness also with three items: *How indebted to you feel toward the other participant*; *How obligated to you feel to do something for the other participant*; *How much do you feel you owe the other participant a favor* ($\alpha = .78$).

Helping Behavior. After completing the feedback questionnaire, the experimenter announced the end of the study. When the participant and the confederate were packing and preparing to leave, the confederate approached the participant and asked if he or she would be willing to help her with pretesting some stimuli for her thesis. The confederate made clear that the task would take around half an hour to finish but the participants could do as much as he or she wished. Yet the more questions were completed, the more helpful it would be. If the participant agreed to help, the confederate would explain that she was allowed to use one of the cubicles in a nearby lab and installed them there. We used a mental rotation task adopted from Study 1 of Williams and DeSteno (2008). This task consisted of a long series of onerous mental rotation exercises which proved to be tedious and cognitively taxing. Participants were presented with the following instructions:

> This is a pilot study for a bachelor thesis. We need you to help evaluate some experimental materials. These materials will be used to investigate people's ability to rotate objects using visual imagery. On each trial, you will be asked to decide whether the two images presented are identical or not. If they are identical, press A. If they are different, press L. Please make sure you answer each question as accurately as possible. Please work on this task as long as you like. Do not feel as if you must finish all of the exercises provided. In fact, it is not possible to complete the entire set in the time provided for this experiment. Please continue doing this task until you feel as if you would like to stop. If you want to stop, click the button Esc at the upper left anytime and

leave the lab. Press the space button to start.

The confederate explained that she had to leave because of an appointment and then left. The computer recorded the exact amount of time each participant spent on this task as the dependent measure of helping behavior, starting with the first image and ending when the participants decided to quit. The task was programmed to quit automatically after 30 minutes.

Results

The help manipulation was successful. Participants in the Help condition felt more grateful than those in the Control condition, both when gratitude was measured with the Original and with the Adjusted measure (All statistics were summarized in Table 1). Participants in the Help condition also felt more indebted than those in the Control condition. Moreover, reported indebtedness correlated positively with both the Original, $r = .48$, $p < .001$, and the Adjusted measure of gratitude, $r = .51$, $p < .001$.

We coded refusals to help as zero minutes of helping behavior, as the original study did. We found that participants helped on average some 7 minutes. The original study found a medium effect size of receiving help on the average time filling out the questionnaire. We found that participants in the Help condition ($M = 7.35$, $SD = 6.61$) spent more time on the mental rotation task than those in the Control condition ($M = 6.47$, $SD = 5.24$), but this was far from significant (see Table 1). The original study reported an indirect effect of receiving help on providing help through gratitude, which we also failed to find. By applying mediation analysis model 4 from the PROCESS procedure (Preacher & Hayes, 2008) and the corresponding SPSS macro, we did not find the mediating effect of gratitude[1] on the relationship between the experimental conditions and helping behavior, $b = 0.04$, $SE = 0.93$, 95%CI [-1.83, 1.90] (see

[1]The pattern of results did not differ between the Original and the Adjusted measures of gratitude. We decided to only report the results for the Adjusted measure of gratitude because of its higher reliability.

Figure 1 for details). In short, we failed to replicate the effect that receiving help promotes providing help later. We also failed to find that gratitude promoted reciprocal behavior.

We then put gratitude and indebtedness into the same mediation model and failed to find the indirect effect through either gratitude or indebtedness. We applied the same mediation analysis from the Macro PROCESS procedure and put gratitude and indebtedness together as the mediators. We found neither an indirect effect through gratitude, b = -0.05, SE = 0.98, 95%CI [-1.97, 1.80], nor an indirect effect through indebtedness, b = 0.07, SE = 0.46, 95%CI [-0.75, 1.08] (see Figure 1 for details). There was no evidence to suggest that indebtedness promoted reciprocal behavior either.

In addition to running these preregistered analyses, we ran several exploratory analyses to further examine why this replication failed. First, we checked whether the Help condition (15%, 12 out of 79) differed on the frequency of refusals with the Control condition (11%, 8 out of 73), and did not find such evidence, $\chi_2(1, N = 152) = 0.59$, $p = .44$. We then excluded "refusals" from the analysis and compared helping behavior only for those participants who actually helped. There was also no evidence that the Help condition participants spent more time on the task. We also did not find a correlation between the time spent on help with gratitude, $r = .11$, $p = .20$, nor with indebtedness, $r = .06$, $p = .47$. This result suggested that even though in our dataset there might be a small effect ($d = 0.25$) that the Help condition exerted more help, it could not be attributed to gratitude and indebtedness.

Second, since there were censored observations for the participants who refused to help, we believed a Tobit regression would provide a more appropriate test of the predicted effects of the experimental conditions on helping behavior. A Tobit regression of the experimental conditions on the time spent to help, by setting up the lower bound as zero, found no significant

effect, $b = 0.75$, $SE = 1.10$, $p = .50$.

Third, we ran a log-rank survival analysis with Kaplan-Meier method to compare the survival curves of the two conditions, by putting helping time into Time, helping happened into Status, and helping conditions as Factor. As Figure 2 shows, we did not find a significant difference between the two conditions in survival time, $\chi_2(1, N = 152) = 1.95$, $p = .16$.

Fourth, we recorded the average time participants spent on each trial. This measure may be different from the total time spent on the task, as it may indicate how much effort participants put into helping with the task. We found that compared to the Control condition, participants in the Help condition spent more time on each trial on average. This difference was marginally significant. We ran a similar mediation analysis on this effect by putting gratitude and indebtedness as mediators with Macro PROCESS method. We did not find an indirect effect through gratitude, $b = 0.01$, $SE = 0.01$, 95%*CI* [-0.02, 0.04], or through indebtedness, $b = -0.00$, $SE = 0.01$, 95%*CI* [-0.02, 0.01]. In sum, this study did not find any evidence that receiving help promoted more help, nor that gratitude or indebtedness are associated with the amount of help provided.

Discussion

To understand whether gratitude and/or indebtedness promote reciprocal behavior, we replicated Study 1 of Bartlett and DeSteno (2006) and added a measure of indebtedness. The original study found that receiving help promotes providing help through the experience of gratitude. We argued that this effect could be attributed to indebtedness in addition to or rather than gratitude, and we measured gratitude and indebtedness independently. First, the original study found a medium effect of receiving help on promoting helping behavior and that this effect was mediated by the experience of gratitude. Surprisingly, in our study, the effect of receiving

help on promoting helping behavior was much smaller and failed to reach significance. Gratitude was not found to be associated with reciprocal helping behavior. Second, we found that the paradigm that was used in the original study also elicited gratitude in this study. Additionally, it also elicited indebtedness, and both emotions were highly correlated. Finally, when analyzing both gratitude and indebtedness together, neither gratitude nor indebtedness was found to be associated with reciprocal helping behavior. Therefore, we failed to replicate the effect reported in Bartlett and DeSteno (2006) Study 1. We also did not find that indebtedness promoted reciprocal behavior, contrary to our hypothesis.

We believe that the present study included some improvements relative to the original study in terms of methodology. First, the present study had a larger sample size, about twice as large of the original study, and therefore was less likely to yield false-negative outcomes. Second, the measurement of the dependent measure was more accurate, as we recorded the exact time participants spent on helping with the task, from the first trial to the last. Third, we analyzed the results with various statistical methods, to make sure that we comprehensively assessed all possible operationalizations of helping behavior in the present paradigm. We included frequency based (i.e., assessing the incidence of helping), time based (i.e., assessing the quantity of help), time per trial based measures (i.e., assessing the quality of help), and survival measures (i.e., assessing the perseverance of helping behavior). Despite these methodological improvements, we found no support for gratitude and/or indebtedness to promote reciprocal behavior.

In the following, we address three concerns about the differences between the original and current studies, and how they may be related to not replicate the original findings. First, we based our sample size calculation on the original dependent measure (d = 0.563), which is actually a more conservative estimation. In the meta-analysis from Ma et al. (2017), gratitude

and prosociality correlated at $r = .374$ which converts to $d = 0.807$. In Williams and DeSteno (2008) where the new dependent measure was from, the effect size of pride on perseverance was $d = 0.86$. Thus, we think that the non-replication is not due to low power.

Second, the original study used a sample of US students, while we used a sample of international students in a Dutch university. One could argue that the manipulation task (which was in English) was more cognitively taxing to students in our study than in the original one. Still, we believe that our participants had no problem comprehending English (they are from a completely English-taught program) but cannot ignore the fact that English is not their primary language. However, we think that if the task was more cognitively taxing for our participants, the help (i.e., avoiding participants to restart the task) should be more beneficial and consequentially trigger stronger feelings of gratitude in our sample. This is supported by the fact that participants reported more gratitude after receiving help in our study (Help/Control conditions: 4.16/2.91) than that of the original study with the same measure (Gratitude/Control condition: 3.08/2.52). Despite this stronger effect on gratitude, we did not find evidence to support the reciprocal effect of gratitude. Therefore, it is unlikely that this failed replication is due to sample differences on language.

Third, we used a different dependent measure than the original paper. We opted for a mental rotation task that was originally used to test the effect of pride on perseverance (William & DeSteno, 2008), upon agreement with the original authors. However, we cannot rule out that the non-replication is due to the usage of a different task. Of course, theoretically, a different helping task should also pick up the effects of gratitude, when it is sensitive enough to do so. In William and DeSteno's (2008) Study 1, participants in the Pride and Control conditions spent an average of 7 minutes and 5 minutes on the task, and our participants in the Help and Control

conditions spent an average of 7.35 minutes and 6.47 minutes. This seems comparable. But, in Bartlett and DeSteno's (2006) Study 1, participants in the Gratitude and Control conditions spent an average of 21 minutes and 14 minutes on the problem-solving survey, which is substantially more time. Perhaps a task involving more effort would have been able to pick up differences between the conditions better.

If we look closer to our results in comparison to those of Williams and DeSteno (2008), we may infer that the null effect in the present study may be due to the overhelpfulness of the control group participants (i.e., a ceiling effect). Moreover, 90% of them offered to help without receiving a help from the confederate. This result may indicate that people provided help for motivations other than gratitude and indebtedness, such as empathy (e.g., Batson, 1991) or common group identity (e.g., Dovidio et al., 1997; Stürmer, Snyder, & Omoto, 2005; for a review, see Penner, Dovidio, Pilavin, & Schroeder, 2005). In our study, the participants (predominantly women) may be aware of the common group identity with the confederate (i.e., both psychology students) and feel empathetic (i.e., they might realize that writing a thesis is difficult). Perhaps they were helpful because of these reasons, making the extra effect from gratitude and indebtedness (if there were any) trivial in the Help condition. We do not know the make-up of the participants in Bartlett and DeSteno's (2006) Study 1, but the fact that we had exclusively psychology students may have made a difference.

We see this failed replication also as a reminder that it is both important and urgent to further reconsider the prosocial nature of gratitude. As we have mentioned in the introduction, even though it is a common notion that receiving favors triggers gratitude and, as a result, promotes the return of favors, this notion was rarely directly tested at the behavioral level. Also note that in Ma et al.'s (2017) meta analytic review, a moderate number of studies (13 out of 91,

14%) failed to find an effect of gratitude on prosocial behavior. We thus encourage more conceptual replication studies of this effect to be conducted with different samples and settings.

Crucially, these replications should simultaneously assess the effects of gratitude and indebtedness. Recent studies suggested that the function of gratitude relies mostly on promoting social affiliative tendencies, while it is indebtedness that accounts for the reciprocation of favors (Algoe, 2012; Greenberg, 1980; Peng et al., 2018). In many cases, social affiliative tendencies and reciprocation of favors are reflected by the same behavior, such as, when you return a favor, you also concern for the other's need, spend time together, and enjoy each other's accompany. This makes it challenging to differentiate the functions of gratitude and indebtedness at the behavioral level. Hence, studying gratitude and indebtedness separately could easily result in attributing the effect of one emotion to the other. Once again, we encourage future researchers to study gratitude and indebtedness together.

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Table 1.

Means (standard deviations within parentheses) by conditions (N = 152)

	Help Condition (N = 79)	Control Condition (N =73)	*t*	*df*	*p*	*d*
Gratitude_Original	4.16 (0.67)	2.91 (0.76)	10.81	150	<.001	1.74
Gratitude_Adjusted	4.05 (0.74)	2.42 (0.91)	12.04	139	<.001	1.97
Indebtedness	2.19 (0.95)	1.59 (0.67)	4.46	141	<.001	0.73
Time on help (refusal = 0)	7.35 (6.61)	6.47 (5.24)	0.91	150	.37	0.15
Time on help (who helped)	8.67 (6.32)	7.27 (5.00)	1.41	130	.16	0.25
Average time per trial	0.10 (0.08)	0.08 (0.05)	1.74	130	.08	0.30

Note: Gratitude and indebtedness were assessed on 5-point scales (1 = Not at all, 2 = A little, 3 = Moderately, 4 = Quite a bit, 5 = Very much). Time is in minutes.

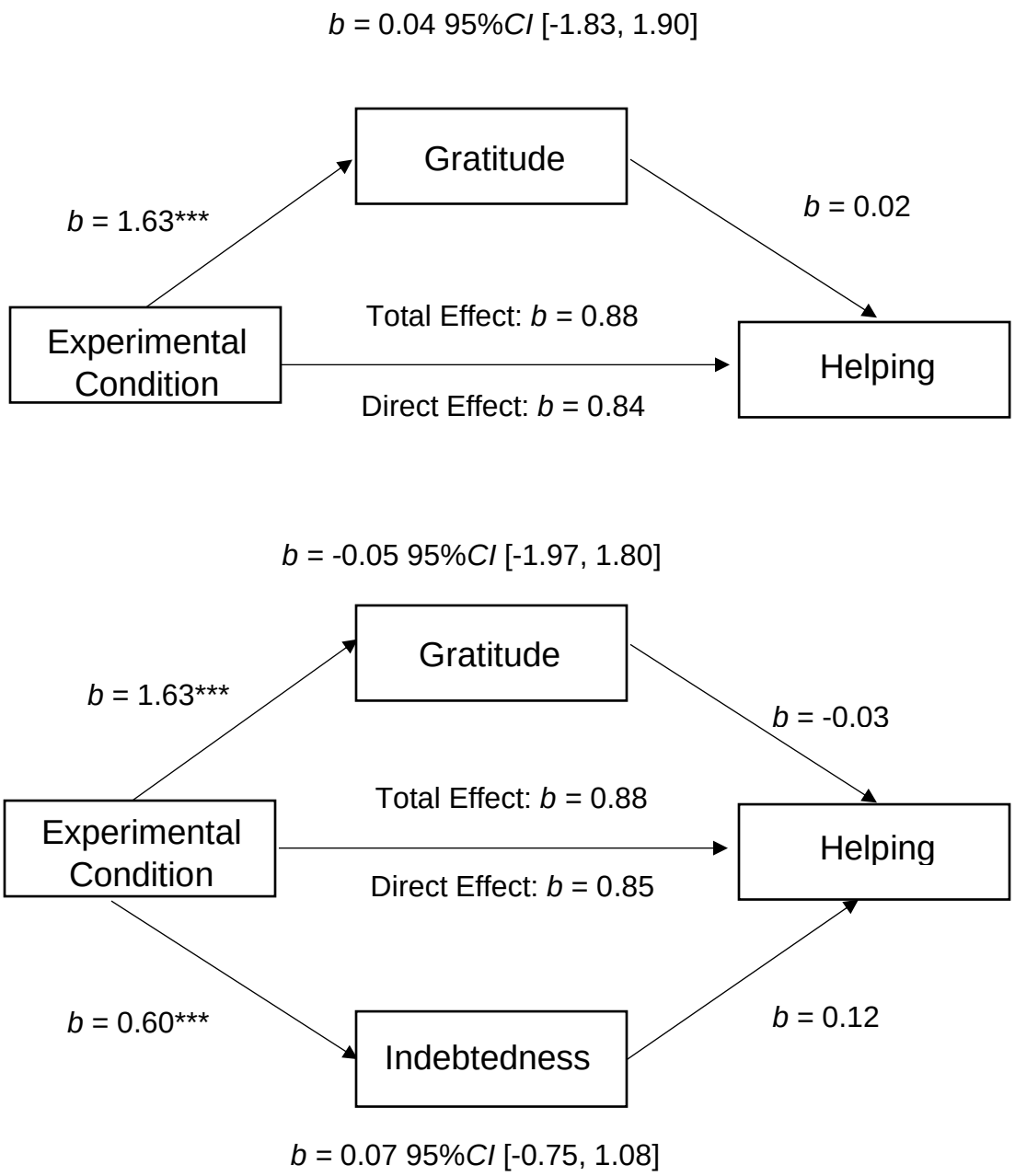

Figure 1. Gratitude (and indebtedness) as the mediator(s) of the experimental condition on helping. Experimental condition was coded as follows: Control condition = 0, Help condition = 1. The numbers are unstandardized coefficients in the multivariate regression models.

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

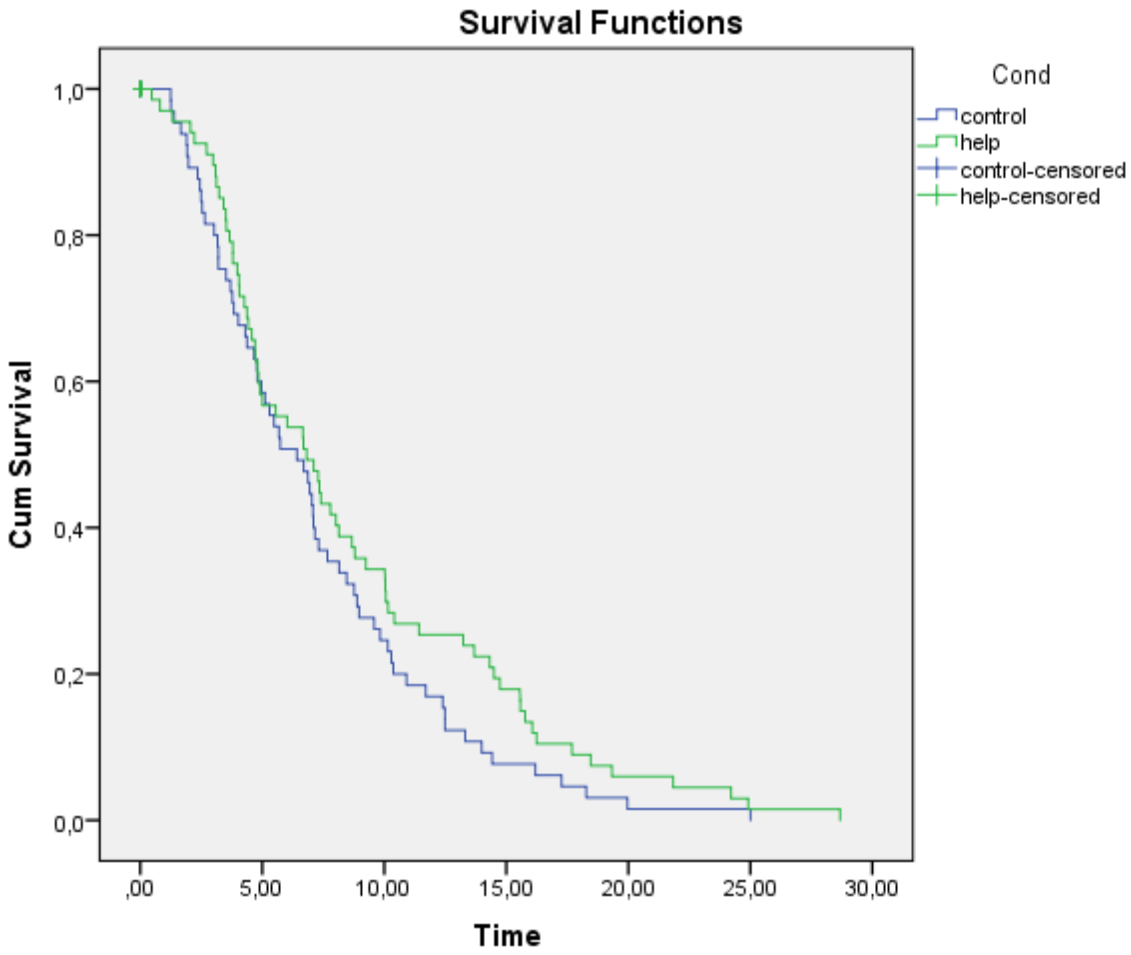

Figure 2. Survival curves for the Help condition and for the Control condition.