

Gratitude, Power, and Temporal Discounting:
Investigating Mechanisms for Reducing Impatience

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Abstract

Gratitude and power are two interpersonal phenomena that affect temporal discounting. Based on recent research in the field of emotions and temporal discounting, the present study tested two competing hypotheses about the mechanisms and effects of these phenomena on temporal discounting: the first about social value and the second about future orientation. Social value, which can be increased through the perception of gratitude and power, has been shown to increase adaptive intertemporal choice. This gave rise to our first hypothesis: gratitude and increased power, indicating high social value, should lead to decreased temporal discounting than reduced power that implies a lower social value. On the other hand, drawing from construal level theory, future orientation has also been proposed as a mechanism that decreases temporal discounting. This led to our second hypothesis: if increased power, through a sense of distance from others, leads to increased future orientation, then decreased power and gratitude should lead to higher temporal discounting. To test these hypotheses, subjects were randomly assigned to four conditions: gratitude, high power, low power or control. We compared the conditions' discounting tendencies and future orientation measures against each other. As per our first hypothesis, we found that the gratitude group showed significantly less impatience than the low-power group, whereas the high-power and gratitude groups did not differ from each other in temporal discounting. Our results mostly supported social value, but not future orientation, as a mechanism for how gratitude and power affect temporal discounting. Future research directions and implications are discussed.

Keywords: temporal discounting, intertemporal choice, power, gratitude, decision making, social value, future orientation

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Would you like to receive \$20 today or \$100 in a year? You would most likely choose \$20 now than \$100 in a year, even though your earnings would quintuple in 12 months (DeSteno, Li, Dickens, & Lerner, 2014). This preference for immediate rewards as opposed to future rewards is known as temporal discounting. It frequently plays an important role in many real-life decisions. For instance, impatient decisions sometimes result in flawed outcomes such as credit card debts (Meier & Sprenger, 2010), unhealthy eating (Chabris, Laibson, Morris, Schuldt, & Taubinsky, 2008), and substance abuse (Kirby, Petry, & Bickel, 1999). We make many of our substantial decisions relating to intertemporal choices, i.e., decisions comprising trade-offs between costs and/or benefits arising at different times (Lerner, Li, Valdesolo, & Kassam, 2015), as we are in emotional states and/or social contexts. Therefore, temporal discounting has been examined in various studies about temporal discounting, emotions, and power.

In the present research, we tested potential contributors to temporal discounting. Particularly, we concentrated on how gratitude and power affect temporal discounting, for three reasons. First, a given person does not discount at the same rate at any given time and multiple factors such as gratitude and power affect his/her discount rate (DeSteno et al., 2014; Joshi & Fast, 2013). Second, gratitude and power are both interpersonal phenomena that need to be studied in the same study. We inspected their effects on temporal discounting comparatively and this has not been previously studied. Third, the previous studies about the underlying mechanisms for how gratitude and power affect impatience exhibit some paradoxes. We

evaluated two competing hypotheses about the mechanisms and effects of these phenomena on temporal discounting: one about social value and the other about future orientation.

Emotions and Temporal Discounting

Temporal discounting is the tendency of people to discount, i.e., reduce the subjective value of, future rewards as a function of the delay to receiving them (Loewenstein & Thaler, 1989). Future rewards hold less utility than instant rewards of equal value (Loewenstein & Prelec, 1992) and people choose not to wait for rewards, i.e., they discount the value of future rewards more compared to the value of instant ones. People often make intertemporal choices while they are in various emotional states. Therefore, automatic mechanisms favoring short- and long-term gains might be connected to emotions. In evolutionary perspective, emotions have evolved to provide instinctive ways to navigate cognition and behavior (Keltner, Haidt, & Shiota, 2006). For example, research has shown that sadness increases impatience, perhaps to avoid a sense of loss (Lerner, Li, & Weber, 2012). In contrast, positive emotions, such as gratitude, could reduce impatience by building long-lasting personal and social resources whose benefits will transpire over time (DeSteno, Li, Dickens & Lerner, 2014; Fredrickson, 2001).

This might suggest a general effect of the valence of emotions: positive affect increases willingness to wait for future rewards, while negative affect reduces this willingness. Nonetheless, there is an ongoing debate in the emotions and decision-making literature about whether to support a one-dimensional (positive or negative valence) or a multi-dimensional (discrete emotional states) view of emotions. Some studies have supported the idea that one-dimensional view of emotions does not capture the cognitive and behavioral response of making a choice. This is because while sadness increases impatience, disgust, another negative emotion has no impact on impatience (Lerner et al., 2012). Since not all negatively valenced emotions can

increase impatience, it has been proposed to consider a multi-dimensional view in the studies of emotions and decision-making, through discrete emotions, such as sadness and gratitude. On the other hand, there is a different outlook on social cognition by examining the effect of discrete emotions on temporal discounting under the umbrella of positive or negative emotions (Valdesolo & DeSteno, 2014). Valdesolo and DeSteno (2014) merge multiple positive emotions, such as gratitude, love, pride, and hope, through their function in temporal discounting. They report that unlike negatively valenced emotions, positive emotions motivate “adaptive” intertemporal choice, i.e., the deferral of instant gains for possible future gains, by enhancing an individual’s *social value*. Social value is defined as the value assigned to a person by others in a social group. In the present research, we adopted this social value notion to formulate our first hypothesis by focusing on two discrete social phenomena: gratitude and power.

Hypothesis 1: Gratitude, Power, Social Value and Temporal Discounting

The Cambridge Dictionaries define *gratitude* as “a strong feeling of appreciation to someone or something for what the person has done to help you”. Gratitude involves the acknowledgment of having received someone’s kindness, the recognition of the source of this kindness, and the appreciation of the benefactor’s motivations (Emmons, 2008). Therefore, gratitude is centered on our social interactions. It has been shown that gratitude might be one of the positive emotions that enhance patience, and therefore decrease temporal discounting (DeSteno et al., 2014). Nonetheless, DeSteno and colleagues have not investigated the mechanism underlying this result.

We tested the idea that social value might be the mechanism that controls gratitude’s effect on temporal discounting. Positive emotions enhance social value, since they develop social (strengthened bonds), physical (enhanced dexterity and health), intellectual (increased problem-

solving skills), and psychological (fostered resilience and goal-orientation) resources that increase long-term prosperity (Valdesolo & DeSteno, 2014). One of the ways positive emotions increase long-term prosperity is by motivating adaptive intertemporal choices: experiencing short-term sacrifices and long-term rewards. But how do positive emotions do that? They do that through person perception, by which the values of individuals are evaluated (Fiske, Cuddy, & Glick, 2007). Positive emotions create the perception of warmth and competence. This person perception based on judgments of warmth and competence often alters our behavioral responses, such as temporal discounting (Fiske et al., 2007). Similar to other positive emotions such as compassion and love, gratitude demonstrates one's cooperative intent and augments one's perceived warmth, one of the two dimensions of person perception (Fiske et al., 2007; Valdesolo & DeSteno, 2014). This, in turn, motivates short-term costs and long-term rewards by increasing one's social value and strengthening people's status in social relationships.

Another fundamental factor in social interactions and temporal discounting is *power*. Power can be defined as the ability to be in charge of one's own outcomes and those of others, as well as the freedom to act (Fiske, 1993). Power closely relates to the second dimension of person perception: competence (Fiske et al., 2007). Being high in power increases one's competence in others' eyes. High-power groups are viewed as more competent than low-power groups. Power increases one's social value through the refinement of perceived competence (Fiske et al., 2007). The increased perception of the capability to act effectively on certain intents increases one's social value, allowing one to have an adaptive intertemporal choice (Valdesolo & DeSteno, 2014).

Gratitude and power are both relational phenomena that relate to different dimensions of person perception. Gratitude relates to the warmth dimension, while power relates to the

competency dimension. According to Valdesolo and DeSteno (2014), warmth and competency increase one's social value, through the recruitment of various resources. Consequently, this increases adaptive intertemporal choice and reduces impatience. Through this reasoning, our first hypothesis was that increasing gratitude and power would both reduce temporal discounting and make people more patient, compared to low-power individuals (Figure 1).

Hypothesis 2: Gratitude, Power, Future Orientation, and Temporal Discounting

There has been another mechanism being tested about how power increases patience: future orientation. According to construal level theory, since power may cause people to have a sense of distance from others, it leads to high-level construal orientation (Smith & Trope, 2006). High-level construal orientation generated by enhanced power means that power increases the ability to think abstractly, expands mental horizons, and enhances planning ahead (Trope & Liberman, 2010). Therefore, the skills of planning for the future and focusing on the central goals, rather than the peripheral ones, are forms of abstract information processing that can be facilitated by elevated power, which allows people to take psychologically distant viewpoints on circumstances (Smith & Trope, 2006). Furthermore, people with higher-level construals, i.e., who abstract more, perceive time shorter than those with lower-level construal orientation (Kantén, 2011). It has been suggested that visualizing the future as being more imminent than it is, enhances the connection with the future self (Joshi & Fast, 2013). Joshi and Fast (2013) have shown that increased future orientation might be the mechanism for how power reduces temporal discounting.

Gratitude, on the other hand, does not allow people to distance themselves from other people. It is an emotion in which the focus is other-directed; we can be grateful to others, to God, to animals, but not to ourselves (Emmons, 2008). For example, a recipient of goodness may say,

“I deeply appreciate the things others have done for me in my life.” Therefore, it can be expected that grateful people will have lower-level construals than high-power people. This created our second hypothesis about the temporal discounting mechanism (Figure 2): if grateful and low-power people have similar construal orientations, i.e., lower-level construals and less connection with the future self than the high-power people, then grateful people should be discounting the same as low-power people and more than high-power people.

Overview of the Present Research

To our knowledge, gratitude and power have not been examined together yet in the same temporal discounting study. Learning which interpersonal phenomenon is a better aid to reducing temporal discounting can present an opportunity to help people to make more effective decisions when offered an intertemporal choice. Therefore, our goal was to investigate which of gratitude or power induction is a better aid to reducing temporal discounting and the mechanism underlying such an effect.

We aimed to build on the findings in the gratitude, power, and temporal discounting literatures by resolving somewhat paradoxical observations in the literature: is social value or future orientation the mechanism of how gratitude and power influence temporal discounting? We did so by proposing two competing hypotheses. It has been indicated that positive emotions engender increased perceived warmth and competency, which increase social value and, subsequently, patience (Valdesolo & DeSteno, 2014). Thus, our first hypothesis was that gratitude (warmth) and power (competency) would both increase patience through increased social value. We predicted grateful and high-power individuals to have lower temporal discounting than low-power individuals. Our second hypothesis challenged the first one. Smith and Trope (2006) found that power increases construal level, future orientation, and abstract

thinking through a sense of distance from others. Joshi and Fast (2013) demonstrated that increasing power reduced temporal discounting, mediated by the connection with the future self. Gratitude, in contrast, embeds people deeply into social relationships. Through this reasoning, we proposed a competing hypothesis to our first one: if power increases the construal level and, subsequently, diminishes temporal discounting, gratitude and decreased power should decrease the construal level and, consequently, lead to higher temporal discounting compared to elevated power. To test these competing hypotheses, we randomly assigned participants to gratitude, high-power, low-power, and control conditions.

Method

Participants

Participants were 157 undergraduates from the University of Michigan's Ross School of Business. The inclusion criteria for the experiment were undergraduate student status and being an adult over the age of 18. Participants were compensated with subject pool credit in their marketing course.

Materials and Procedure

The experiment incorporated four conditions. The first three induced three different types of sensations and were the experimental conditions: a high-power, a low-power, and a gratitude condition. The fourth condition was the control condition, which provided baseline information, where there was no induction. Participants were randomly assigned to each condition. They completed the experiment in a laboratory setting with other participants present. Each experimental session involved around 10 participants and they did not communicate with each other for the duration of the study.

Recall paradigm. We adopted a recall paradigm to induce power (Galinsky, Gruenfeld, & Magee, 2003) and gratitude conditions. Participants in the high-power condition were instructed to think and write about a time they had power over another individual or individuals. Participants in the low-power condition were requested to think and write about a time that someone else had power over them. Participants in the gratitude condition were asked to think and write about an event that made them feel grateful. The control group wrote about a typical day in their lives (see Appendix A for the full-length instructions). To execute this task, participants were provided with a sheet of paper containing the instructions and a blank space to write on.

Measures.

Emotion manipulation check. After the emotion inductions, on a 5-point scale (1=“not at all”; 5=“very much”), participants indicated the degree to which the characteristics provided, such as thankful, powerful, dominant, described them (Appendix B). These self-rated states allowed us to check how successful the emotion inductions were for each condition. We checked the scale reliabilities to see if we had good measures of power and gratitude items. Power descriptors were “powerful”, “strong”, “dominant”, “formidable”, and “influential”. The gratitude descriptors were “grateful”, “thankful”, and “appreciative”. We expected participants in the high-power condition to be higher on the state descriptors of power, than the participants in the low-power condition. We predicted participants in the gratitude condition to be higher on the state descriptors of gratitude than the participants in the control condition.

We also had two coders who were blind to the experiment’s hypotheses and conditions (Galinsky et al., 2003). They rated subjects’ essays on power and gratitude after the study. We anticipated that the subjects in the high-power condition would describe themselves as more

power than those in both the low-power and the control conditions. Moreover, we expected subjects in the gratitude condition to describe themselves as feeling more grateful than those in the control group.

Inclusion of Others in Self (IOS) scale. Each participant completed a modified version of the Inclusion of Others in Self (IOS) scale (Ersner-Hershfield, Garton, Ballard, Samanez-Larkin, & Knutson, 2009), through which we tested future self-continuity, i.e., future orientation (Figure 3). The scale contained seven circle pairs ranging from completely apart to completely overlapping circles. Participants chose the circle pair that best described how “connected” and how “similar” they felt to their future selves in ten years. According to our second hypothesis, we examined whether the high-power induced participants were more connected to their future selves than the gratitude induced participants. We expected the low-power and gratitude groups to be similar in IOS.

Consideration of Future Consequences scale (CFC-14). Using a 5-point scale (1=“extremely uncharacteristic”; 5=“extremely characteristic”), participants indicated their concern with future outcomes (CFC-Future) and concern with immediate outcomes (CFC-Immediate) (Joireman, Shaffer, Balliet, & Strathman, 2012). Some examples of the items in the CFC-Future subscale were “I consider how things might be in the future, and try to influence those things with my day-to-day behavior” and “I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes”. A few items in the CFC-Immediate subscale were “I only act to satisfy immediate concerns, figuring the future will take care of itself” and “Since my day-to-day work has specific outcomes, it is more important to me than behavior that has distant outcomes”. We tested how the conditions differed specifically on

the CFC-Future subscale, in order to supplement our future orientation mechanism hypothesis. For the full scale, please see Appendix C.

Temporal discounting task. The outcome measurement was the temporal discounting task. We used Kirby et al.'s (1999) Monetary Choice Questionnaire (MCQ) to measure the rate of temporal discounting (Appendix D). On 27 choice trials, each participant made trade-off choices for money, between a sooner, smaller reward versus a later, larger reward (e.g., \$34 now or \$35 in 186 days; \$54 now or \$80 in 30 days; \$19 now or \$25 in 53 days, etc.).

In accordance with our first hypothesis, we predicted both high-power and grateful participants, who have a higher social value, to have a greater discount factor (i.e., less temporal discounting) than low-power participants. As per our second hypothesis, we expected participants in the high-power condition, who were more future oriented, to have a greater discount factor (i.e., less temporal discounting) than participants in gratitude and low-power conditions.

Results

Manipulation Check

We had a two-pronged approach for the manipulation check. The first approach consisted of analyzing the scale reliabilities of power and gratitude subscales within the self-rated state measure and testing how the conditions influenced the power and gratitude scores. The second approach incorporated two coders, who were blind to the conditions and hypotheses and rated all the priming essays according to the level of power and gratitude the participant described.

First, we found that the state descriptors of power and gratitude were highly reliable. The power subscale consisted of 5 items and the mean response of these 5 items allowed us to assess power (Cronbach's $\alpha = .71$). The gratitude scale consisted of 3 items and we measured gratitude

through the mean response of these items (Cronbach's $\alpha = .87$). We did multiple regression analyses to test the effect of each condition on the reported emotions, relative to control. The condition variables were dummy coded, with control being the reference group. To see if the condition had a varied effect depending on the emotion being measured, we calculated emotion (powerful and grateful) by condition (high power, low power, gratitude, control) interaction, which was marginally significant, $F(1, 153) = 2.49, p = .06$.

To see whether the interaction went in the expected direction, we tested the effect of each condition on self-rated states relative to control. First, controlling for the subjective levels of power, we found that the conditions influenced participants' gratitude scores, $R^2 = .22, F(4, 152) = 10.71, p < .001$. The gratitude condition significantly influenced self-rated gratitude ($\beta = .42, p = .01$); people in the gratitude group ($M = 4.36, SD = .61$) were more grateful than control ($M = 3.95, SD = .95$). Second, we ran another regression to investigate how condition influenced the power score. Controlling for the subjective sense of gratitude, the results of this regression analysis revealed that the conditions influenced self-rated power $R^2 = .20, F(4, 152) = 9.60, p < .001$. People in the low-power group ($M = 2.83, SD = .83$) saw themselves as significantly less powerful than control ($M = 3.14, SD = .69$), $\beta = -.35, p = .03$. There was no significant difference between high-power ($M = 3.11, SD = .69$) and control ($M = 3.14, SD = .69$) conditions in self-rated power. Furthermore, when we contrasted the two power groups against each other on self-rated power, they were not significantly different, $F(1, 155) = 2.76, p = .10$.

This last result might suggest that the power manipulation did not work as well as we had anticipated. Therefore, we employed a second approach to the manipulation check: essay-coded states. It was used in the research we adopted our power recall paradigm from and is an alternative way to check the power manipulations besides the self-rated power (Galinsky et al.,

2003). It was conducted by two coders who were blind to the research hypotheses and conditions. These coders rated all the essays for how much power and gratitude each participant reported, using a 7-point Likert scale. Based on face validity, we expected the essay-coded power and the essay-coded gratitude to serve as the manipulation check. There was a high reliability between two coders both for power (Cronbach's $\alpha = .93$) and gratitude (Cronbach's $\alpha = .99$). The averages between the coders were calculated to contrast essay-coded power and gratitude in different conditions. As we expected, people in the high-power condition described themselves as having more power than those in both the low-power condition, $t(43.46) = 24.54, p < .001$, and the control condition $t(37) = -25.99, p < .001$. Furthermore, people in the gratitude condition described themselves as feeling more grateful than those in the control group $t(44) = -72.99, p < .001$.

Temporal Discounting Results

Participants' discount factor k was estimated through the intertemporal choice patterns they demonstrated in the Monetary Choice Questionnaire. We used Kaplan, Lemley, Reed, and Jarmolowicz's (2014) 27-Item Monetary Choice Questionnaire Automated Scorer to calculate the k values. Due to the skewness in the distribution of the k values, we normalized them through the natural log transformation. Therefore, our statistical analyses about temporal discounting were based on the $\ln(k)$ values. From our planned contrast of gratitude and low power in temporal discounting, we found that the gratitude group discounted less compared to the low-power group, matching our prediction in our first hypothesis ($M_{Low\ Power} = -1.96, SD_{Low\ Power} = .54; M_{Gratitude} = -2.21, SD_{Gratitude} = .57; t(81.24) = -2.08, p = .04$). We did not find any other group differences in temporal discounting (see Table 1 for further descriptives and Figure 4 for the graph of the measured temporal discounting across conditions).

Inclusion of Others in Self (IOS) Scale and Consideration of Future Consequences Scale

(CFC-14) Results

Through planned contrasts, we compared high power and gratitude's effect on future self-continuity through IOS and found that the IOS for the high-power group was significantly greater than the IOS for the gratitude group, similar to what was predicted by our second hypothesis ($M_{High\ Power} = 4.39$, $SD_{High\ Power} = 1.28$; $M_{Gratitude} = 3.84$, $SD_{Gratitude} = 1.21$; $t(76.77) = -1.98$, $p = .049$). We also compared gratitude and low power on IOS and, consistent with our second hypothesis, did not find a significant difference between them ($M_{Low\ Power} = 4.05$, $SD_{Low\ Power} = 1.28$; $t(78.79) = -.76$, $p = .45$) (Figure 5a). Furthermore, there was a significant correlation between self-rated power and IOS, $r = .20$, $p = .01$: higher the self-rated power, higher the connection with the future self (Figure 6a). IOS did not correlate with any other self-rated emotion, such as gratitude. Although we did not find significant group differences on the CFC scale or subscales (Figure 5b), there was a significant correlation between self-rated power and CFC-Future, $r = .18$, $p = .02$ (Figure 6b). CFC-Future did not correlate with any other emotion measured. This mirrors our correlational results for self-rated power and IOS.

Discussion

The present research compared two mediating mechanisms for how gratitude and power affect temporal discounting: social value and future orientation. The findings mostly supported our first hypothesis: gratitude and increased power, both implying enhanced social value, did not differ from each other in temporal discounting, whereas lowered power, indicating low social value, led to higher temporal discounting than did gratitude. Gratitude tends to create social resources through social bonds, such as friendships and one can use these social resources when one needs support (Emmons, 2008). The resourcefulness that we see in grateful individuals is

similar to that in individuals with high power, who have more physical, intellectual, and psychological resources compared to low-power individuals (Valdesolo & DeSteno, 2014). Increased resources, and thus increased social value, contribute to reduced temporal discounting. In our study, low-power individuals, who felt deprived of various resources, were more impatient than the grateful participants who had the social resources. Resourceful high-power and grateful individuals, on the other hand, discounted similarly. Hence, our data provided support for the social value mechanism in temporal discounting.

Our results also offer insights about how power and gratitude influence future orientation. Just as we anticipated in our second hypothesis, we found that high-power individuals, who according to the construal level theory can psychologically distance themselves from other people, were more connected with their future selves than grateful individuals. Furthermore, we discovered that the low-power and gratitude groups did not differ from each other on the future orientation measures. Additionally, the self-rated power, unlike other self-rated states, was positively correlated with the future orientation measures. This suggests that power is related to connection with the future-self and consideration of future consequences. The reason we cannot sustain our second hypothesis is that the temporal discounting results did not follow its predictions that the low-power and gratitude participants would have a similar discounting factor that is greater than high-power participants. Therefore, although the future self-continuity measure behaved as we expected, it does not explain our outcome measure. We demonstrated that social value does.

In sum, we appear to have resolved the enigmatic results in the literature about gratitude, power, and temporal discounting. Our results mostly supported Hypothesis 1, as opposed to Hypothesis 2. Although increased power seemed to have elevated future orientation compared to

gratitude, gratitude and power's effects on temporal discounting were not explained by our future orientation findings. We provided evidence for how social value is an important factor that impacts power and gratitude's influence on patience.

Limitations and Future Research

There are potential limitations in our findings. Although we found that low-power subjects were discounting more heavily than grateful subjects, we did not see a significant difference between high and low power in temporal discounting, as we predicted in Hypothesis 1. Therefore, we failed to replicate Joshi and Fast's (2013) previous indications that high power leads to less temporal discounting than low power. There may have been multiple reasons for this. First, we did not use real money or any other kind of reward as incentives in our experiment. Therefore, the subjects might not have provided their answers based on what they would actually choose in a temporal discounting task in real life. This might have reduced the statistical significance of our tests. Second, we used the discounting questionnaire that DeSteno and colleagues (2014) used, which was different than what Joshi and Fast (2013) incorporated in their studies. This might have contributed to the non-replication. In future research, we plan to overcome these weaknesses by providing actual rewards and using the same discounting questionnaire that Joshi and Fast (2013) have used.

Another limitation is that the study might appear to attempt to "prove" the null hypothesis by predicting (finding) that there will be (was) no significant difference between gratitude and high power in temporal discounting results. Nonetheless, our strategy was to have a high-powered experimental design with 157 subjects such that we were giving the alternative hypothesis every opportunity to be supported.

Our findings indicate that social value might be an important mechanism in action when it comes to the comparison of gratitude and power in temporal discounting. According to Valdesolo and DeSteno (2014), gratitude increases the warmth dimension of person perception, whereas power increases the competency dimension of person perception. Cuddy, Fiske, and Glick (2008) report that the balance between two dimensions is the optimal way to increase social value. It would be intriguing to study if inducing power alone, gratitude alone, and both power and gratitude, makes a difference in adaptive intertemporal choice. Such ideas merit future research.

Since high-power individuals were more connected to their future selves than grateful individuals, one could investigate whether gratitude increases mindfulness and being in the moment, while increased power enhances planning for the future. Further, as low power, gratitude, and control did not differ from each other in connection with the future self, one could argue that the low-power individuals were made aware of their weaknesses and therefore, they felt in the moment and were not thinking about the future. Likewise, individuals in the control group, who were instructed to think about their typical day, might have been induced to feel in the moment, since they were thinking about a constrained period of time, which may have prohibited them from planning for the future. Future investigation could illuminate whether this mindfulness hypothesis explains our future orientation results.

Implications and Importance

The research finding that gratitude induces more patience opens up an innovative avenue for decision aids that combat impulsivity. In the future, we hope to further explore the mechanisms underlying gratitude's effect on temporal discounting. We also hope to examine this effect in more real-life situations. For example, in earlier experiments, the incidental emotion of

gratitude was induced prior to the introduction of the temptation, i.e., money. This does not necessarily best represent what occurs in real life. Most likely, in situations where impulse control is needed, people are already confronted with a temptation, such as a tasty chocolate cake or an iPhone 6S with a 50% discount. Then the question becomes, in this tempting atmosphere, whether (and how) gratitude helps overcome immediate desire. Since impulsivity leads to many poor decisions without consideration of future consequences, such as overspending, overeating, and dropping out of school, it is important to find an easy and effective strategy to rectify this human shortcoming.

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Table 1

Means and Standard Deviations of Measures for the Total Sample and Across Conditions.

	Total (<i>N</i> = 157) Mean (SD)	Control Condition (<i>n</i> = 35) Mean (SD)	Gratitude Condition (<i>n</i> = 45) Mean (SD)	High Power Condition (<i>n</i> = 38) Mean (SD)	Low Power Condition (<i>n</i> = 39) Mean (SD)
Self-Rated Power	3.05 (.73)	3.14 (.69)	3.13 (.70)	3.11 (.69)	2.83 (.83)
Self-Rated Gratitude	4.20 (.84)	3.95 (.95)	4.36 (.61)	4.39 (.84)	4.04 (.90)
Essay-Coded Power	2.25 (2.21)	1.00 (.00)	1.10 (.08)	6.00 (1.18)	1.08 (.35)
Essay-Coded Gratitude	2.70 (2.61)	1.00 (.00)	6.76 (.53)	1.09 (.40)	1.11 (.39)
IOS	4.03 (1.27)	3.86 (1.29)	3.84 (1.21)	4.39 (1.28)	4.05 (1.28)
CFC-Total	3.84 (.46)	3.84 (.46)	3.88 (.40)	3.84 (.57)	3.75 (.46)
CFC-Future	3.96 (.49)	4.03 (.49)	3.97 (.45)	3.97 (.60)	3.89 (.44)
CFC- Immediate	3.71 (.60)	3.75 (.52)	3.80 (.56)	3.70 (.72)	3.61 (.60)
ln(<i>k</i>)	-4.81 (1.37)	-4.83 (1.50)	-5.10 (1.31)	-4.76 (1.37)	-4.52 (1.24)

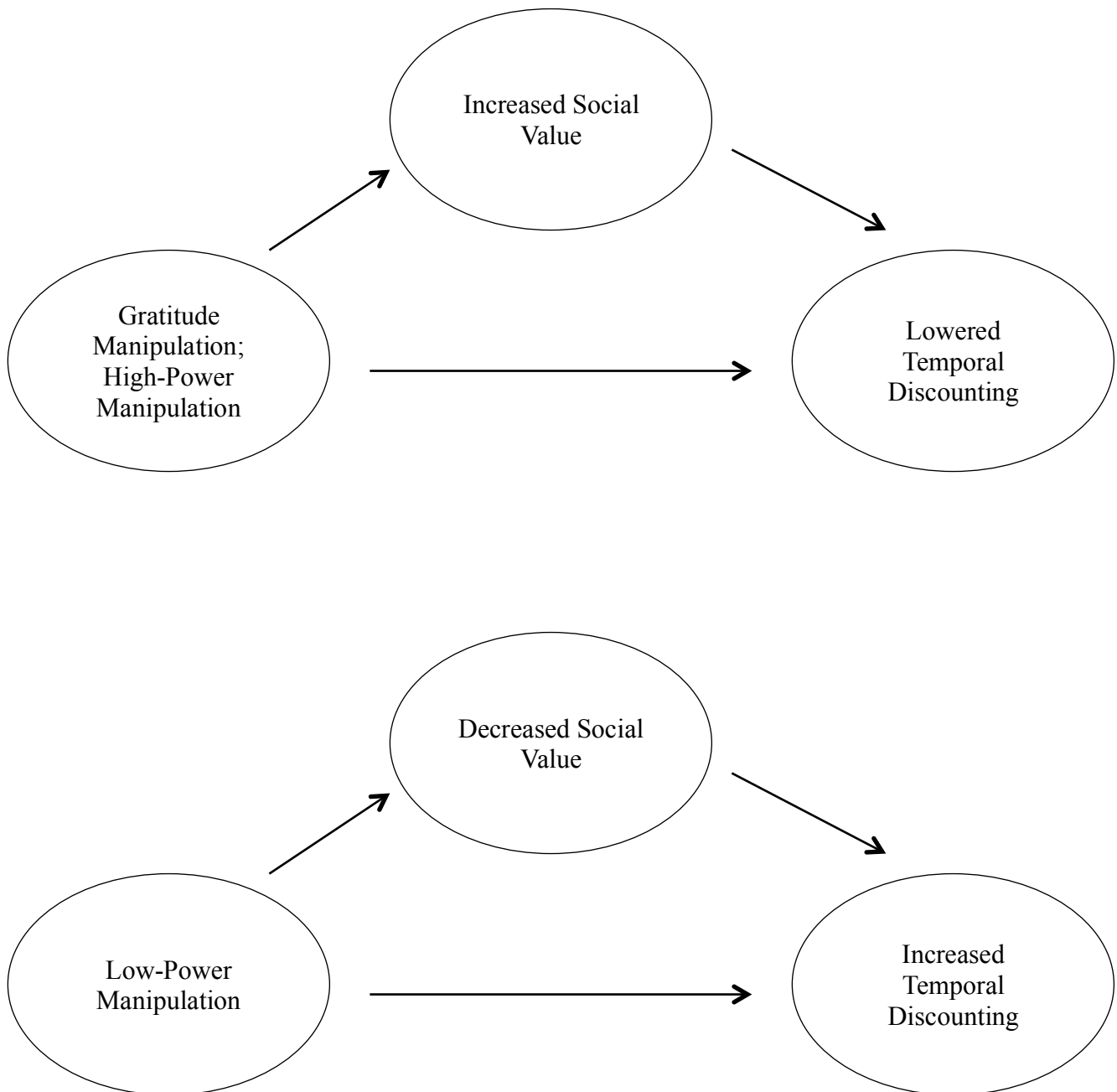


Figure 1. Illustration of Hypothesis 1. Social value mediates the relationship between power/gratitude and temporal discounting.

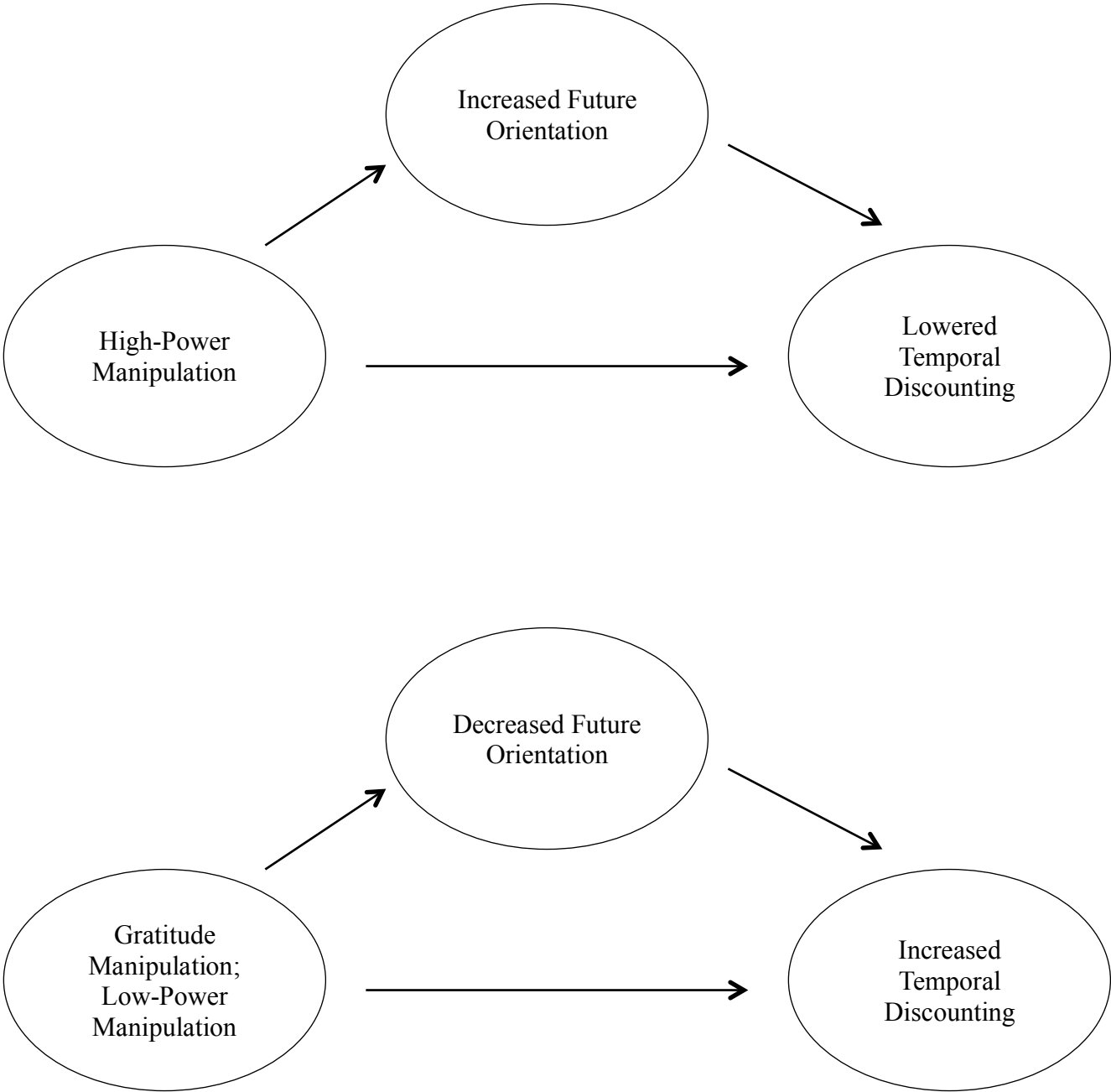


Figure 2. Illustration of Hypothesis 2. Future orientation mediates the relationship between power/gratitude and temporal discounting.

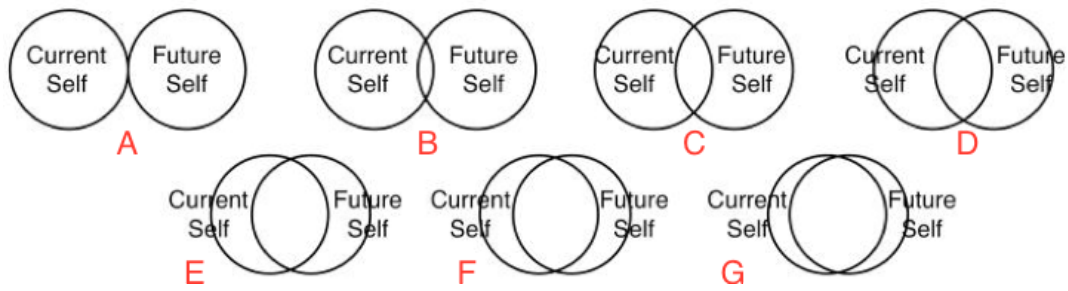


Figure 3. Inclusion of Others in Self (IOS) scale (Ersner-Hershfield, Garton, Ballard, Samanez-Larkin, & Knutson, 2009). Subjects were instructed to select the circle pair that best described how “connected” and how “similar” they felt to a future self in ten years.

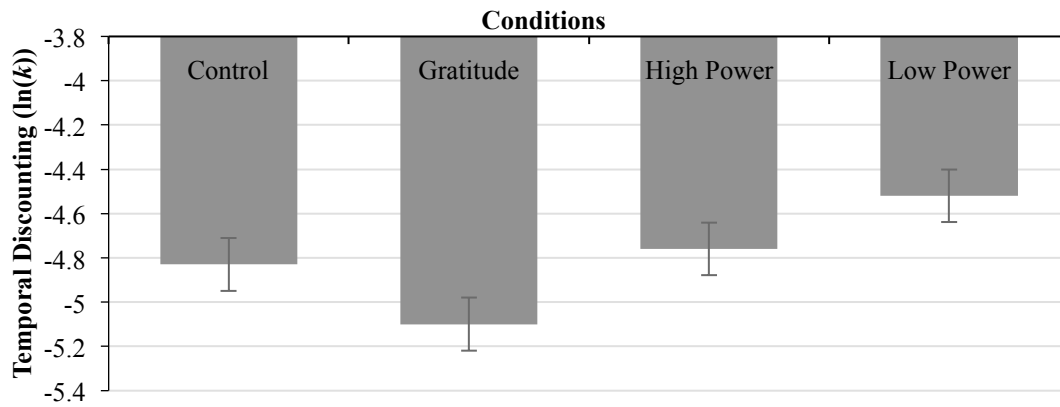
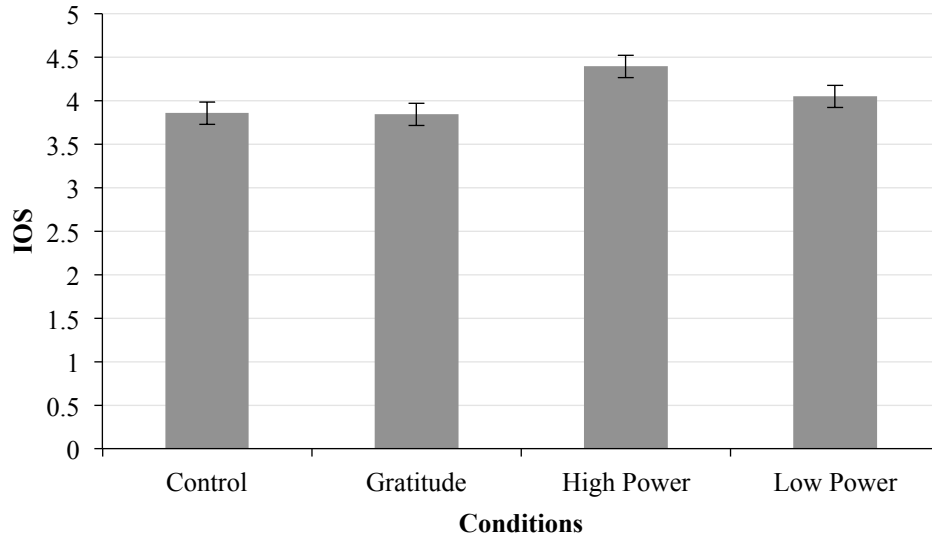


Figure 4. Mean $\ln(k)$ values across four conditions (control, gratitude, high power, and low power). Lower $\ln(k)$ values indicate less temporal discounting. Error bars represent one standard error above and below the mean.

a.



b.

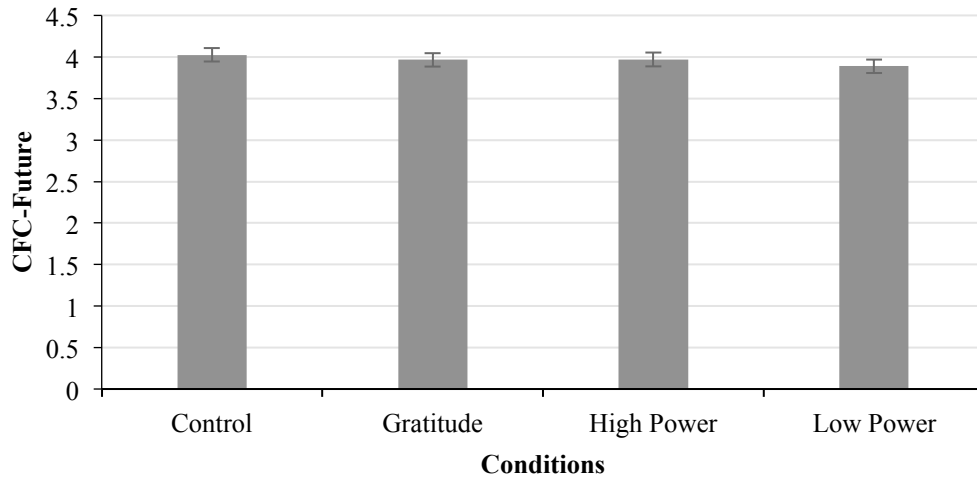
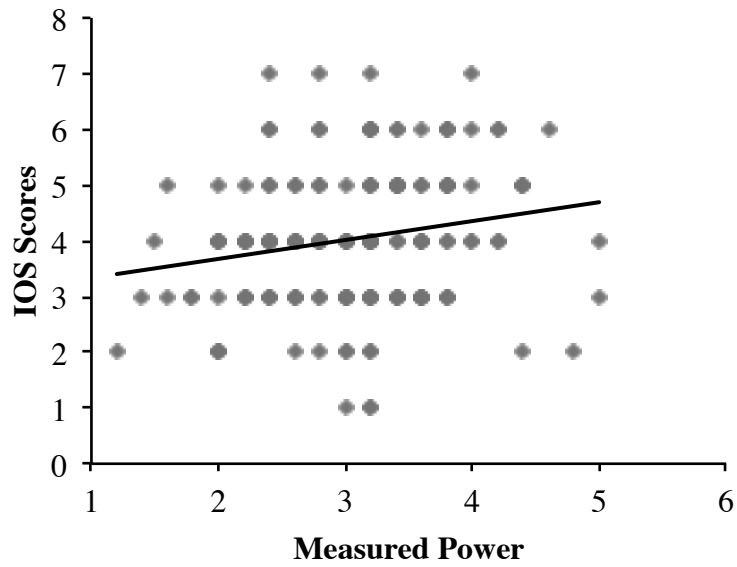


Figure 5. Future orientation mechanisms across conditions. Error bars represent one standard error above and below the mean.

a.



b.

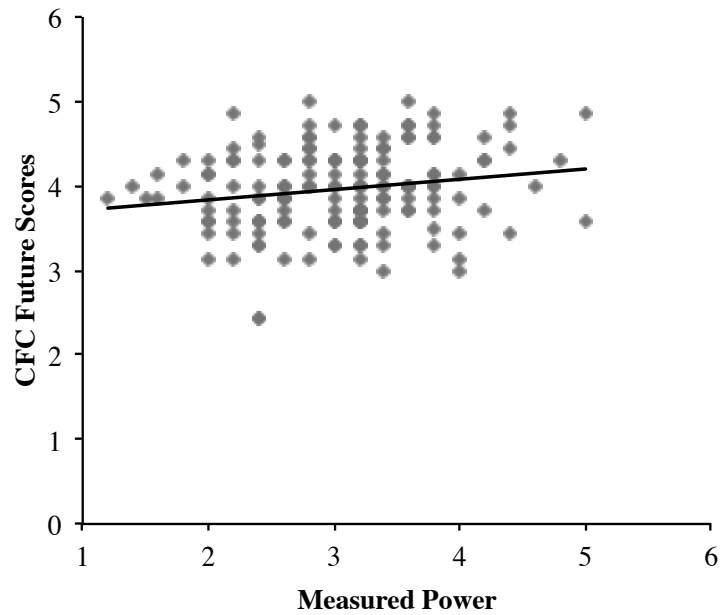


Figure 6. Correlations between measured power and future orientation scales. (a) Correlation between future self-continuity and measured self-rated power, $r = .20$, $p = .01$. (b) Correlation between the concern with future consequences and measured self-rated power, $r = .18$, $p = .02$.

Appendix A

Recall Paradigm

The instructions for the participants in the high-power condition were as follows:

Please recall a particular incident in which you had power over another individual or individuals. By power, we mean a situation in which you controlled the ability of another person or persons to get something they wanted, or were in a position to evaluate those individuals. Please describe this situation in which you had power— what happened, how you felt, etc. In about 5 minutes you will be able to move on to the next study.

The instructions for the participants in the low-power condition were as follows:

Please recall a particular incident in which someone else had power over you. By power, we mean a situation in which someone had control over your ability to get something you wanted, or was in a position to evaluate you. Please describe this situation in which you did not have power—what happened, how you felt, etc. In about 5 minutes you will be able to move on to the next study.

The instructions for the participants in the gratitude condition were as follows:

Please take a few moments to recall an event that made you feel grateful. Consider the details of that moment and how you felt. Write one or two descriptive, detailed paragraphs about that time. In about 5 minutes you will be able to move on to the next study.

The instructions for the participants in the control condition were as follows:

Please take a few moments to recall the events of a typical day in your life. Consider typical events that are likely to happen. Write one or two descriptive,

detailed paragraphs about your average day. In about 5 minutes you will be able to move on to the next study.

Appendix B

Emotion Manipulation Check

Instructions: For this set of questions, please indicate how much you feel each one of the following descriptors using the scale below:

	Not at all	Not much	A little	Somewhat	Very much
Good	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Owed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Happy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Appreciative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Powerful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guilty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strong	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Angry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bored	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thankful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Glad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dominant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Satisfied	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Not at all	Not much	A little	Somewhat	Very much
Frustrated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Proud	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Confident	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Obliged	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unhappy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grateful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fulfilled	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pleasant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Annoyed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Formidable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Influential	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Embarrassed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Worried	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Beholden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Not at all	Not much	A little	Somewhat	Very much
Accomplished	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Content	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix C**Consideration of Future Consequences Scale (CFC-14)**

Instructions: For each of the statements below, please indicate whether or not the statement is characteristic of you. If the statement is extremely uncharacteristic of you (not at all like you) please fill in a "1" on the answer sheet; if the statement is extremely characteristic of you (very much like you) please fill in a "5" on the answer sheet. And, of course, use the numbers in the middle if you fall between the extremes. Please keep the following scale in mind as you rate each of the statements below.

1=extremely uncharacteristic

2=somewhat uncharacteristic

3=uncertain

4=somewhat characteristic

5=extremely characteristic

___ 1. I consider how things might be in the future, and try to influence those things with my day-to-day behavior.

___ 2. Often I engage in a particular behavior in order to achieve outcomes that may not result for many years.

___ 3. I only act to satisfy immediate concerns, figuring the future will take care of itself.

___ 4. My behavior is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions.

___ 5. My convenience is a big factor in the decisions I make or the actions I take.

___ 6. I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes.

___7. I think it is important to take warnings about negative outcomes seriously even if the negative outcome will not occur for many years.

___8. I think it is more important to perform a behavior with important distant consequences than a behavior with less-important immediate consequences.

___9. I generally ignore warnings about possible future problems because I think the problems will be resolved before they reach crisis level.

___10. I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time.

___11. I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date.

___12. Since my day-to-day work has specific outcomes, it is more important to me than behavior that has distant outcomes.

___13. When I make a decision, I think about how it might affect me in the future.

___14. My behavior is generally influenced by future consequences.

A. \$34 today

B. \$35 in 186 days

14. Would you prefer \$27 today, or \$50 in 21 days?

A. \$27 today

B. \$50 in 21 days

15. Would you prefer \$69 today, or \$85 in 91 days?

A. \$69 today

B. \$85 in 91 days

16. Would you prefer \$49 today, or \$60 in 89 days?

A. \$49 today

B. \$60 in 89 days

17. Would you prefer \$80 today, or \$85 in 157 days?

A. \$80 today

B. \$85 in 157 days

18. Would you prefer \$24 today, or \$35 in 29 days?

A. \$24 today

B. \$35 in 29 days

19. Would you prefer \$33 today, or \$80 in 14 days?

A. \$33 today

B. \$80 in 14 days

20. Would you prefer \$28 today, or \$30 in 179 days?

A. \$28 today

B. \$30 in 179 days

21. Would you prefer \$34 today, or \$50 in 30 days?

A. \$34 today

B. \$50 in 30 days

22. Would you prefer \$25 today, or \$30 in 80 days?

A. \$25 today

B. \$30 in 80 days

23. Would you prefer \$41 today, or \$75 in 20 days?

A. \$41 today

B. \$75 in 20 days

24. Would you prefer \$54 today, or \$60 in 111 days?

A. \$54 today

B. \$60 in 111 days

25. Would you prefer \$54 today, or \$80 in 30 days?

A. \$54 today

B. \$80 in 30 days

26. Would you prefer \$22 today, or \$25 in 136 days?

A. \$22 today

B. \$25 in 136 days

27. Would you prefer \$20 today, or \$55 in 7 days?

A. \$20 today

B. \$55 in 7 days