

CULTIVATING AN ATTITUDE OF GRATITUDE: TESTING MODERATORS OF THE  
EFFECTS OF A GRATITUDE DIARY INTERVENTION ON WELL-BEING AND  
INTERPERSONAL OUTCOMES

by

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Abstract

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In the past few years, evidence has amassed suggesting that gratitude interventions can have a number of personal and interpersonal benefits (for a review, see Wood, Froh, & Geraghty, 2010). For instance, gratitude interventions may lead to increases in body satisfaction (Geraghty, Wood, Hyland, 2010a), positive affect, prosocial behavior, as well as decreased physical health problems (Emmons & McCullough, 2003). The purpose of this study was to replicate previous findings by showing that a gratitude diary intervention could improve participants' psychological and physical well-being as well as decrease their indirect aggression. A second aim of this study was to test whether individuals who scored highly on personality measures of curiosity and desire for character growth would benefit more from the gratitude intervention, than individuals who scored low on these measures.

Participants first completed an online survey containing the relevant personality measures as well as measures of well-being and aggression (time 1 assessment). Participants were then randomly assigned to one of three diary conditions in which they either wrote about things for which they were grateful (experimental condition), hassles,

or minor details from their lives. After finishing the diary phase of the study, participants completed an online survey that contained all the same measures as the pre-diary survey (time 2 assessment). The gratitude intervention did not lead to improvements in the proposed outcomes and these effects were not consistently moderated by curiosity and desire for character growth. However, preliminary results regarding the Desire for Character Growth Scale (DCGS), which was specifically created for this study, suggested that this measure is psychometrically sound and demonstrates good predictive validity. Desire for character growth measured at time 1 had a positive relationship with gratitude at time 2, even after controlling for gratitude and social desirability at time 1. Furthermore desire for character growth predicted happiness at time 2 controlling for happiness at time 1 and this relationship was mediated by changes in gratitude. In addition, a strong sense of self at time 1 predicted happiness at time 2, even after controlling for happiness at time 1 and other relevant predictors. Future research should further investigate the role of sense of self in well-being as well as the psychometric properties of the DCGS and its ability to predict growth with regard to virtues beyond gratitude.

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## Chapter 1

### Introduction

As I began planning this project, it was the month of November and Thanksgiving Day was fast approaching. Social network sites were peppered with individuals posting about things for which they were thankful. It seemed that gratitude, at least for some, was a virtue that was especially salient and valued at this time of the year. On the other hand, it has always seemed ironic to me that the very holiday devoted to practicing gratitude is also the day before Black Friday, a day marked by peak levels of consumerism.

Commentators have often bemoaned the fact that Black Friday appeared to be encroaching even further upon Thanksgiving Day, as stores announced that they would begin their special sales on the evening of Thanksgiving Day. One blogger for Huffington Post went so far as to write “Black Friday could not be contained to a mere 24 hours. It is Consumerism. It wants more. It always wants more. Nothing is sacred to it; nothing is valuable. So, now, Black Friday has eaten Thanksgiving alive (Walsh, 2013).”

Many people recognize that gratitude is an important virtue, but it can be difficult to continuously practice this virtue. The media and advertisements are forever trying to convince us that we need more things to make us happy. Furthermore, life deals out stressors and it is difficult to be grateful and focus on the good when negative events are salient. Yet these very facts of life underscore why gratitude may be such an important virtue to cultivate. Studies have shown that trait gratitude is associated with a number of positive outcomes, such as less materialism (McCullough, Emmons, & Tsang, 2002; Polak & McCullough, 2006). Gratitude can even help reduce distress in breast cancer patients (Ruini & Vescovelli, 2013) and has been shown to buffer the relationship between depressive symptoms and suicidal ideation (Kleiman, Adams, Kashdan, & Riskind, 2013).

## 1.1 Conceptions of Gratitude

From an empirical standpoint, gratitude has been examined in several ways. Some researchers have examined gratitude as a stable trait and found that it is related to a variety of other adaptive personality characteristics, psychological and physical well-being, and positive relationship outcomes (for a review see Wood, Froh, and Geraghty, 2010). Other studies have used intervention techniques with the goal of actively increasing gratitude. One of the most common gratitude intervention exercises that has been used involves asking participants to make gratitude lists. For instance, participants may be asked to keep a gratitude diary in which they list under each entry three things for which they are grateful<sup>1</sup>. The typical control groups either receive no treatment, or they keep diaries in which they write about things, such as daily hassles, recent significant life events, or mundane details of life. The results from one of the earliest gratitude intervention studies used the diary technique and participants in the gratitude condition, relative to those in the control conditions, showed improvements in psychological and physical well-being (Emmons & McCullough, 2003).

Another study (Geraghty, Wood, & Hyland, 2010a) found that participants who kept gratitude diaries had significant decreases in body dissatisfaction compared to participants who had no treatment. Furthermore, the gratitude exercise was just as effective as an established clinical technique in which participants recorded their negative thoughts and practiced replacing them with more realistic thoughts. Perhaps the most interesting finding from this study was that the participants in the gratitude condition were

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<sup>1</sup> Other interventions have involved participants being asked to write “thank you” letters to someone who has helped them or given them a gift, but compared to the gratitude diary technique, the effects of writing a “thank you” letter seem to dissipate sooner (Wood et al., 2010).

twice as likely to complete the intervention as the participants in the other treatment condition.

But how could one virtue be linked to so many positive outcomes? The answer could be that gratitude involves an entire “life orientation” (Wood et al., 2010). According to this interpretation, gratitude is a broad dispositional approach to perceiving life—one that is characterized by attending to and relishing positive things. There are currently three different self-report measures of individual differences in gratitude. The Gratitude Questionnaire is a unidimensional measure of gratitude (McCullough et al., 2002). Other measures are multi-faceted, and include The Gratitude, Appreciation and Resentment Test (Watkins, Woodward, Stone, & Kolts, 2003), and the Appreciation Scale (Adler & Fagley, 2005). These scales assess individual differences in 8 different facets of gratitude: (1) frequency of experiencing grateful emotions, (2) feelings of appreciation towards other people, (3) focusing on ways in which one’s life is full, rather than deficient, (4) feelings of wonderment when encountering beauty, (5) grateful behavior, (6) focusing on the positive aspects of the present moment, (7) appreciation originating from the recognition that life is fragile and short, and (8) appreciation originating from comparing one’s circumstances to individuals who are less fortunate (Wood et al., 2010).

The “life orientation” approach maintains that these various conceptions of gratitude are manifestations of a higher-order gratitude factor (Wood et al., 2010). As such, scores on these subscales should covary with one another and a grateful person should tend to score highly on all of these indicators. Wood, Maltby, Stewart, and Joseph (2008) found evidence for this hierarchical structure in two large samples in which the participants completed all three gratitude personality measures. The results revealed that all 8 facets loaded on a single superordinate dimension, which the authors called gratitude.

Readers may be wondering how trait gratitude differs from trait positivity. Positivity has typically been measured with items assessing self-esteem, optimism, and life satisfaction (Caprara et al., 2010; Caprara et al. (2012). Gratitude is conceptually distinct from each of these three facets of positivity. Although similar to life satisfaction in that it is characterized by cherishing positive aspects of life, gratitude also involves 1.) a focus on the source of that benefit (McCullough et al., 2002) and 2.) feelings of luck by recognizing that through some benefactor one has received a gift that is not guaranteed to everyone (Roberts, 2004). Furthermore, whereas optimism concerns positive expectations about the future, gratitude involves celebrating positive aspects of the present (Wood et al., 2010). Finally, research has shown that the layperson's conception of gratitude primarily involves feeling grateful to other individuals (although people also acknowledge that they can feel grateful for objects, events, and circumstances) (Lambert, Graham, & Fincham, 2009). This separates the construct from self-esteem which primarily concerns a focus on positive aspects of the self.

From an empirical standpoint, gratitude appears to be separate from life satisfaction and optimism. A few studies of trait gratitude have demonstrated correlations with life satisfaction ranging from .27 to .53 (Adler & Fagley, 2005; Froh, Yurkewicz, & Kashdan, 2009; Emmons & McCullough, 2003; McCullough et al., 2002; Park, Peterson, & Seligman, 2004). The correlations between gratitude and optimism have ranged from .25 to .51 (Adler & Fagley, 2005; Emmons & McCullough, 2003; McCullough et al., 2002). As such, gratitude has moderate to large correlations with each of these two constructs, but gratitude does not appear to be redundant with life satisfaction or optimism. No known studies have examined the relationship between trait gratitude and self-esteem.



If gratitude really is a celebration of the benefits that one has received, then it makes sense that cultivating more grateful thoughts and emotions should produce a variety of positive outcomes. The present study of gratitude focused on four main outcomes: (1) general trait gratitude (2) psychological well-being, (3) physical well-being, and (4) interpersonal outcomes. The aims of the present study were to replicate previous findings by testing whether a gratitude intervention could lead to improvements in some of the same dependent measures as previous studies, and to extend what is currently known by examining potential personality moderators of these expected effects.

### 1.2 Overview of the Present Study

In the present study, participants were randomly assigned to one of three diary conditions. The experimental condition required participants to write about things for which they were grateful. There were two control conditions—one in which the participants wrote about daily hassles and a second in which participants wrote about recent details of their lives. Before learning of their diary condition assignment, the participants completed an online survey in which personality measures were obtained as well as baseline measures of each expected outcome (time 1). The participants then completed three diaries per week for a total of four weeks. Their final task involved completing a second online survey that contained all of the same measures that were included in the first survey (time 2).

This repeated measures design made it possible to test whether the participants' scores on each outcome variable changed from time 1 to time 2 and whether or not these changes were significantly different among the three diary conditions. By comparing the gratitude diary condition to the hassles diary condition, it was possible to test whether focusing on what one is grateful for is more beneficial than focusing on irritants and venting. By comparing the gratitude diary condition to the life details condition, it was

possible to test whether keeping a gratitude diary is more beneficial than a general, neutral writing task. It was expected that participants in the gratitude condition would exhibit significantly better changes in their outcomes than those in the life details condition or those in the daily hassles condition. It was further hypothesized that individual differences in curiosity and desire for character growth (measured at time 1) would moderate these effects by causing participants to value and fully engage in the gratitude diary.

### 1.3 Dependent Measures

#### 1.3.1 *Gratitude*

A seemingly obvious prediction for the present study was that self-reported gratitude would increase more for participants in the gratitude intervention condition, than for the participants in the other two conditions. This prediction is based on empirical precedent as previous studies have reported increases in gratitude following the completion of gratitude diaries. For instance, in one longitudinal study, a gratitude diary intervention produced (Froh, Sefick, & Emmons, 2008) higher average feelings of gratitude immediately after the participants completed each gratitude diary and at a post-intervention 3-week follow-up assessment when compared to a control condition and controlling for baseline levels of gratitude. However, it should be noted that this study assessed gratitude as an affective state with the measure inquiring about how intensely participants had experienced grateful affect during the past day. In contrast, the present study tested whether the gratitude intervention would lead to increases in a general grateful outlook from time 1 to time 2. The present study also examined whether individual differences in curiosity and desire for character growth would moderate this proposed effect. Specifically, it was expected that individuals who scored high on these

traits would approach the gratitude diary with more enthusiasm and therefore benefit more than those who scored low on these traits.

### *1.3.2 Psychological Well-being*

It is probably safe to assume that most of us want to experience the “good life.” In one study, participants from 17 different countries were asked to respond to questions by indicating on a scale of 1 to 7 the degree to which they considered happiness important (Diener, 2000; Suh, Diener, Oishi, & Trandis, 1998). Tanzania had the lowest mean importance rating, but even their rating was fairly high (5.45, to be exact). The authors of the study concluded that the data provided evidence that the desire for happiness is universal. Perhaps one of the most appealing characteristics of gratitude is that it has been implicated in increasing happiness and well-being.

Cross-sectional studies of trait gratitude have shown that it is negatively associated with depression and positively associated with positive affect (McCullough et al., 2002). In addition, gratitude intervention studies have shown similar results. For instance, Emmons and McCullough (2003) found that keeping a gratitude diary led to higher levels of life satisfaction than two control conditions. Likewise, Seligman, Steen, Park, and Peterson (2005) found that increases in happiness were evident following the end of the diary task at both a 3-month and 6-month follow-up, along with significant decreases in depression at a 1-month and 3-month follow-up. These effects may have occurred because the experience of gratitude is pleasant and positively valenced in a variety of different ways. For instance, Schimmack and Reisenzein (1997) showed that gratitude was judged to be highly similar to joy and contentment but was judged to be dissimilar to negative emotions. As such, if someone has a habitual tendency to experience gratitude, then they are, in effect, also habitually experiencing a pleasant emotion.

The effects of practicing gratitude have been so promising that clinicians have even started assigning gratitude diaries as a treatment for depression and anxiety (Emmons & Stern, 2013). This task can be easily implemented (Wood et al., 2010) and many participants indicate that they enjoy the task and continue with it even after the intervention is over (Seligman, 2005). The present study examined the effects of the gratitude intervention, relative to the other conditions, on outcome measures of happiness and depressive symptoms. Participants in the gratitude condition were expected to report increases in happiness and decreases in depressive symptoms, (relative to participants in the other two conditions), thus replicating previous findings. The present study also examined whether individual differences in curiosity and desire for character growth would moderate this effect. Individuals who scored high on these traits were expected to approach the gratitude diary with more interest and therefore incur more psychological benefits.

### *1.3.3 Health Symptoms*

Although several studies have examined the effect of gratitude on psychological well-being, fewer studies have examined its effects on physical well-being (Wood et al., 2010). This is surprising when we consider that psychological well-being is itself linked to physical health and reduced mortality (Chida & Steptoe, 2008). There are, however, a few studies worth mentioning in this regard. One longitudinal survey study of older adults showed that gratitude felt towards God can serve as a defense that moderates the relationship between stress and health for older women (Krause, 2006).

Promising results have also emerged from intervention studies. In a study conducted by Emmons and McCullough (2003), participants who were in the gratitude diary condition, compared to those in the other control conditions, reported fewer symptoms associated with physical illness. Another study found that a gratitude diary

intervention led to decreased diastolic blood pressure (Jackowska, Ronaldson, Brown, & Steptoe, 2005). The present study aimed to replicate the effect of gratitude interventions on physical health symptoms and extend our understanding by examining personality variables (curiosity and desire for character growth) that might moderate this effect. Participants in the gratitude condition were expected to report stronger decreases in physical health symptoms from time 1 to time 2, compared to those in the two control conditions. In addition, curiosity and desire for character growth were expected to moderate this effect, such that participants who were in the gratitude condition and who scored highly on curiosity and desire for character growth would report the strongest decrease in physical health symptoms.

#### *1.3.4 Interpersonal Cognitions and Behaviors: Envy & Aggression*

So far, the discussion of gratitude has primarily focused on outcomes involving well-being. These effects on psychological and physical well-being can be viewed as intrapersonal benefits that the practitioners of gratitude acquire for themselves. However, gratitude may lead to interpersonal benefits as well--specifically, to decreases in negative interpersonal thoughts and antisocial behaviors. In fact, a previous cross-sectional study found that trait gratitude was associated with lower levels of anger/hostility, as measured by a facet of neuroticism (Wood, Joseph & Maltby, 2008).

Similarly, DeWall, Lambert, Pond Jr., Kashdan, and Fincham (2012) manipulated gratitude in a single lab study by having participants write a gratitude letter to someone. They found that the participants in the gratitude condition displayed significantly less aggression towards other people than participants in the control condition. They also established that longitudinal increases in gratitude predicted longitudinal decreases in aggression.

There are several reasons why increasing gratitude might decrease aggression. Perhaps the act of counting one's blessings decreases feelings of relative deprivation, and is therefore associated with less resentment and envy of others who appear more fortunate. Indeed, McCullough et al. (2002) found that gratitude was negatively associated with envy. Furthermore, several studies have demonstrated a positive correlation between envy and aggression (e.g., Parker, Low, Walker, & Gamm, 2005; Culotta & Goldstein, 2008; Arnocky et al., 2012). In one study, females who frequently compared their attractiveness to that of other females experienced more jealousy, which in turn led to more indirect aggression (Arnocky et al., 2012).

The results of these studies suggest that envy may serve as a mediating factor between gratitude and aggression. The present study focused on indirect aggression, because it appears to be the type of aggression that is most related to envy (Arnocky et al., 2012). Unlike physical and verbal aggression, indirect aggression has been defined as a more covert means of harming others that is more commonly observed in girls than boys. It often does not involve face-to-face interaction with the victim (e.g., gossiping about the victim). The aggressor may even deploy others to harm a person (e.g., convincing them to exclude the victim) (Björkqvist, Österman & Kaukiainen, 1992).

The present study tested whether a gratitude intervention, relative to the other conditions, would lead to decreases in self-reported indirect aggressive tendencies. It also tested whether this relationship was mediated by decreased envy of others. Specifically, the participants in the gratitude condition, as compared to the participants in the other two conditions, were expected to report decreases in envy from time 1 to time 2. This reduction in envy was, in turn, expected to predict reductions in indirect aggression from time 1 to time 2. Finally, because curiosity and desire for character growth are expected to lead to more engagement in the gratitude task, they were

expected to strengthen the effect of the gratitude intervention on decreases in envy and indirect aggression.

#### 1.4 Personality Moderators

A few studies have *not* found that the gratitude intervention leads to positive changes beyond those reported by individuals in a control group (Wood et al., 2010). It is therefore possible that the intervention is only effective for certain types of people. The present study explored this possibility, by examining various individual difference variables as potential moderators of the gratitude intervention effects. All of the proposed moderators were expected to affect the participants' level of motivation and engagement in the gratitude diary task; therefore they were expected to moderate the effects of gratitude on all of the previously outlined outcomes.

##### 1.4.1 Curiosity and Exploration

Senf and Liau (2013) randomly assigned participants to either a control condition or a gratitude intervention condition. They found that the gratitude intervention was most predictive of happiness for participants who were high in openness to experience. This effect was considerably weaker in the control condition. Interestingly, some researchers have argued that openness to experience should be conceptualized more as intellect (McCrae & Sutin, 2009) and, in fact, an inspection of the items on frequently used openness measures reveals that few items actually seem to measure adventurousness or curiosity. Therefore, a more direct measure of curiosity was tested as a potential moderator in this study. Curiosity is defined as the tendency to eagerly approach new stimuli and experiences. Bishop et al. (2004) defined it as a "receptive attitude toward whatever is the target of attention." Silvia (2006) found that when people are curious about an activity, they devote more attention to it and they also engage in deeper processing of information and have better memories for the activity. Finally, they are also

more likely to persevere in the given activity until their goal is achieved. It is therefore not surprising that when developing their individual difference measure of curiosity and exploration, Kashdan et al., (2009) found that this measure was positively correlated with personal growth and positive affect. Given this evidence, it was expected that individual differences in curiosity would moderate the relationship between the diary condition variable and the various outcomes. Specifically, the beneficial effects of the gratitude intervention were expected to be stronger for those participants who scored high on trait curiosity.

#### *1.4.2 Desire for Character Growth*

There may be some individuals who habitually think about and actively work to improve their character. These individuals value virtues and personal development and may therefore consider the practice of gratitude to be a worthy pursuit in the service of their goals toward self-actualization. For this reason, the desire for character growth was expected to moderate the relationship between the experimental condition and positive outcomes, such that those who were high in desire for character growth would benefit the most from the gratitude intervention.

There are existing scales designed to measure individual differences in the proclivity for personal growth, such as the Personal Growth Initiative Scale (Robitschek, 1998) and the Personal Growth subscale of Ryff's (1995) Psychological Well-being Scale. These scales, however, mostly have items that assess the pursuit of general goals and growth, not those specifically related to character growth. For instance, some of the items on the Personal Growth Initiative Scale include, "I know what I need to do to get started for reaching my goals," and "I know how to change specific things that I want to change in my life." Similarly, Ryff's measure contains items that either assess general growth as well as growth that has happened in the past. Items on her scale include, "For



me, life has been a continuous process of learning, changing, and growth,” and “I am not interested in activities that will expand my horizons.” To meet the specific aims of this study, a more specific measure was developed to assess individual differences in the propensity to value and engage in activities specifically designed to increase ones’ personal virtues.

### 1.5 Summary of Hypotheses

In summary, this study examined the effects of a gratitude intervention on various measures of psychological and physical well-being, as well as envy and indirect aggression. In addition, personality variables were examined as potential moderators of these predicted relationships. The details of the specific hypotheses were as follows:

#### 1.5.1 *Dependent Measure: Gratitude*

Hypothesis 1 states that participants in the gratitude condition should show significant increases in gratitude from time 1 to time 2 (condition X time effect), relative to participants in the other two conditions. Curiosity and desire for character growth should moderate this effect, such that the increase in gratitude from time 1 to time 2 should be strongest for participants who are in the gratitude condition *and* who score high on curiosity and desire for character growth (condition X time X desire for character growth effect & condition X time X curiosity effect).

#### 1.5.2 *Dependent Measure: Happiness*

Hypothesis 2 states that participants in the gratitude condition should show significant increases in happiness from time 1 to time 2 (condition X time effect), relative to the other two conditions. Curiosity and desire for character growth should moderate this effect, such that the increase in happiness from time 1 to time 2 should be strongest for participants who are in the gratitude condition *and* who score high on curiosity and

desire for character growth (condition X time X desire for character growth & condition X time X curiosity).

#### *1.5.3 Dependent Measure: Depressive Symptoms*

Hypothesis 3 states that participants in the gratitude condition should show significant decreases in depressive symptoms from time 1 to time 2 (condition X time effect), relative to the other two conditions. Curiosity and desire for character growth should moderate this effect, such that the decrease in depressive symptoms from time 1 to time 2 should be strongest for participants who are in the gratitude condition *and* who score high on curiosity and desire for character growth (condition X time X desire for character growth & condition X time X curiosity).

#### *1.5.4 Dependent Measure: Physical Health Symptoms*

Hypothesis 4 states that participants in the gratitude condition should show significant decreases in physical health symptoms from time 1 to time 2 (condition X time effect). Curiosity and desire for character growth should moderate this effect such that the decrease in physical health symptoms from time 1 to time 2 should be strongest for participants who are in the gratitude condition *and* who score high on curiosity and desire for character growth (condition X time X desire for character growth & condition X time X curiosity).

#### *1.5.5 Dependent Measure: Indirect Aggression*

Hypothesis 5 states that participants in the gratitude condition should show decreases in envy from time 1 to time 2, relative to the other two conditions. This decrease should in turn partially predict decreases in indirect aggression from time 1 to time 2. Furthermore, curiosity and desire for character growth should moderate the effect of the gratitude condition on decreases in envy and indirect aggression, such that those

high on these traits will demonstrate the largest decrease in envy and aggression. Figure 1-1 displays this mediation model.

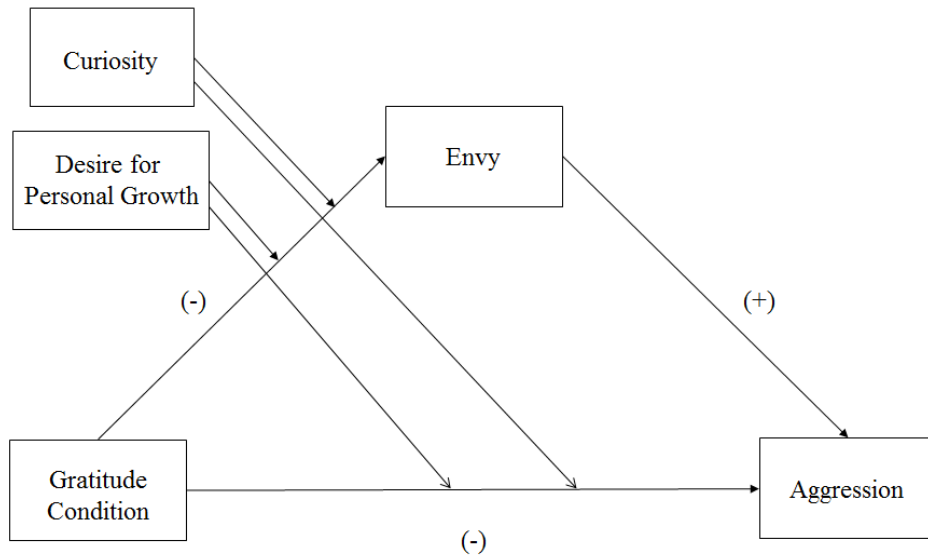


Figure 1-1 Mediation Model for Hypothesis 5

### 1.6 Novelty and Importance of the Present Study

Several previous studies have shown that gratitude interventions can increase psychological well-being and decrease depression and symptoms of illness. These relationships were tested in the present study, but the novel contribution was to test what types of people benefit most from the intervention- specifically by testing the moderators of desire for character growth and curiosity. This could be valuable information to clinicians because the intervention may not be effective for all individuals. Because gratitude interventions are often implemented by clinicians, the moderator of desire for character growth seems especially relevant since clients often come to therapy voluntarily in order to improve themselves. On the other hand, some individuals are mandated by courts to receive treatment for various behavioral issues and these same individuals may not be high on desire for character growth.

The proposed study may also further our understanding of how gratitude interventions can improve interpersonal outcomes by testing whether gratitude decreases aggressive tendencies by first reducing envy. The majority of clinicians have used gratitude interventions as a way to treat well-being, but the proposed study sought to establish that gratitude interventions are a useful tool for treating certain types of aggression.

## Chapter 2

### Method

#### 2.1 Participants

A total of 271 participants completed the pre-diary survey and 200 (73.8%) participants completed all phases of the study. There were 26 participants who dropped out directly after the pre-diary survey, without completing any part of the diary phase of the study. This left a total of 245 participants who completed at least one diary. Condition was significantly associated with attrition,  $\chi^2(2) = 7.67, p = .02, \omega = .18$ .

Table 2-1 indicates the number of participants who did and did not complete the entire study in each condition. Examination of the standardized residuals indicated that fewer individuals than expected by chance dropped out of the study in the gratitude condition ( $z = 2.0, p < .05$ ). None of the other cell counts were significantly different than what would be expected by chance. The ratio of completers to total participants in the respective conditions was significantly greater in the gratitude condition compared to the life details condition ( $z = 2.67, p < .05$ ) and in the gratitude condition compared to the hassles condition ( $z = 2.00, p < .05$ ). This finding replicates a similar finding by Geraghty et al. (2010a) who found that participants were more likely to complete a diary intervention rather than a typical cognitive therapy treatment when being treated for problems with body dissatisfaction.

Table 2-1 Descriptive Statistics for Completers  
and Non-completers for Each Condition

	Gratitude		Hassles		Life Details	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Completers	72	91.10%	66	79.50%	62	74.70%
Non-completers	7	8.90%	17	20.50%	21	25.35%
Total	79	100.00%	83	100.00%	83	100.00%

The gender and ethnic proportions for all participants who completed the entire study generally matched the overall sample. Table 2-2 provides descriptive statistics for *all* participants who at least completed the initial pre-diary survey versus participants who completed the entire study.

Table 2-2 Demographic Statistics for Participants

Gender	All Participants		Completers	
	<i>n</i>	%	<i>n</i>	%
Males	42	15.50%	32	16.00%
Females	228	84.10%	167	83.50%
Missing	1	0.40%	1	0.50%
Race	<i>n</i>	%	<i>n</i>	%
White/Anglo-American	104	38.40%	79	39.50%
Black/African-American	36	13.30%	24	12.00%
Hispanic/Latino	72	26.60%	49	24.50%
Asian	38	14.00%	35	17.50%
Native Hawaiian/Pacific Islander	3	1.10%	3	1.50%
Other	15	5.50%	8	4.00%
Missing	3	1.10%	2	1.00%

## 2.2 Design

The present study took each participant approximately four weeks to complete. The participants were randomly assigned to one of three diary conditions. All diaries were submitted online. In one condition, the participants were asked to list three things for which they felt grateful and to state why they felt grateful for each item. In a control condition, participants were asked to list three hassles they had recently experienced and state why each hassle was irritating. In a second control condition, participants were asked to list three life details and state why that detail stood out in their mind. Participants submitted three diaries per week for a total of four weeks. For each diary, the participants listed the three things outlined above. For each participant who completed the diary phase, this resulted in a total of 12 diaries and a total of 36 items listed in the diaries. All

participants completed the same initial survey questionnaire before they were informed of their specific diary assignment (time 1 assessment of outcomes). Within 48 hours after completing this measure, all participants were emailed the survey link for submitting their diaries. Finally, all participants were asked to complete a final online post-diary intervention survey questionnaire (time 2 assessment of outcomes). This link was sent to them within 48 hours of them submitting their last diary entry. The only aspect of the procedure that varied between the conditions was the requested content of the diaries (gratitude items, life details, and hassles).

### 2.3 Procedure

Participants were recruited from the Psychology Department's participant pool at the University of Texas at Arlington. The present study was posted on the web-based Sona Systems Software, which permitted potential participants to review descriptions of all available studies and sign up for the studies of their choosing. The present study was labeled the "Life Experiences Study." A description of the study informed potential participants that they would be asked to submit three short online diaries each week for a total of four weeks and complete two online surveys. The participants were informed that each diary should take roughly 10 minutes to complete and the two surveys would take no longer than 1 hour to complete. The participants were not told that it was an intervention study and were not told to expect beneficial outcomes.

Once participants signed up for the study, a link became available to them in Sona, which allowed them to access the first online survey in SurveyMonkey. The first page of this survey consisted of the online consent form and explained that the purpose of the study was to see "how different factors are related to word choices and linguistic style when writing diaries." This, of course, was not the actual purpose of the study, but a putative one that masked the true purpose in order to minimize potential demand



characteristics in responding. The survey included demographic questions, a measure of social desirability, personality measures of curiosity and desire for character growth, sense of self, mindfulness, and the outcome measures of gratitude, happiness, depression, envy, aggression, physical health symptoms, and life stressors.

After completing these measures, the students were directed to an online page that thanked them for their participation and informed them that they would receive an email with a link to the online diary submission survey within 48 hours. This later-arriving email reminded participants that they would be asked to complete three diaries each week for a total of four weeks and that further instructions would be included in the diary survey. The email also asked the participants not to submit more than one diary per day and no more than three diaries per week.

Once the participants accessed the link to the diary survey, they were first reminded of the instructions for submitting their diaries. They were then informed that each time they wished to submit a new diary entry, they would use that same link. The diary survey was designed so that participants could access it multiple times and submit new responses. The next page of the survey that appeared was the one in which participants wrote and submitted their diary entry. Depending on the condition that the participants were assigned to, they saw one of the sets of instructions that appear in the blocks of text below. These instructions were adapted from those used in previous gratitude intervention studies (Emmons & McCullough, 2003; Sheldon & Lyubomirsky, 2006).

*Gratitude diary instructions.* "There are many things in our lives, both large and small, that we might be grateful for. These things might include particular supportive relationships, sacrifices or contributions that others have made for you, external events, such as nice weather, facts about your life, such as your advantages and opportunities, or even gratitude for life itself and the world we live in. You might not have thought about your life in this way before, but whether you have or not, please think back over the last few days (or since your last diary entry) and describe 3 things in your life that you are

grateful or thankful for. Please write a complete sentence for each item and state why you are grateful for that item. For example, "I am grateful for X, because..."

*Hassles diary instructions.* "Hassles are irritants—things that annoy or bother you. These things occur in various domains of life, including relationships, work, school, housing, finances, health, and so forth. You might not have thought about your life in this way before, but regardless of whether you have or not, please think back over the last few days (or since your last diary entry) and describe 3 hassles that occurred in your life. Please write a complete sentence for each item and state why that item was irritating. For example, "X was a hassle and was irritating because..."

*Life details diary instructions.* "Paying more attention to your life means that you take notice of the ordinary details of your life that you would not typically think about. These might include particular classes or meetings you attend, typical interactions with acquaintances, typical thoughts that you have during the day, or your usual schedule as you move through the day. You may not have thought about your life in this way before, but regardless of whether you have or not, please think back over the last few days (or since your last diary entry) and describe 3 life details that you thought of. Please write a complete sentence for each life detail and also explain why this detail stood out in your mind. For example, "X was a life detail that stood out in my mind, because..."

After submitting the first diary entry, participants were asked to indicate the extent to which they agreed with the following statement, "I think writing this type of diary could be beneficial to me." The response options ranged from 1 (strongly disagree) to 7 (strongly agree). This question only appeared after the first diary submission, to reduce demand characteristics. However, after completing each of the 12 diaries, participants indicated how much they enjoyed writing that particular diary entry by responding to the following statement, "I enjoyed writing this diary." Again, response options ranged from 1 (strongly disagree) to 7 (strong agree). The participants also completed measures of positive and negative affect directly before and after completing the 1st, 6th, 7<sup>th</sup>, and 12<sup>th</sup> diary. These affect measures were collected only on these occasions to help minimize demand characteristics and to reduce the repetitiveness of the task.<sup>2</sup>

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<sup>2</sup> Analyses revealed that the perceived benefit and the average enjoyment of the diary task did not differ across conditions. These variables also did not prove to be moderators or mediators of the relationship between the diary condition and any of the outcomes. There was also no significant changes in positive or negative affect for any of the diary conditions. As such, these variables are not further discussed.

Participants were sent reminders throughout the diary phase of the study that informed them of their progress. After the four weeks passed and the participants had completed their last diary entry, they were sent one last online survey link. This link allowed them to access the post-diary survey questionnaire. This survey was identical in all respects to the pre-diary survey in its content, except that it did not contain any demographic questions. Participants were asked to complete this survey within 2-3 days of receiving the email link to it.

## 2.4 Measures

In the present study, there were occasions when participants skipped items. Sum scores were therefore not used, because participants' scores might have been biased and lower simply due to the fact that they did not answer all items. For all scale scores, the average of the relevant items was used in all analyses.<sup>3</sup> However, when using the sum it was important to ensure that the majority of the items were answered so that there was adequate construct coverage and measurement. Therefore average scores were only calculated if 70% of the items were answered. In addition, all scales were scored so that a higher score indicated more of the construct. For instance, a higher score on the gratitude measure indicated more gratitude, whereas a higher score on the depression measure indicated more depression.

### 2.4.1 Control Variables

#### 2.4.1.1 The Shortened Social Desirability Scale (SSDS)

Strahan and Gerbasi (1972) developed a shortened, 10-item version of the Marlow-Crowne Social Desirability Scale (Crowne and Marlowe, 1960) to assess individual differences in the tendency to answer survey questions in a socially desirable

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<sup>3</sup> The analyses were also conducted with sum scores for only participants that answered all questions for the scale, and the conclusions drawn from the hypothesis tests did not change.

way. This measure uses a true/false format. Two sample items from this scale are, "I am always willing to admit it when I make a mistake," and "There may have been occasions when I took advantage of someone [reverse scored]." This measure was used as a control variable in the present study for other scales for which participants might not be entirely truthful (e.g., gratitude, envy, and aggression).

In the present study, the SSDS had an internal consistency of .57. This value is somewhat low, however the SSDS' relationship with relevant variables were similar in magnitude as what has been observed with similar measures of social desirability in previous studies. For example, McCullough et al. (2002) observed a correlation of .17 to .21 between a similar measure of social desirability orientation and the Gratitude Questionnaire (GQ-6). In the current sample the correlation between social desirability and the GQ-6 was .23. Although some loss in internal consistency is expected when using this shortened measure, the authors noted that their shortened measure seems to operate in much the same way as the original measure. Because it has the advantage of being much briefer than other social desirability scales, it was preferable for use in the present study in which many other measures were collected.

#### 2.4.1.2 The College Adjustment Rating Scale (CARS)

The College Adjustment Rating Scale was developed by Zitzow (1984) to assess whether or not students are experiencing a variety of different stressful events. The scale contains 50 different stressful events in four domains: academic ("Falling behind in classes due to illness"), social ("Being alone when others are socializing"), personal ("Lack of self-confidence"), and family-home environments ("Having an alcoholic parent"). Zitzow (1984) showed that this measure predicted which students sought counseling services due to excessive stress. For the purposes of this study, participants were asked to indicate whether or not they experienced each event in the last month and if so, to rate

how much stress it caused them on a scale from 1 (no stress) to 7 (extreme stress). This measure was collected as a relevant control variable, because stressful events may predict several of the outcome variables (e.g., happiness, depression). However, preliminary analyses revealed that it did not emerge as an important covariate, predictor or moderator in this study; therefore it does not appear in and of the statistical models presented in the results section. In the current sample, this measure had an internal consistency of .91.

#### *2.4.2 Personality Moderators*

##### *2.4.2.1 Desire for Character Growth Scale (DCGS)*

The Desire for Character Growth Scale was developed by the author specifically for use in the present study. As mentioned before, the existing personal growth measures focus on general goal striving and growth rather than striving for character development. Just because someone works hard to attain a goal, that does not mean that it is a goal involving the development of virtues. Some goals are more external in nature, such as financial gain, or achievement at work. For the purposes of this study, a more specific measure of the desire for character growth was needed. There were 11 items generated. Appendix A contains the items for this scale. Some example items are “It is important to me to always work towards becoming a good and virtuous person” and “I am willing to work hard at an activity if I think it will make me a better person.” The response options range from 1 (strongly disagree) to 7 (strongly agree). In the current sample, the DCGS demonstrated good internal consistency, both at time 1 (.89) and time 2 (.90). It also demonstrated good test-retest reliability (.73).

##### *2.4.2.2 Curiosity and Exploration Inventory-II (CEI-II)*

The Curiosity and Exploration scale was developed by Kashdan et al. (2009) as a revision of the original Curiosity and Exploration Inventory. It consists of 10 Likert-scale

items and can be used as a general measure of curiosity. Factor analysis has revealed two subfactors: stretching and embracing. The stretching scale assesses individual differences in the tendency to actively search for information and novel experiences. The embracing scale measures individual differences in the tendency to welcome unpredictable events. Example items for these two scales, respectively, are, “I am always looking for experiences that challenge how I think about myself and the world” and “I am the kind of person who embraces unfamiliar people, events, and places.” Response options range from 1 (very slightly or not at all) to 5 (extremely). In the current sample, the inter-item reliability for the overall scale was .90. The inter-item reliability of the stretching and embracing subscales were .84 and .82, respectively.

#### *2.4.3 Additional Personality Measures*

##### *2.4.3.1 The Sense of Self Scale (SOSS)*

The Sense of Self Scale measures the strength versus weakness of one’s sense of self (Flury & Ickes, 2007). This measure consists of 12 Likert scale items with response options ranging from 1 (strongly disagree) to 5 (strongly agree). Example items from this scale are, “It’s hard for me to figure out my own personality, interests, and opinions (reverse-scored)” and “I have a clear and definite sense of who I am and what I am all about.” This measure has demonstrated good convergent validity and predictive validity in previous research (Cuperman, Robinson, & Ickes, 2012; Flury & Ickes, 2007) and demonstrated good inter-item reliability in the current sample (.88).

##### *2.4.3.2 The Mindful Attention and Awareness Scale (MAAS)*

The Mindful Attention and Awareness Scale was developed by Brown and Ryan (2003) and assesses individual differences in a person’s tendency to be aware of what is happening in the present moment. This measure consists of 15 Likert scale items with response options ranging from 1 (almost always) to 6 (almost never). Example items

include “I do jobs or tasks automatically, without being aware of what I’m doing,” and “I find myself preoccupied with the future or the past.” This measure demonstrated good inter-item consistency in the present study (.91).

#### *2.4.4 Dependent Measures of Gratitude*

##### *2.4.4.1 The Gratitude Questionnaire (GQ-6)*

The GQ-6 is a measure designed by McCullough et al. (2002) to assess individual differences in general gratitude and the propensity to feel appreciation for what one has received in life. This measure consists of 6 items assessed on a Likert scale with response options ranging from 1 (strongly disagree) to 7 (strongly agree). One item reads, “I have so much in life to be thankful for.” This measure has been used in many previous studies and has been positively associated with theoretically relevant measures of prosocial tendencies as well as negatively associated with measures of materialism and envy (McCullough et al., 2002). In the current sample, it had an internal consistency of .76 at time 1 and .75 at time 2.

##### *2.4.4.2 The Gratitude, Resentment, and Appreciation Test (GRAT)*

This measure was developed by Watkins et al. (2003). It consists of 44 Likert scale items with response options ranging from 1 (I strongly disagree) to 9 (I strongly agree). It consists of three subfactors: a Sense of Abundance (Ab), Simple Appreciation, (SA), and Appreciation for Others (AO). Sample items for each of these subscales, respectively, are, “I really don’t think that I’ve gotten all the good things that I deserve in life” (reverse coded), “I think it’s important to appreciate each day that you are alive,” and “I feel deeply appreciative for the things others have done for me in my life.” This scale has demonstrated good predictive validity as indicated by the GRAT’s positive associations with various aspects of subjective well-being (Watkins et al. 2003). In the current study, the inter-item reliability for the Sense of Abundance subscale was .93 at

time 1 and .95 at time 2. Inter-item reliability for the Simple Appreciation scale was .91 at time 1 and .93 at time 2. The inter-item reliability for the Appreciation of Others subscale was .84 at time 1 and .83 at time 2.

#### 2.4.4.3 The Short-Form Appreciation Scale (AS)

The Short-Form Appreciation Scale was developed by Adler and Fagley (2005). It consists of 18 Likert scale items. The first 9 items ask about the frequency of appreciation behaviors within the past year. For the purposes of this study, however, the response options were changed to ask about the last four weeks. The response options that were used were: never, once, 2-3 times total, once a week, a few times a week, every day, more than once every day. The last 9 items had response options ranging from 1 (strongly disagree) to 5 (strongly agree). The scale contains a variety of items that assess different facets of appreciation, such as (1) a focus on what one has, (2) feelings of awe, (3) ritualistic behaviors to practice gratitude (e.g., prayer, unique personal routines), (4) appreciation of aspects of the present moment (5) feelings of interpersonal gratitude in response to the efforts of others and (6) learning not to take things for granted after experiencing loss/adversity. Appendix A contains sample items for each of these aspects of gratitude. This measure demonstrated good inter-item reliability in the current study at both time 1 (.92) and time 2 (.94).

#### 2.4.5 *Dependent Measure of Envy*

##### 2.4.5.1 Dispositional Envy Scale (DES)

The Dispositional Envy Scale is a measure designed by Smith, Parrott, Diener, Hoyle, and Kim (1999) to assess individual differences in the inclination to experience envy. It consists of 8 Likert scale items with response options ranging from 1 (strongly disagree) to 5 (strongly agree). A sample item reads, "Frankly, the success of my neighbors makes me resent them." Scores on this measure have been shown to



correlate with similar constructs (e.g., jealousy, self-esteem) and the measure has demonstrated good criterion-related validity (Smith et al., 1999). This measure demonstrated good internal consistency in the current sample both at time 1 (.92) and time 2 (.94).

#### *2.4.6 Dependent Measures of Aggression*

##### *2.4.6.1 Direct and Indirect Aggression Scale – Bully (DIAS-B)*

The Direct and Indirect Aggression Scale was developed by Björkqvist, Lagerspetz, & Österman (1992). It consists of 24 Likert scale items that assess the frequency of various aggressive behaviors. The items measure the frequency of physical aggression (“How often have you hit other people?”), verbal aggression (“How often did you insult other people?”), and indirect aggressive behaviors (“How often did you gossip about people you were angry with?”). The response options range from 0 (never) to 4 (very often). For the purposes of this study, the participants were asked to answer these questions using the last 4 weeks as their timeframe. This scale appears to be valid, as it has predicted outcomes theoretically related to aggression (e.g., Wallenius, Punamäki, & Rimpelä, 2007). The indirect aggression scale was of primary interest in the current study and it demonstrated good inter-item consistency at both time 1 (.82) and time 2 (.79).

##### *2.4.6.2 The Adult Indirect Aggression Scale (IAS-A)*

The Adult Indirect Aggression Scale was developed by Forrest, Eatough, and Shevlin (2005). It consists of 25 Likert scale items. Like the DIAS-B, this scale has the benefit of assessing the frequency of actual behaviors, however, the IAS-A focuses solely on types of indirect aggression that are commonly displayed by adults. The scale consists of three facets: social exclusion (“Purposefully left them out of activities”), use of malicious humor (“Done something to try and make them look stupid”), and guilt induction (“Tried to influence them by making them feel guilty”). Only two studies to date have

provided information about the validity of this scale; but in both studies it was found to relate to theoretically relevant variables (Sergeant, Dickens, Davies, & Griffiths, 2006; Young, 2008). The overall scale score was used in this study and it demonstrated good inter-item at both time 1 (.92) and time 2 (.92)

#### 2.4.7 Dependent Measures of Psychological Well-Being

##### 2.4.7.1 The Subjective Happiness Scale (SHS)

The Subjective Happiness Scale was developed by Lyubomirsky and Lepper (1999) to assess overall happiness. This measure consists of four items measured on a Likert scale ranging from 1 to 7. The end points for the response options vary depending on the questions. For instance, one of the items reads, "In general, I consider myself..." The respondents then choose one of the points on the scale ranging from "not a very happy person" to "a very happy person." Another item reads. "Some people are generally very happy. They enjoy life regardless of what is going on, getting the most out of everything. To what extent does this characterization describe you? The respondents then choose one of the points on the scale ranging from "not at all" to "a great deal." This measure has demonstrated good convergent and divergent validity (Lyubomirsky and Lepper, 1999) and has been successfully used in previous positive psychology interventions designed to increase happiness (Sheldon, Boehm, & Lyubomirsky, 2012). This scale demonstrated good inter-item consistency in the current study at both time 1 (.88) and time 2 (.89).

##### 2.4.7.2 The Revised Center for Epidemiological Studies Depression Scale (CESD-R).

The CESD-R is a measure consisting of 20 Likert-scale items assessing the frequency of depressive symptoms in the previous week. This is a widely used measure and has been well-validated (Eaton, Smith, Ybarra, Muntaner, & Tien, 2004). Response options in the current study ranged from 1 (not at all) to 4 (nearly every day). Example

items from this scale are, "I could not shake off the blues," and "I lost interest in my usual activities." This scale demonstrated good inter-item consistency in the current study at both time 1 (.92) and time 2 (.94).

#### *2.4.8 Dependent Measure of Physical Health*

##### *2.4.8.1 Daily Record Form (DRF)*

The Daily Record Form was developed by Baum, Breslin, O'Keffe, Ratliffe-Crain, and Burell (1994) as a brief instrument for assessing stress and physical health symptoms. It consists of 24 somatic symptoms. Participants are asked to respond on a 5-point Likert scale indicating how much they have experienced that particular symptom., Response options range from 1 (not at all) to 5 (extremely). There is also a space where participants may indicate any other symptom that they have experienced that was not listed as part of the 24 items. For the purposes of this study, participants were asked to indicate how much they had suffered from each symptom in the past 4 weeks. This scale has demonstrated good convergent validity as indicated by its correlation with existing established symptom checklists (Baum et al., 1994). Factor analysis of the DRF revealed three factors: negative affect, energy/arousal, and body pain symptoms. Because the current study included other measures to assess negative affect and energy and arousal, the body pain symptoms subscale was of primary interest. This measure demonstrated good inter-item reliability at both time 1 (.85) and time 2 (.85).

#### *2.4.9 Measure of Mood.*

##### *2.4.9.1 Positive and Negative Affect Schedule (PANAS).*

The Positive and Negative Affect Schedule was developed by Watson, Clark, and Tellegen (1988) to assess mood. Its items address 20 different emotions and participants are instructed to rate the degree to which they are experiencing each emotion at the present moment. There are 10 items to assess positive affect (e.g., happy,

inspired) and 10 items to assess negative affect (e.g., sad, angry). Both the positive affect scale and negative affect scale demonstrated good internal consistency in the present study (an average reliability of .89 and .85, respectively for ratings of the present moment). The response options range from 1 (very slightly or not at all) to 5 (extremely). This scale has been widely used and has demonstrated good convergent validity (Watson et al., 1998).

## Chapter 3

### Results

#### 3.1 Data Screening

The data were screened to ensure that all assumptions were met for subsequent statistical tests. There were three variables that were considerably skewed, with absolute values of skewness above Bulmer's (1979) recommended cut-off value of one. Trait gratitude was negatively skewed, but a square root transformation produced a more normal distribution for this variable at both time points. Depression and adult indirect aggression were both positively skewed. Square root and natural log transformations were applied to these two variables respectively at both time points. Although still skewed, these transformations did produce better distributions.<sup>4</sup> The means, standard deviations, skewness, and kurtosis values for all continuous variables used in the reported analyses are provided in Table 3-1. There were a few univariate outliers that appeared, but they represented plausible values, so they were retained in the models. There were no issues of heteroscedasticity or multicollinearity. In addition, all continuous independent variables were linearly related to each other as well as to the outcome measures being tested.

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<sup>4</sup> All hypothesis tests and supplementary analyses were conducted using both original untransformed and transformed variables, but the results and conclusions did not vary substantially.

Table 3.1 Descriptive Statistics for Primary Study Variables

Study Variables	<i>M</i>	<i>SD</i>	Skewness	Kurtosis
Social Desirability (T1)	1.46	0.20	0.35	-0.01
Desire for Character Growth (T1)	5.84	0.84	-0.74	0.18
Curiosity (T1)	3.27	0.85	-0.22	-0.62
Stretching (T1)	3.53	0.87	-0.34	-0.81
Embracing (T1)	3.00	0.96	-0.16	-0.80
SOS (T1)	2.15	0.65	0.09	-0.84
Mindfulness (T1)	3.12	0.91	-0.24	-0.08
Gratitude T1 (GQ-6) <sub>a</sub>	36.58	10.40	-0.75	-0.08
Gratutitude T2 (GQ-6) <sub>a</sub>	35.80	9.49	-0.41	-0.64
Happiness (T1)	5.05	1.36	-0.69	-0.04
Happiness (T2)	4.71	1.41	-0.30	-0.55
Depressive Symptoms (T1) <sub>b</sub>	1.46	0.32	0.77	0.30
Depressive Symptoms (T2) <sub>b</sub>	1.47	0.33	1.01	1.18
Somatic Symptoms (T1)	2.18	0.61	0.43	-0.21
Somatic Symptoms (T2)	2.14	0.62	0.67	0.25
Envy (T1)	2.08	0.98	0.79	-0.14
Envy (T2)	1.98	1.05	0.89	-0.35
Indirect Aggression (T1) (AIAS) <sub>c</sub>	0.29	0.26	1.32	2.03
Indirect Aggression (T2) (AIAS) <sub>c</sub>	0.24	1.55	0.89	2.96

<sub>a</sub> Square Transformation

<sub>b</sub> Square Root Transformation

<sub>c</sub> Natural Log Transformation

### *3.2 Description of Data Analytic Strategy*

For the tests of hypotheses 1 through 5, the data were analyzed using multilevel modeling in which the dependent variable at time 1 and time 2 was nested within each participant. This method was appropriate for several reasons. First, the outcome scores at the two time points were expected to be more similar within each participant, than across participants. In other words, the data were not independent. For each model, the intercept was set to be a random factor, so that the outcome score (at both time 1 and time 2) was allowed to vary as a function of the participant from which it was measured. It is through this variation of the intercepts that the non-independence in participant's scores on the outcome between time 1 and time 2 is modeled (Twisk, 2006).

A second reason that multilevel modeling was chosen was due to the presence of missing data. Unlike repeated measures and mixed-model ANOVA, multilevel modeling makes use of maximum likelihood estimation (Hox, 1995). This estimation procedure permits all cases to be included in the analyses, even those cases that have partially missing data. In fact, it has been argued that maximum likelihood is a better alternative for handling missing data than more commonly-used methods like multiple imputation (Allison, 2012). Multilevel modeling was therefore advantageous for the present data because there were a number of participants that dropped out of the study and therefore did not complete the post-diary survey.

#### *3.2.1 Assessing Change in the Dependent Measures*

In all tests of the hypotheses, time was treated as an independent variable because the hypotheses specifically stated that there would be significant changes in the outcomes between time 1 and time 2 in the gratitude condition. Other approaches for assessing change involve predicting the outcome at time 2 with some focal set of independent variables, while simultaneously treating the time 1 outcome measure as a

control variable. However, this approach does not actively test whether there are significant mean differences in the outcome between time 1 and time 2. Given that this was an intervention study, it was necessary to test whether the gratitude intervention resulted in substantial mean differences between the pre- and post-intervention assessments.

### 3.2.2 *Assessing the Personality Moderators*

Only the time 1 measurement (pre-diary assessment) of the personality variables was used to test moderation, because this measurement of the variable would theoretically be the one that would predict their level of engagement going forward into the diary task. Each new hypothesis was first tested by examining both of the proposed personality moderators (curiosity and desire for character growth) simultaneously in one multilevel model. None of these models produced significant effects. However, these models were complex, containing four main effects, five two-way interactions, and two three-way interactions. It is therefore possible that the sample may have been underpowered to test these complex models.<sup>5</sup> Furthermore, desire for character growth and curiosity are conceptually and empirically overlapping constructs,  $R^2 = .31$ ,  $p < .001$ . It is possible that when they were entered into the same model, they competed for some of the variance in the outcome, which prevented both of them from being significant moderators. Therefore, for each hypothesis, two additional models were tested in which only one personality moderator was examined at a time. Those results are presented in this results section.

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<sup>5</sup> The results for these more complex models appear in Appendix C.



### 3.3 Psychometric Properties of the Desire for Character Growth Scale

Before testing the hypotheses, the psychometric properties of the Desire for Character Growth Scale (DCGS) were investigated. A principal components analysis was conducted on the 11 items with direct oblimin rotation. Oblimin rotation was chosen, because all items had been generated with one theoretical factor in mind, therefore subfactors that might have emerged were expected to correlate. The Kaiser-Meyer-Olkin statistic was excellent ( $KMO = .91$ ) according to cut-off values provided by Hutcheson and Sofroniou (1991). It indicated that the sample size was appropriate for conducting a principal components analysis with the present data. In addition, Bartlett's test of sphericity indicated that correlations between items were sufficiently high to conduct a principal components analysis,  $\chi^2 = 1459.99$ ,  $p < .001$ . Only one component emerged with an Eigenvalue above 1. This factor accounted for 51.84% of the variance. Appendix B contains each item and its respective factor loading. All loadings were above .60 except for the last item, which was reverse-scored and had a loading of .44. This item was retained in the overall scale score, because reverse-scored items are important for reducing bias. Additionally, the overall reliability of the scale with this item included was still quite high. As mentioned before, this scale demonstrated good inter-item consistency (.89 at time 1 and .90 at time 2) and the test-retest reliability of the measure was also good (.73).

### 3.4 Hypothesis Tests

#### 3.4.1 Hypothesis 1: Gratitude as the Dependent Measure

Hypothesis 1 stated that participants in the gratitude condition should show significant increases in gratitude from time 1 to time 2 (condition X time effect), relative to participants in the other two conditions. Curiosity and desire for character growth should

moderate this effect, such that the increase in gratitude from time 1 to time 2 should be strongest for participants who were in the gratitude condition *and* who scored high on curiosity and desire for character growth (condition X time X desire for character growth effect & condition X time X curiosity effect).

#### 3.4.1.1 Curiosity as the Personality Moderator

First, the model containing only curiosity as a personality moderator was tested. Scores on the Gratitude Questionnaire (GQ-6) represented the dependent measure. This particular measure was chosen as the starting point for testing changes in trait gratitude, because it appears to be a more global measure of gratitude and is not specific to any one source of gratitude (e.g., interpersonal gratitude, etc). Scores on the Shortened Social Desirability Scale (SSDS) were included as a control variable, because social desirability has been shown to correlate with this measure of gratitude in previous studies (McCullough et al., 2002). The statistics for all variables in this model are presented in Table 3-2.

There were no significant main effects for either diary condition or time on gratitude. There was a significant main effect for curiosity, such that curiosity was positively associated with gratitude ( $\beta = .29$ ). It is important to note that these were relationships between the personality variable and gratitude collapsed across both time 1 and time 2. In other words, this was not a personality by time interaction effect on gratitude.

There was a significant interaction between diary condition and time. However, Bonferroni post-hoc tests revealed that there were no significant simple effects. This indicated that, contrary to the hypothesis, the gratitude diary condition did not produce significant increases in gratitude from time 1 to time 2, nor did any of the other groups.

This also indicated that there were no significant differences in gratitude between the groups at time 1 or time 2.

Although they were not of direct interest, none of the other two-way interactions were significant (diary condition X curiosity & time X curiosity). There was a significant three-way interaction between diary condition, time and curiosity. This three-way interaction was probed, but the pattern of simple effects was not in the hypothesized direction. Participants who were in the life details condition *and* who had average scores on curiosity decreased in gratitude from time 1 ( $M = 37.01$ ,  $SE = 1.03$ ) to time 2 ( $M = 34.78$ ,  $SE = 1.09$ ) ( $p = .03$ ). Finally, participants who were in the life details condition *and* who scored high on curiosity showed significant decreases in gratitude from time 1 ( $M = 41.30$ ,  $SE = 1.58$ ) to time 2 ( $M = 37.35$ ,  $SE = 1.71$ ) ( $p = .02$ ). This pattern of simple effects may have been a fluke, because these effects were not replicated when examining changes in other measures of gratitude. The simple effects were also examined to see if there were differences between the groups at either time 1 or time 2 as a function of participants' scores on curiosity. None of these simple effects were significant.

#### 3.4.1.2 Desire for Character Growth as Personality Moderator

The next model included desire for character growth (DCG) as the personality moderator of interest. However, none of the hypothesized effects were significant, nor were any other variables in the model, except a significant positive association between desire for character growth and gratitude across both time points ( $\beta = .49$ ).<sup>6</sup> Table 3-2 provides the statistics for all independent variables in this model.

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<sup>6</sup> An earlier version of this model had included social desirability as a control variable. However, it was not a significant predictor in the model, so it was dropped from future analyses.

Table 3-2 Model Statistics for Hypothesis 1  
with Gratitude as the Dependent Measure

Model with Curiosity as the Moderator				
Independent Variables	Numerator <i>df</i>	Denominator <i>df</i>	<i>F</i>	<i>p</i>
Diary Condition	2	235.78	1.63	0.20
Time	1	209.86	1.07	0.30
SSDS	1	244.87	7.41	< .01
Curiosity	1	236.63	27.63	< .001
Diary Condition X Time	2	209.61	3.30	0.04
Diary Condition X Curiosity	2	237.91	1.67	0.19
Time X Curiosity	1	211.30	1.93	0.17
Time X Diary Condition X Curiosity	2	210.95	3.29	0.04
Model with Desire for Character Growth (DCG) as the Moderator				
Independent Variables	Numerator <i>df</i>	Denominator <i>df</i>	<i>F</i>	<i>p</i>
Diary Condition	2	240.96	0.44	0.64
Time	1	219.09	0.47	0.50
DCG	1	242.27	106.86	< .001
Diary Condition X Time	2	219.14	1.69	0.19
Diary Condition X DCG	2	242.46	0.51	0.60
Time X DCG	1	220.16	0.72	0.40
Time X Diary Condition X DCG	2	220.18	1.97	0.14

This hypothesis was tested with other measures of gratitude and there were no significant effects except for the main effects for the personality predictors.

### 3.4.2 Hypothesis 2: Happiness as the Dependent Measure

Hypothesis 2 stated that participants in the gratitude condition should show significant increases in happiness from time 1 to time 2 (condition X time effect), relative to the other two conditions. Curiosity and desire for character growth should moderate this effect, such that the increase in happiness from time 1 to time 2 should be strongest for participants who were in the gratitude condition *and* who scored high on curiosity and desire for character growth (condition X time X desire for character growth & condition X time X curiosity).

Again, this hypothesis was first tested by examining only curiosity as a personality moderator. The hypothesis was then tested with only desire for character growth (DCG) as the personality moderator. None of the hypothesized effects were significant in either model. There were, however, significant positive associations between curiosity and happiness ( $\beta = .33$ ) and desire for character growth and happiness ( $\beta = .39$ ) in each of the respective models. Table 3-3 displays the statistics for these two models.

Table 3-3 Model Statistics for Hypothesis 2  
with Happiness as the Dependent Measure

Model with Curiosity as the Moderator				
Independent Variables	Numerator <i>df</i>	Denominator <i>df</i>	<i>F</i>	<i>p</i>
Diary Condition	2	243.15	0.19	0.83
Time	1	203.21	0.35	0.55
Curiosity	1	244.70	32.72	< .001
Diary Condition X Time	2	202.91	0.68	0.51
Diary Condition X Curiosity	2	244.61	0.20	0.82
Time X Curiosity	1	203.40	3.16	0.08
Time X Diary Condition X Curiosity	2	203.06	0.83	0.44
Model with Desire for Character Growth (DCG) as the Moderator				
Independent Variables	Numerator <i>df</i>	Denominator <i>df</i>	<i>F</i>	<i>p</i>
Diary Condition	2	244.81	1.71	0.18
Time	1	205.62	2.40	0.12
DCG	1	245.73	50.17	< .001
Diary Condition X Time	2	205.64	2.28	0.11
Diary Condition X DCG	2	245.88	2.09	0.13
Time X DCG	1	206.15	0.76	0.38
Time X Diary Condition X DCG	2	206.15	2.43	0.09

### 3.4.3 Hypothesis 3: Depressive Symptoms as the Dependent Measure

Hypothesis 3 stated that participants in the gratitude condition should show significant decreases in depressive symptoms from time 1 to time 2 (condition X time effect), relative to the other two conditions. Curiosity and desire for character growth should moderate this effect, such that the decrease in depressive symptoms from time 1 to time 2 should be strongest for participants who were in the gratitude condition *and* who scored high on curiosity and desire for character growth (condition X time X desire for character growth & condition X time X curiosity).

None of the hypothesized effects were significant in either the model containing only curiosity as a moderator or the model containing only desire for character growth (DCG) as a moderator. Only one effect emerged in which desire for character growth was inversely related to depressive symptoms ( $\beta = -.20$ ). Table 3-4 displays the statistics for the two models.

Table 3-4 Model Statistics for Hypothesis 3  
with Depressive Symptoms as the Dependent Measure

Model with Curiosity as the Moderator				
Independent Variables	Numerator <i>df</i>	Denominator <i>df</i>	<i>F</i>	<i>p</i>
Diary Condition	2	237.59	1.48	0.23
Time	1	203.59	0.51	0.48
Curiosity	1	239.26	2.90	0.09
Diary Condition X Time	2	202.82	1.16	0.32
Diary Condition X Curiosity	2	239.19	1.87	0.16
Time X Curiosity	1	203.84	0.80	0.37
Time X Diary Condition X Curiosity	2	203.58	1.74	0.18
Model with Desire for Character Growth (DCG) as the Moderator				
Independent Variables	Numerator <i>df</i>	Denominator <i>df</i>	<i>F</i>	<i>p</i>
Diary Condition	2	242.00	1.02	0.36
Time	1	205.65	0.01	0.93
DCG	1	242.75	9.02	< .01
Diary Condition X Time	2	205.63	0.94	0.39
Diary Condition X DCG	2	242.86	0.98	0.38
Time X DCG	1	205.88	0.03	0.88
Time X Diary Condition X DCG	2	205.87	1.04	0.36



#### *3.4.4 Hypothesis 4: Physical Health Symptoms as the Dependent Measure*

Hypothesis 4 stated that participants in the gratitude condition should show significant decreases in physical health symptoms from time 1 to time 2 (condition X time effect). Curiosity and desire for character growth should moderate this effect such that the decrease in physical health symptoms from time 1 to time 2 should be strongest for participants who were in the gratitude condition and who scored high on curiosity and desire for character growth (condition X time X desire for character growth & condition X time X curiosity).

Again, none of the hypothesized effects were significant in either the model containing only curiosity as a personality moderator or the model containing only desire for character growth as a moderator. Although there were a few marginally significant interactions in these two models, Bonferroni post-hoc tests did not reveal any significant or marginally significant simple effects. Table 3-5 displays the statistics for both of these models.

Table 3-5 Model Statistics for Hypothesis 4  
with Physical Health Symptoms as the Dependent Measure

Model with Curiosity as the Moderator				
Independent Variables	Numerator <i>df</i>	Denominator <i>df</i>	<i>F</i>	<i>p</i>
Diary Condition	2	225.81	0.59	0.55
Time	1	192.95	3.95	0.06
Curiosity	1	227.71	0.01	0.94
Diary Condition X Time	2	192.73	1.63	0.19
Diary Condition X Curiosity	2	227.59	0.45	0.64
Time X Curiosity	1	193.72	3.63	0.06
Time X Diary Condition X Curiosity	2	193.43	1.48	0.23
Model with Desire for Character Growth (DCG) as the Moderator				
Independent Variables	Numerator <i>df</i>	Denominator <i>df</i>	<i>F</i>	<i>p</i>
Diary Condition	2	230.57	1.30	0.27
Time	1	230.59	1.30	0.27
DCG	1	231.37	0.63	0.43
Diary Condition X Time	2	197.13	2.81	0.06
Diary Condition X DCG	2	231.62	1.18	0.31
Time X DCG	1	197.40	2.70	0.10
Time X Diary Condition X DCG	2	197.35	2.83	0.06

### *3.4.5 Hypothesis 5: Envy and Adult Indirect Aggression as the Dependent Measures*

Hypothesis 5 stated that participants in the gratitude condition should show decreases in envy from time 1 to time 2, relative to the other two conditions. This decrease should in turn partially predict decreases in indirect aggression from time 1 to time 2. In other words, changes in envy should mediate the relationship between the diary condition and changes in indirect aggression. Furthermore, curiosity and desire for character growth should moderate the effect of the gratitude condition on decreases in envy and indirect aggression, such that those high on these traits will demonstrate the largest decrease in envy and indirect aggression.

In order for mediation to take place, the independent variables of interest must predict the mediator (Baron & Kenny, 1986). As such, the first model included envy as the dependent measure. Scores on the Shortened Social Desirability Scale (SSDS) were included in all models predicting envy, because it was expected that individuals may not readily admit their tendency to be envious. For the model with curiosity as the moderator, none of the hypothesized effects were significant. There was, however, a significant main effect for curiosity, indicating an inverse relationship between curiosity and envy ( $\beta = -.16$ ).

The same model was tested with desire for character growth as a moderator. Again, there were no significant effects in the model, except for a significant inverse relationship between desire for character growth and envy ( $\beta = -.22$ ). Table 3-6 displays the statistics for these two models. The relevant independent variables did not predict the proposed mediator, envy. Hypothesis 5 was therefore not supported. It should be noted that these models were tested with adult indirect aggression as the direct outcome, but there were no effects in these models as well. The statistics for those models are presented in Table 3-7.

Table 3-6 Model Statistics for Hypothesis 5  
with Envy as the Dependent Measure

Model with Curiosity as the Moderator				
Independent Variables	Numerator <i>df</i>	Denominator <i>df</i>	<i>F</i>	<i>p</i>
Diary Condition	2	239.94	2.07	0.13
Time	1	204.84	1.16	0.28
SSDS	1	245.78	29.10	< .001
Curiosity	1	240.96	8.45	< .01
Diary Condition X Time	2	204.69	0.99	0.38
Diary Condition X Curiosity	2	241.92	1.09	0.34
Time X Curiosity	1	205.56	0.12	0.73
Time X Diary Condition X Curiosity	2	205.37	1.05	0.35
Model with Desire for Character Growth (DCG) as the Moderator				
Independent Variables	Numerator <i>df</i>	Denominator <i>df</i>	<i>F</i>	<i>p</i>
Diary Condition	2	243.28	0.17	0.84
Time	1	206.75	0.42	0.52
SSDS	1	246.37	21.25	< .001
DCG	1	243.49	15.51	< .001
Diary Condition X Time	2	206.77	0.12	0.89
Diary Condition X DCG	2	244.51	0.21	0.81
Time X DCG	1	207.16	1.16	0.28
Time X Diary Condition X DCG	2	207.16	0.11	0.90

Table 3-7 Model Statistics for Hypothesis 5  
with Adult Indirect Aggression as the Dependent Measure

Model with Curiosity as the Moderator				
Independent Variables	Numerator <i>df</i>	Denominator <i>df</i>	<i>F</i>	<i>p</i>
Diary Condition	2	231.35	0.84	0.43
Time	1	198.28	0.060	0.81
SSDS	1	240.18	46.87	< .001
Curiosity	1	232.07	0.75	0.39
Diary Condition X Time	2	198.13	0.98	0.38
Diary Condition X Curiosity	2	232.99	0.88	0.41
Time X Curiosity	1	199.22	0.06	0.80
Time X Diary Condition X Curiosity	2	198.99	0.95	0.39
Model with Desire for Character Growth (DCG) as the Moderator				
Independent Variables	Numerator <i>df</i>	Denominator <i>df</i>	<i>F</i>	<i>p</i>
Diary Condition	2	235.96	1.87	0.16
Time	1	200.81	0.35	0.56
SSDS	1	240.23	37.74	< .001
DCG	1	235.32	1.01	0.32
Diary Condition X Time	2	200.86	0.45	0.64
Diary Condition X DCG	2	201.17	0.78	0.38
Time X DCG	1	201.17	0.78	0.38
Time X Diary Condition X DCG	2	201.21	0.42	0.66

### 3.5 Serendipitous Findings

In summary, none of the five research hypotheses were supported. Overall, there were no main effects of time, indicating that the outcomes did not significantly change from time 1 to time 2. Additionally, this lack of change was not moderated by diary condition or by personality variables. There were, however, main effects for curiosity and desire for character growth on the outcomes of gratitude and happiness. However, it is important to remember that these were effects on the outcomes collapsed across time 1 and time 2.

The tests of the hypotheses suggested that stable personality variables may be better predictors of the outcomes than keeping a gratitude diary. Additional exploratory analyses were conducted in which the measured personality variables were tested as longitudinal predictors of the previously investigated outcomes. Rather than looking at whether there are mean differences between a measure at time 1 and time 2, another approach assesses outcomes at time 2 controlling for its time 1 measure (Laursen, Little, & Card, 2012). If the time 1 measure of the outcome perfectly predicts scores on the time 2 measure of the outcome, then there is no change that can be predicted. However, if the time 1 measure does not perfectly predict time 2, then this indicates that there is change and the non-shared/residual variance can be thought of as a continuous measure of the change. This approach allows the researcher to assess whether the focal predictors of interest can explain the change in the outcome, even if the observed changes are small.

First, partial correlations were examined between each personality variable at time 1 and the outcome at time 2, controlling for the outcome measured at time 1. The personality variables that significantly predicted each outcome were then entered into a multiple regression framework. Because multiple regression requires complete data from all cases it was first necessary to assess the pattern of missing data to ensure that it

would not bias parameter estimates. Little's MCAR test indicated that the missing data were distributed at random,  $\chi^2(97) = 106.66$ ,  $p = .24$  for the variables in these models. For that reason, listwise deletion was used. The models were also tested in which the missing values were estimated using multiple imputation, but the parameter estimates ( $r$ , Betas,  $s^2$ ) were generally the same when the analyses were conducted with imputed data. There were however more degrees of freedom which allowed more predictors to emerge as significant predictors. The original data were used without estimating values for the missing data points in order to be more conservative with the following exploratory analyses.

### *3.5.1 Changes in Gratitude*

The first set of exploratory analyses tested personality predictors of changes in gratitude. Scores on the Gratitude Questionnaire (GQ-6) represented the dependent measure. This particular measure was chosen, because it is a general measure of trait gratitude. Desire for character growth (DCG) was tested as a possible personality predictor, because gratitude can be thought of as a specific character trait that may be valued by individuals high on desire for character growth. In addition, the stretching and embracing subscales of the curiosity measure as well as the mindfulness measures were tested as possible predictors, because they have each been associated with increased attentiveness and engaging in deeper processing (Brown & Ryan, 2003; Silvia, 2006). Individuals high on these traits may be more grateful over time, because they are acutely aware of benefits they receive in life as well as the source of those benefits. Table 3-8 displays the partial correlations for each personality variable with gratitude at time 2 controlling for gratitude at time 1.

Table 3-8 Partial Correlations Between  
Personality Variables at Time 1 and Gratitude at Time 2

Variables	Partial Correlation	$R^2$
SSDS (T1)	0.14	0.02
DCG (T1)	0.29***	0.08
Stretching (T1)	.15*	0.02
Embracing (T1)	0.07	0.00
Mindfulness (T1)	0.14	0.02

*Note.* Gratitude at time 1 served as the control variable.

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

Desire for character growth and stretching were the only time 1 personality variables that had significant partial correlations with gratitude at time 2. In order to assess each of these variables' unique explanation of the variance in gratitude at time 2, both variables were tested in a multiple regression model. Gratitude at time 1 was once again included as a control variable in order to properly assess change. In addition, because social desirability has been shown to correlate with gratitude in the past, scores on the Shortened Social Desirability Scales (SSDS) were also included in the model as a necessary control variable.

The four predictors together accounted for a significant percentage (43%) of the variance in gratitude at time 2,  $F(4, 192) = 35.51, p < .001$ . Not surprisingly, Gratitude at time 1 was the strongest predictor of gratitude at time 2. However, desire for character growth was also a significant predictor and accounted for an additional 3% of



the variance beyond the other predictors<sup>7</sup>. Stretching and social desirability were not significant predictors.

Table 3-9 Regression of Gratitude at Time 2 on Personality Variables at Time 1

Personality Predictors	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>	<i>p</i>	<i>sr</i> <sup>2</sup>
Gratitude (T1)	0.43	0.06	0.47	7.43	< .001	0.16
SSDS (T1)	4.10	2.77	0.08	1.48	0.14	0.01
DCG (T1)	2.96	0.90	0.27	3.29	0.001	0.03
Stretching (T1)	-0.49	0.78	-0.05	-0.63	0.53	0.00

### 3.5.2 Changes in Happiness

The next outcome of interest was happiness at time 2. The personality variables of interest were all measured at time 1 and were as follows: trait gratitude, desire for character growth (DCG), stretching, embracing, mindfulness, and sense of self. Trait gratitude was tested as a predictor, because it has been shown to relate to happiness in previous studies (for a review, see Wood et al., 2010). Desire for character growth was included, because of its theoretical relationship with the propensity to improve and seek self-actualization. The stretching, embracing, and mindfulness measures have also each been shown to predict positive affect and life satisfaction in previous cross-sectional studies (Brown & Ryan, 2003; Kashden et al., 2009). Finally, a stronger sense of self (SOS) was expected to predict happiness, as it provides individuals with a consistent and reassuring sense of their identity, goals, purpose, and values (Flury & Ickes, 2007).

<sup>7</sup> Desire for character growth also predicted several other measures of gratitude at time 2 controlling for gratitude 1; therefore this does not appear to be a fluke effect.

Although many of these variables have been previously tested as predictors of positive emotions and life satisfaction, many have not been tested longitudinally. In addition, to the author's knowledge this is the first study to test these predictors together in a multiple regression framework to determine the strongest predictors of changes in happiness. Again, first partial correlations were examined between the personality variables at time 1 and happiness at time 2. Happiness at time 1 served as the control variable. Table 3-10 displays these partial correlations along with the  $R^2$  values.

Table 3-10 Partial Correlations Between  
Personality Variables at Time 1 and Happiness at Time 2

Variables	Partial Correlation	$R^2$
Gratitude (T1)	0.20**	0.04
DCG (T1)	0.20**	0.04
Stretching (T1)	0.04	0.00
Embracing (T1)	-0.05	0.00
Mindfulness (T1)	0.15*	0.02
SOS (T1)	0.22**	0.05

*Note.* Happiness at time 1 served as the control variable.

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

Gratitude, desire for character growth, mindfulness, and sense of self all had significant positive partial correlations with the change in happiness from time 1 to time 2. In order to assess each of these variables' unique explanation of the variance in happiness at time 2, all four variables were tested in a multiple regression model. When all of the predictors were included in model together, none of the predictors were

significant on their own. This may have been due two borderline issues of multicollinearity. According to Tabachnick and Fidell (2013), there may be issues of multicollinearity when two or more predictors have variance proportions of .50 or above. Although they did not have large zero-order correlations indicating redundancy, sense of self at time 1 and mindfulness at time 1 both loaded together and had variance proportions of .50 and .68, respectively. Mindfulness was therefore dropped from the model as it had the lowest partial correlation with happiness at time 2. In addition, gratitude at time 1 and happiness at time 1 had variance proportions of .49 and .50, respectively. As such, gratitude at time 1 was also dropped as a predictor. Dropping happiness at time 1 was not considered appropriate as it needed to be retained in the model as a control variable for assessing change.

The final regression model regressed happiness at time 2, on happiness, desire for character growth, and sense of self at time 1. The results revealed that, together, the personality variables at time 1 accounted for 68% of the variance in happiness at time 2,  $F(3, 192) = 137.19, p < .001$ . Sense of self and desire for character growth each had significant positive relationships with changes in happiness. Table 3-11 provides the regression statistics for each of the predictors in this model.

Table 3-11 Regression of Happiness at Time 2 on Time 1 Personality Predictors

Personality Predictors	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>	<i>p</i>	<i>sr</i> <sup>2</sup>
Happiness (T1)	0.73	0.05	0.72	15.14	< .001	0.37
DPG (T1)	0.16	0.07	0.09	2.10	0.04	0.01
SOS (T1)	0.27	0.10	0.13	2.71	< .01	0.01

### 3.5.3 Does Gratitude Mediate the Relationship Between Desire for Character Growth and Happiness?

Recall that desire for character growth predicted changes in gratitude as well as changes in happiness. One way that desire for character growth may have predicted happiness is through changes in gratitude. As such, a mediation model was tested in which desire for character growth at time 1 was expected to predict happiness at time 2, through changes in gratitude from time 1 to time 2. Gratitude and happiness at time 1 were again treated as covariates to more appropriately model change in each variable. Social desirability was also included as a covariate, because of its relationship with gratitude. The total effect of desire for character growth at time 1 on happiness at time 2 was significant without taking into account the time 1 covariates,  $\beta = .37$ ,  $t(192) = 5.61$ ,  $p < .001$ . There was no significant total effect of desire for character on happiness at time 2, when factoring in the covariates of happiness, gratitude, and social desirability at time 1,  $\beta = .06$ ,  $t(189) = 1.23$ ,  $p = .23$ . However, Hayes (2013) argues that the primary independent variable need not predict the outcome in order for mediation to occur, because it can be affecting the outcome indirectly and entirely through a mediator.

Bias-corrected bootstrapping procedures with 1000 samples revealed that gratitude at time 2 was indeed a significant mediator of the relationship between desire for character growth at time 1 and happiness at time 2,  $\beta = .05$ , 95% *CI* [.02, .12], even after controlling for the relevant variables at time 1. In other words, higher scores on desire for character growth at time 1 were associated with higher scores on gratitude at time 2,  $\beta = .22$ ,  $t(189) = 3.54$ ,  $p < .001$ , 95% *CI* [.10, .35] which in turn predicted more happiness at time 2,  $\beta = .27$ ,  $t(188) = 5.14$ ,  $p < .001$ , 95% *CI* [.17, .38]. The direct effect of desire for character growth at time 1 on happiness at time 2 was not significant when the effects of the mediator and covariates were taken into account,  $\beta = -.00$ ,  $t(188) = -.01$ ,

$p = .99$ . This indicates that there was full mediation. Figure 3-2 displays the standardized estimates for each path in this model.

Although the statistical tests presented in this section were not part of the original intention of this study, most of the effects for desire for character growth, gratitude, and sense of self had  $p$  values past the .01 level, therefore it is less likely that they are spurious effects.

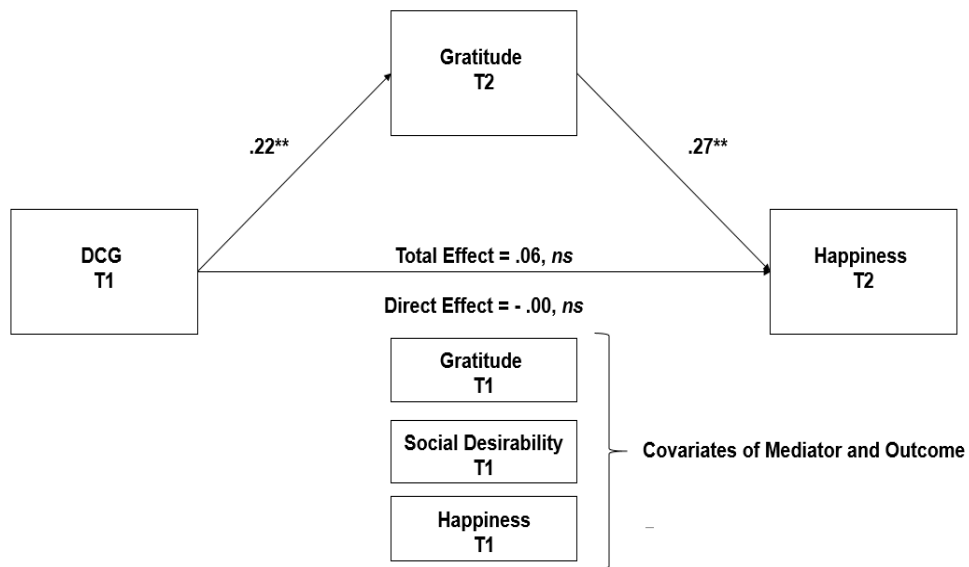


Figure 3-1 Desire for Character Growth Predicting Happiness Via the Mediator of Gratitude

## Chapter 4

### Discussion

The purpose of this study was to attempt to replicate previous findings by showing that a gratitude diary intervention, compared to two control diary tasks, could lead to beneficial changes in gratitude, happiness, depression, physical health symptoms, and (reduced) aggressive tendencies. In addition, the present study aimed to extend previous findings by testing whether traits such as curiosity and desire for character growth would moderate the predicted beneficial effects. Specifically, it was expected that participants who were in the gratitude diary condition and who scored high on curiosity and desire for character growth would show the most positive changes from time 1 to time 2. The results did not support these hypotheses and findings from previous studies of gratitude interventions were not replicated.

#### 4.1 Possible Explanations for the Null Effects

One possible explanation for these null effects is that previous studies may have induced demand characteristics. For instance, several studies tested a gratitude intervention with clinical samples who were seeking help for various problems (e.g., Geraghty et al., 2010a; Geraghty et al., 2010b). The participants in these clinical samples may have been expecting positive effects, an expectation which in turn caused them to actually experience (or at least report experiencing) positive effects. In the present study, participants were given a cover story and told that the purpose of the study was to test “how different factors are related to word choices and linguistic style when writing diaries.” If the previous results cannot be replicated, by providing participants with a cover story like the one used in the present study, one possible explanation is that any positive effects observed in previous studies may be due only to the demand characteristics they introduced and not to any added benefit that the intervention itself provided. Even in

studies that used college-age samples, the gratitude prompts sometimes stated that the aim was to “cultivate a sense of gratitude (Sheldon & Lyubomirsky, 2006)”. In fact, more concrete evidence for previous effects being moderated by demand characteristics comes from a recent meta-analysis of gratitude intervention studies. It showed that the effects were generally stronger when the participants had knowledge of the study goals (Dickens & Vicaria, 2015).

Another possible reason that the present intervention was not effective is that the participants may have viewed the task as repetitive and therefore wrote their diaries in a repetitive way. Many participants tended to write about the same sources of gratitude in each successive diary. It might actually be detrimental to continually reflect repeatedly on the same things, because doing so might cause the task to become boring and cause people to further habituate to the positive feelings that these things might normally elicit.

The tendency to adapt to positive aspects of life is referred to as the hedonic treadmill and is empirically supported. For instance, Brickman, Coates, and Janoff - Bulman (1978) found that individuals who won the lottery quickly adapted to their extra financial freedom and eventually returned to their baseline levels of happiness. In another study, Sheldon, Boehm, & Lyubomirsky (2012) argued that “variety is the spice of happiness.” These researchers randomly assigned some participants to perform a variety of acts of kindness over a 10-week period, whereas other participants were assigned to perform the same acts of kindness repeatedly over the 10-week period. Participants in the variety condition showed increases in happiness from pre- to post-intervention, whereas participants in the “same old, same old” condition actually reported decreases in happiness from pre- to post-intervention. This suggests that gratitude diaries may be effective only if participants strive to keep the task fresh by focusing on new sources of gratitude in each diary.

This line of reasoning brings up another point worth mentioning. If participants are continually reporting the same things in their gratitude diaries, does this really represent true grateful contemplation? McCullough et al. (2002) argue that one important aspect of gratitude is “span.” Span represents the number of events or things that elicit gratitude in an individual. In fact, their measure of gratitude, which was used in the present study, includes items to assess grateful span, such as, “If I had to list everything that I felt grateful for, it would be a very long list.” Scholars have argued that gratitude is a type of worldview (Wood et al., 2010) that involves continually relishing positive aspects. Accordingly, if someone is not already in the habit of engaging in grateful contemplation, it may not be enough to tell participants to contemplate things for which they are grateful. These people may also require a bit of coaching on *how* to effectively engage in grateful contemplation.

Recent studies have shown that individuals who are high in trait gratitude tend to interpret benefits received from others in ways that differ from those who are low in trait gratitude. For example, they believe that the individual was sincere in bestowing the benefit on them and genuinely meant to help them. In addition, they value the benefit received more than those low on trait gratitude. Finally, they also consider how granting the benefit cost the benefactor time, money, energy, etc, (Wood, Maltby, Stewart, Linley, & Joseph, 2008). Perhaps when considering benefits received from others, participants should be given thought questions to encourage them to focus on the value of the benefit received, the unselfish intent of the benefactor, and the cost incurred to the benefactor by granting the benefit.

Another possibility for the null effects that is worth mentioning concerns the length of the intervention. It is possible that the intervention in the present study was not long enough and this is why changes were not observed. Although previous studies have



used interventions as short as two weeks and shown positive effects many studies that had effects lasted as long as 6 to 10 weeks, with fewer diaries written each week (Wood et al., 2010). Requiring fewer diaries each week might have helped the task to seem less repetitive and less like a chore.

#### 4.2 Longitudinal Personality Predictors of Happiness

Although the gratitude intervention was not successful at improving any of the well-being outcomes that were examined in this study, there were a number of personality variables that predicted longitudinal changes in happiness, including trait gratitude. This replicates previous findings indicating that gratitude is longitudinally related to happiness (Wood et al., 2010). If additional research does indeed show that gratitude interventions are less effective than previously thought, it may be beneficial to switch the research focus to determine how we can cultivate the development of trait gratitude in children so that interventions are not necessary.

Perhaps an even more promising personality variable that is relevant to happiness is sense of self. Recall that sense of self at time 1 had a slightly stronger partial correlation with happiness at time 2 (controlling for happiness at time 1) than the other personality predictors of gratitude, stretching, embracing, mindfulness, and desire for character growth. This is somewhat surprising as the items on the sense of self scale appear to be more neutrally valenced than some of the items on these other personality measures, which tend to explicitly use positive emotion terms. Individuals with a strong sense of self tend to have a clear understanding of their personality, strengths, weaknesses, values, and goals (Flury & Ickes, 2007). Previous studies have found relationships between uncertainty and stress (Monat, Averill, and Lazarus, 1972), so perhaps individuals who have a strong sense of self experience less anxiety and stress because of their certainty about their self-concept and identity. In addition, a sense of

purpose in life has been shown to be a strong predictor of happiness (Reker, Peacock, & Wong, 1987). Future studies should further explore the longitudinal links between sense of self and happiness by testing mediators such as uncertainty, anxiety, and purpose in life.

#### 4.3 The Desire for Character Growth Scale

There were also promising findings regarding the newly-developed Desire for Character Growth Scale (DCGS). Preliminary results suggest that the DSGS has good inter-item consistency as well as test-retest reliability. In addition, it tended to correlate with theoretically relevant constructs, such as curiosity. It also appeared to have only a small correlation with social desirability orientation, suggesting that it may be relatively independent of the tendency for people to respond in socially desirable ways on self-report measures. These results should be interpreted with caution, because the social desirability scale used in this study had a relatively low inter-item reliability. The DCGS also appeared to have only one factor as it was intended.

Finally, there was also evidence for predictive validity, because DCGS was associated with gratitude at time 2, controlling for gratitude at time 1. This finding suggests that this measure not only predicts the tendency to want to grow, but also the tendency to show actual growth. As mentioned before, there are existing measures of individual differences in personal growth. However, these existing measures are not as specific to character growth as the current measure. For instance, Ryff's (1995) and Robitschek's (1998) measures tend to assess general goal pursuit or even past growth that is not specifically defined.

The DCGS could prove useful for assessing change over time in other character traits and virtues. This possibility has direct implications for positive psychology research, which has historically focused on positive outcomes (Lopez & Gallagher, 2009). A

number of recent positive psychology studies have focused on the development of virtues, such as bravery, kindness, and, perseverance, etc (Peterson & Park, 2009). Future studies should investigate the ability of the DCGS to predict changes in these virtues. In addition, desire for character growth predicted happiness at time 1 after controlling for happiness at time 1, and this was shown to be mediated by changes in gratitude. This sequence suggests that desire for character growth may be associated with well-being outcomes by first exerting positive growth on character. Although the results regarding the DCGS are promising, it should be cautioned that these are preliminary findings. For instance, a better test of the mediation model would involve a study in which desire for character growth, gratitude, and happiness were each collected at three time points. This would allow the mediator of gratitude to be tested at a true midpoint between the predictor of desire for character growth and the outcome of happiness. Future studies should also further investigate the psychometric properties of the scale and test whether the DCGS predicts character growth over and above the more general pre-existing measures of personal growth.

#### 4.4 Conclusions

In summary, the current study failed to replicate previous findings showing that a gratitude diary intervention could be used as an effective way to improve psychological, physical, and interpersonal well-being. There were no significant changes in gratitude, happiness, depression, physical health symptoms, or indirect aggression for participants in the gratitude intervention. In addition, the present study did not extend previous findings, because curiosity and desire for character growth did not consistently moderate the effect of the gratitude intervention on the outcomes. There were, however, some promising serendipitous findings, which suggest that certain personality variables, such as a strong sense of self and the desire for character growth may be important predictors

of happiness. In addition, the present study provided preliminary evidence supporting the utility of the Desire for Character Growth Scale. In the current sample, this measure showed good reliability and predictive validity. Future studies in the positive psychology should further investigate the role of both the Sense of Self Scale and the Desire for Character Growth Scale for predicting positive outcomes.

## Appendix A

### Sample Items for Each Facet of the Short-Form Appreciation Scale

**1. “Have” Focus**

I counted my blessings for what I have in this world.

**2. Awe**

I had moments when I realized how fortunate I was to be alive.

**3. Ritual**

I did things to remind myself to be thankful.

**4. Present Moment**

I enjoyed the little things around me like the trees, the wind, animals, sounds, light, etc.

**5. Interpersonal**

I remind myself to appreciate my family.

**6. Loss/Adversity**

Thinking about dying reminds me to live every day to the fullest.

Appendix B

Items and Factor Loadings for the Desire for Character Growth Scale (DCGS)

Item	Factor Loading
It is important to me to always work towards becoming a good and virtuous person.	0.64
I often seek out ways to grow as a person.	0.77
I am willing to step out of my comfort zone for an activity if I think it will lead to self-improvement in my character	0.71
I don't often think about improving my character.	0.74
I am willing to work hard at an activity if I think it will make me a better person.	0.75
I actively seek out activities that I think will lead to personal growth and make me a better person.	0.65
I believe there is always room for improvement and you can always make yourself a better person.	0.79
If I notice that I have a character flaw, I work hard to fix it.	0.86
It is important to me to always try and improve my character.	0.85
I work towards becoming a good and virtuous person.	0.64
If I notice a personal weakness, I tend to move on and not think about it.	0.44



## Appendix C

Models with Curiosity and Desire for Character Tested Simultaneously

Hypothesis 1 with Gratitude as the Dependent Measure

Independent Variables	Numerator <i>df</i>	Denominator <i>df</i>	<i>F</i>	<i>p</i>
Diary Condition	2	237.46	0.24	0.79
Time	1	214.60	0.02	0.90
SSDS	1	243.76	1.07	0.30
Curiosity	1	237.62	1.01	0.32
DCG	1	239.36	49.75	< .001
Diary Condition X Time	2	214.69	2.68	0.07
Diary Condition X Curiosity	2	238.41	1.80	0.17
Time X Curiosity	1	214.89	2.18	0.14
Diary Condition X Time X Curiosity	2	215.08	1.38	0.25
Diary Condition X DCG	2	240.70	1.29	0.28
Time X DCG	1	216.44	0.32	0.57
Time X Diary Condition X DCG	2	216.90	1.36	0.26

Hypothesis 2 with Happiness as the Dependent Measure

Independent Variables	Numerator <i>df</i>	Denominator <i>df</i>	<i>F</i>	<i>p</i>
Diary Condition	2	244.70	1.66	0.19
Time	1	203.96	2.41	0.12
Curiosity	1	245.88	6.30	0.01
DCG	1	246.52	18.44	< .001
Diary Condition X Time	2	203.98	2.27	0.11
Diary Condition X Curiosity	2	246.42	0.87	0.42
Time X Curiosity	1	208.14	7.12	< .01
Diary Condition X Time X Curiosity	2	207.84	0.08	0.92
Diary Condition X DCG	2	247.16	2.96	0.05
Time X DCG	1	206.36	4.90	0.03
Time X Diary Condition X DCG	2	206.62	1.32	0.27

Hypothesis 3 with Depressive Symptoms as the Dependent Measure

Independent Variables	Numerator <i>df</i>	Denominator <i>df</i>	<i>F</i>	<i>p</i>
Diary Condition	2	239.92	1.20	0.30
Time	1	204.04	0.002	0.96
Curiosity	1	239.46	0.01	0.93
DCG	1	242.62	6.22	0.01
Diary Condition X Time	2	204.04	0.72	0.49
Diary Condition X Curiosity	2	239.93	2.39	0.09
Time X Curiosity	1	203.85	1.02	0.31
Diary Condition X Time X Curiosity	2	203.90	1.26	0.29
Diary Condition X DCG	2	242.85	1.54	0.22
Time X DCG	1	205.03	0.29	0.59
Time X Diary Condition X DCG	2	205.10	0.64	0.53

Hypothesis 4 with Physical Health Symptoms as the Dependent Measure

Independent Variables	Numerator <i>df</i>	Denominator <i>df</i>	<i>F</i>	<i>p</i>
Diary Condition	2	235.98	1.08	0.36
Time	1	202.36	2.330	0.13
Curiosity	1	234.99	0.34	0.56
DCG	1	237.76	1.02	0.31
Diary Condition X Time	2	202.41	2.59	0.08
Diary Condition X Curiosity	2	235.72	0.10	0.90
Time X Curiosity	1	200.71	1.21	0.27
Diary Condition X Time X Curiosity	2	200.79	0.23	0.79
Diary Condition X DCG	2	238.81	0.49	0.61
Time X DCG	1	203.07	0.33	0.57
Time X Diary Condition X DCG	2	203.48	1.62	0.20

Hypothesis 5 with Envy as the Dependent Measure

Independent Variables	Numerator <i>df</i>	Denominator <i>df</i>	<i>F</i>	<i>p</i>
Diary Condition	2	242.92	0.26	0.77
Time	1	206.88	0.74	0.39
SSDS	1	246.12	21.05	< .001
Curiosity	1	243.09	1.02	0.32
DCG	1	244.93	7.60	< .01
Diary Condition X Time	2	206.91	0.03	0.97
Diary Condition X Curiosity	2	243.80	1.41	0.25
Time X Curiosity	1	207.02	1.70	0.19
Diary Condition X Time X Curiosity	2	207.05	1.44	0.24
Diary Condition X DCG	2	245.70	0.78	0.46
Time X DCG	1	207.68	3.07	0.08
Time X Diary Condition X DCG	2	207.83	0.50	0.61

Hypothesis 5 with Adult Indirect Aggression as the Dependent Measure

Independent Variables	Numerator <i>df</i>	Denominator <i>df</i>	<i>F</i>	<i>p</i>
Diary Condition	2	236.31	1.39	0.25
Time	1	201.04	0.67	0.43
SSDS	1	239.45	38.56	< .001
Curiosity	1	235.51	2.53	0.11
DCG	1	238.45	3.03	0.08
Diary Condition X Time	2	201.08	0.27	0.76
Diary Condition X Curiosity	2	236.03	0.17	0.85
Time X Curiosity	1	200.75	0.25	0.62
Diary Condition X Time X Curiosity	2	200.78	0.71	0.49
Diary Condition X DCG	2	239.36	0.66	0.52
Time X DCG	1	202.32	1.28	0.26
Time X Diary Condition X DCG	2	202.39	0.02	0.99

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### Biographical Information

Anna Park received a Bachelor of Arts degree from Texas A&M-Commerce, where she double-majored in Psychology and Spanish. As a graduate student in the Experimental Psychology program at University of Texas at Arlington, she has worked in the lab of Dr. William Ickes. The majority of her research projects have focused on negative social interactions and maladaptive personality traits. Although she enjoyed and learned much from this initial line of research, she ultimately decided to focus on factors that promote well-being and positive interpersonal outcomes. She is currently involved in projects testing the effects of gratitude and mindfulness interventions on well-being and learning outcomes. In addition, she is researching the positive outcomes of service-learning and how people reflect on this experience. Her long-term research interests are in the areas of character growth, empathy, general prosocial behavior, and community service. When she is not conducting research, she enjoys volunteer work, road trips, and spending time with her favorite humans and animals.