



# A grateful eye towards the future? Dispositional gratitude relates to consideration of future consequences

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## ABSTRACT

Although individual differences in dispositional gratitude have been shown to relate with both personal well-being and intergenerational beneficence, no work has yet examined whether trait gratitude is correlated with consideration of future consequences for one's self. Across six studies (total  $N = 2758$ ) we find robust evidence for a significant and positive correlation between dispositional gratitude and consideration of future consequences (CFC):  $r = 0.33$ ,  $SE = 0.02$ ,  $Z = 16.82$ ,  $p < .001$ , 95% CI [0.30, 0.37]. Further, we show that related dispositional factors, including feelings of indebtedness and valuing fairness, do not show a similar relationship with CFC. The association between gratitude and CFC also remains significant when controlling for core personality traits. These initial findings highlight that gratitude may be a novel leverage point for increasing individuals' consideration of self-relevant long-term outcomes; in turn, this relationship may prove useful in promoting individual and community well-being in the future.

## 1. Introduction

Many of the challenges that we face both collectively and individually require consideration of what the future will entail (Strathman et al., 1994). Decisions related to personal and public health, environmental conservation, financial choices and most other domains of daily life hold significant implications for near-term and far-future well-being. Yet there is clear evidence that individuals differ widely in their consideration of such future consequences when making decisions in the present (Strathman et al., 1994). Moreover, it is clear that people generally have a difficult time making prudent decisions when consequences accrue in the future (particularly the far future). In other words, individuals are often more strongly motivated by the near-term implications of their actions than they are by the future consequences of their actions, for a variety of well-known psychological and cultural reasons (e.g., Bartels & Rips, 2010; Frederick, 2003; H.E. Hershfield et al., 2012).

Because many actions taken in the present have their most consequential impacts far in the future (both for the actor and for others), researchers have explored factors that promote and inhibit intergenerational beneficence (i.e., being generous towards future others; K.A. Wade-Benzoni, 2002; K.A. Wade-Benzoni et al., 2008). Another primary avenue of research has explored the factors that increase intertemporal concern for one's future self and self-continuity (i.e., the

ability to perceive one's future self as a continuation of one's present self) in the future (H.E. Hershfield & Bartels, 2018; Reiff et al., 2020; Rutchick et al., 2018). The current investigation adds to this line of research by examining how individual differences in gratitude may affect consideration of the future consequences (CFC; Strathman et al., 1994) of one's actions. CFC is defined as "a stable individual difference in the extent to which people consider distant versus immediate consequences of potential behaviors" (Strathman et al., 1994, p.742) and has been shown to be a robust predictor of key personal (e.g., fiscal considerations, Joireman et al., 2005), health (e.g., Sheina & Martin, 2006), and human development behaviors (Cauffman & Steinberg, 2000). However, no extant work has yet examined how stable individual differences in gratitude may relate to CFC.<sup>1</sup>

Across six studies we present evidence that a disposition towards feeling grateful, but not indebted, is associated with increased CFC. We suggest that this finding is important as it is one of the first to highlight gratitude as a mechanism that can increase not only present well-being but also *inter-temporal* self-protective behaviors as well.

### 1.1. Gratitude and positive life outcomes

Extant research on gratitude and its consequences has highlighted that gratitude predicts better and more constructive personal life out-

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comes. Studies have shown that those higher in gratitude report greater well-being and place less emphasis on materialistic attitudes and values (McCullough et al., 2002). Gratitude has also been associated with lower rates of depression, less anxiety, and greater mindfulness in one's life (Duprey et al., 2018). Studies have also found evidence for a negative correlation between gratitude and stress, as well as positive correlations with good mental health and quality of life (Valikhani et al., 2019). Findings also suggest that those higher in gratitude score lower in loneliness (O'Connell et al., 2016) while also reporting greater meaning in their lives (Flinchbaugh et al., 2012). Thus, gratitude seems to be associated with both the presence of positive life outcomes and the absence of negative ones (for a review see Jans-Beken et al., 2019). In fact, a recent review highlighted that gratitude can positively impact biomarkers (e.g., endothelial dysfunction and prognostic inflammatory markers) in a manner that promotes personal health (Cousin et al., 2020).

Perhaps of most relevance to the current hypothesis, recent findings reveal the capacity of gratitude to decrease economic impatience. In a recent study, Dickens and DeSteno (2016) find that this effect of gratitude on economic impatience—defined as the tendency to prioritize obtaining rewards in the present rather than the future, even if future rewards are expected to be greater—is unique in relation to a general state of happiness. Importantly, this study utilized real monetary rewards, boosting confidence in its validity (DeSteno et al., 2014), and showed that findings were consistent regardless of whether gratitude was experimentally induced in the lab or captured as a trait (Dickens & DeSteno, 2016). Taken together, it appears clear that gratitude—conceptualized both as a state and a trait—is positively related to better life outcomes; critically for the current investigation, there is initial evidence that it may also be positively related to reduced intertemporal discounting (at least with regards to personal economic outcomes).

### 1.2. Gratitude and prosociality

Research also shows that gratitude promotes prosociality. In close relationships, several studies have highlighted that expressions of gratitude can go a long way in promoting relationship quality (S.B. Algoe et al., 2016). These effects seem to be dependent on a partner's level of responsiveness (i.e., the degree to which people feel that their relationship partners are responsive to them; S.B. Algoe & Zhaoyang, 2015). In fact, there is research to suggest that while indebtedness can help maintain a relationship, gratitude can act as a booster shot for relationships by elevating relationship quality (S.B. Algoe et al., 2010). Furthermore, research also highlights that expressions of gratitude can increase perceptions of social support in a relationship (S.B. Algoe & Stanton, 2012). Another series of studies suggests that gratitude is also capable of increasing social affiliation through its capacity to promote inclusive behaviors (with a preference towards one's benefactor; M.Y. Bartlett et al., 2012). Overall, similar to its role in promoting individual well-being, gratitude can also foster more positive and higher quality close relationships (for a review see S.B. Algoe, 2012).

Even outside the sphere of close relationships, gratitude seems to play a role in elevating concern for others. Scholars have posited that gratitude, and other emotions like it, might have evolved as mechanisms

that aid in the promotion of cooperation in groups (Stellar et al., 2017; Trivers, 1971). Moreover, scholars widely agree that gratitude acts as a positive reinforcer of beneficent behavior (Buck, 2004; Grant & Gino, 2010; Harpham, 2004; Komter, 2004; Moss & Page, 1972). For example, researchers have found that gratitude reinforces cooperative economic exchange, even when such a transaction is not beneficial to the individual's monetary output (D. DeSteno et al., 2010). Research has also provided meta-analytical evidence in support of such claims, as gratitude expressed both as a disposition and as a state has been found to be a predictor of increased prosociality (Ma et al., 2017). Further, in some cases, gratitude can promote altruism, by instilling prosocial intentions, even when these intentions come with costs and demands to the actor (M. Bartlett & DeSteno, 2006).

Importantly, expressing feelings of gratitude is not just a result of having received aid from others but rather it is also the product of norms regarding reciprocity. Gratitude has been shown to promote reciprocal helping behavior (Emmons & Mishra, 2011; Froh et al., 2010) even in situations in which direct reciprocity is not possible (e.g., intergenerational decision-making, i.e., making decisions for the sake of future others usually with the aim of addressing intergenerational inequities; Barnett et al., 2019; H.M. Watkins & Goodwin, 2019; Syropoulos et al., 2020). Thus, there is ample evidence that gratitude can promote beneficence both for close and (socially and temporally) distant others.

### 1.3. Alternative explanations: fairness and indebtedness

When people are on the receiving end of beneficence and good deeds from others, they tend to respond with expressions of gratitude. However, that is not the only response people demonstrate. Sometimes, people respond with feelings of indebtedness. Indebtedness has been defined as a “a state of obligation to repay another, which arises from the norm of reciprocity” (Greenberg, 1980, p. 200). Experimental work has elucidated on the differences between gratitude and indebtedness, highlighting that these two constructs are distinguishable (Goei & Boster, 2005; Naito & Sakata, 2010). Research has shown that indebtedness is often associated with other negative emotions (Roberts, 2004; Tsang, 2006) whereas gratitude tends to be associated with positive emotions. In close relationships as well, feelings of indebtedness have been shown to reduce relationship quality whereas gratitude can promote relationship quality (S.B. Algoe et al., 2010). Other studies have shown that stronger expectations of return are associated with elevated indebtedness but reduced expressions of gratitude (P. Watkins et al., 2006). Other work has highlighted that the intentions of the benefactor (e.g., benevolent vs. ulterior) can influence gratitude but not indebtedness (Tsang, 2006). Within the context of the current investigation, we expect that gratitude motivates consideration of future consequences of one's action, as gratitude has been shown to both increase well-being, prosociality, and intergenerational beneficence, whereas feelings of indebtedness, which tend to often promote ‘tit-for-tat’ reciprocal behavior (Greenberg, 1980) would be less strongly or not at all associated with CFC.

The moral foundation of fairness, on the other hand, is a construct concerned with capturing individual differences in reciprocal altruism and proportionality in decision making (Graham et al., 2011). Scholars have argued that norms of fairness play a crucial role in (intergenerational) beneficence (K.A. Wade-Benzoni & Tost, 2009). However, this does not necessarily translate to a positive link between fairness and CFC. Because CFC is a construct inherently focused on individual behavior and evaluation of one's own actions rather than that of others, fairness may not play a central role in shaping such considerations. To that end, while fairness and gratitude should both promote intergenerational beneficence, gratitude should be a stronger and more consistent correlate of CFC when compared to fairness, as gratitude relates to more individual outcomes in life ranging from high quality relation-

<sup>1</sup> Importantly, CFC (i.e., “a stable individual difference in the extent to which people consider distant vs immediate consequences of potential behaviors” Strathman et al., 1994) is relevant to but different from intertemporal decision making (i.e., making decisions which have consequences in the future) and intergenerational beneficence (i.e., being generous towards future others). CFC could be conceptualized as an antecedent of intertemporal decision making by nature, as it involves the consideration of distant consequences, and as an extension, an antecedent of intergenerational beneficence, which requires intertemporal decision making with the aim of benefiting future others.

ships to better life outcomes (e.g., better mental and physical health), as well as the tendency to reduce temporal discounting for individual benefit.

#### 1.4. The current studies

Despite the work cited above which separately links gratitude with personal benefits as well as social benefits (in the present and across time), no research has yet examined how gratitude relates to individuals' consideration of their own future well-being and the consequences of present actions on future outcomes for the self (outside the scope of reducing temporal discounting in economic outcomes, e.g., D. DeSteno et al., 2014). Because thinking about the future consequences of one's own actions is a positive predictor of individual health and well-being (for a recent meta-analysis of the literature see Murphy & Dockray, 2018), it is important to examine whether gratitude—which has been shown to be highly responsive to targeted interventions (e.g., lowering delay discounting: Teuscher & Mitchell, 2011; increasing generativity towards future generations: Morselli & Passini, 2015)—may be related to such future-oriented considerations.

The aim of the current investigation was to determine the nature of the relationship between gratitude and CFC. Extant research has established gratitude as a predictor of individual well-being (Jans-Beken et al., 2019), prosociality (Ma et al., 2017) and intergenerational beneficence (H.M. Watkins & Goodwin, 2019). Based on these findings we hypothesized that those who are higher in dispositional gratitude would consider the future consequences of their actions to a greater degree. Further, we also wanted to control for two alternative mechanisms: fairness and indebtedness. For these constructs, we hypothesized that the relationship with CFC would be weaker in magnitude and less consistent. Considering past research which has emphasized that personality traits are important predictors of CFC (e.g., Strathman et al., 1994), we sought to also control for the effect of core personality traits on our outcome (e.g., Big Five). Doing so provides a more stringent test of our hypothesis, one which accounts for the effects of various core personality traits (e.g., conscientiousness, agreeableness) on the tendency to consider the future consequences of an individual's actions. Finally, in a more exploratory fashion, we also investigated the association of gratitude and indebtedness with the BIG-5 personality traits. Our aim was to determine whether these two emotions would exhibit a distinct pattern of correlations with the BIG-5 personality traits. We expected that gratitude would be associated with the BIG-5 personality traits in a more constructive manner (i.e., positively with conscientiousness, agreeableness, openness and extraversion, and negatively with neuroticism) due to its aforementioned positive relationship with prosociality and well-being.<sup>2</sup>

Sensitivity analyses were performed with G\*Power (Erdfeider et al., 1996) with the following parameters:  $\alpha = 0.05$ , power = 0.80, tails = two. Exclusions for all studies included: removal of participants who: (1) were not US American; (2) provided nonsensical responses to manipulation checks; and (3) were multivariate outliers based on their responses to all relevant variables included in our analyses. The word “null” is used to declare that the experimental manipulation of the specific study produced null results.

## 2. Studies 1A-1B

The first two studies examined gratitude as a correlate of CFC. They also attempted to control for alternative explanations such as feelings of indebtedness or endorsement of the moral foundation of fairness.<sup>3</sup>

<sup>2</sup> Data from the current investigation have been used for another publication investigating the association of gratitude with intergenerational proenvironmental concern (masked for review). None of the analyses included in the current investigation overlap, however.

### 2.1. Methods

#### 2.1.1. Participants

A starting sample of 363 participants was recruited through Amazon Mechanical Turk (MTurk).<sup>4</sup> MTurk has been shown to be capable of providing valid and reliable data for psychological research (e.g., Buhrmester et al., 2011; Rouse, 2015). After applying exclusion criteria ( $N = 27$ , see Table 1), a sample of 336 participants was retained. Detailed demographic information for Study 1A can be found in Table 1.

A starting sample of 563 participants was recruited via MTurk. After applying the same exclusion criteria as Study 1A, 558 participants remained. Detailed demographic information for Study 1B can be found in Table 1.

#### 2.1.2. Materials and procedure

Study 1A was correlational, with all the measures presented in a randomized order. Gratitude was measured with the GQ-6 (6 items; e.g., “I have so much in life to be thankful for.”; McCullough et al., 2002). Items were scored on a 1–7 Likert scale. Indebtedness was also measured with six items, on a 1–7 Likert scale that were developed by the research team based on the GQ-6 (e.g., “If someone saves your life, you are forever in their debt”). The moral foundation of fairness was measured with the fairness subscale (6 items, e.g., “When the government makes laws, the number one principle should be ensuring that everyone is treated fairly”) of the Moral Foundations Questionnaire (MFQ) on a 1–6 Likert scale (Graham et al., 2011).<sup>5</sup> CFC was measured with a seven-item measure, with four items being reverse coded (e.g., “I consider how things might be in the future, and try to influence those things with my day to day behavior”) developed by Strathman et al., 1994 and was measured on a 1–5 scale. Means, SDs and reliability estimates for Study 1A can be found in Table 2.

The second study (Study 1B) attempted to experimentally manipulate gratitude towards previous generations. The study was framed around the issue of preserving national parks. Participants were assigned to a condition that portrayed past generations as unhelpful, ambiguous in terms of their intentions, or helpful/positive in their efforts to preserve national parks. After being presented with this information, participants were asked to express their perception of previous generations, and their own inclination to preserve national parks. No main effect of condition was observed. Given that we did not find a significant

<sup>3</sup> The authors wish to disclose that: There are additional measures outside the scope of this work that are not reported in this investigation. These measures focus primarily on environmental attitudes, and have been published elsewhere (masked for review). Additional information for the experimental manipulation for each of the experimental studies can be found in the Supplementary Materials. For data exclusions, for each study we estimated and excluded multivariate outliers based on participants' responses to the measures of each study. For the correlational studies the aim was to have a sample size that was adequately powered to test for relatively small correlations ( $\rho = 0.15$ ). For the experimental studies, the aim was to have an adequately powered sample for a small to medium effect size ( $f = 0.15$ ), either for 3 (for Studies 1B, 3A, and 3B) or 4 (Study 3C) conditions.

<sup>4</sup> MTurk allows researchers to collect samples that are more diverse than undergraduate student samples. However, samples from MTurk are not necessarily representative of the US population. Gender is roughly equally split between male and female, the average age is around 40 years old, and the samples tend to be at least ¾ White. Chmielewski and Kucker (2020) recently noted a decrease in MTurk data quality. We believe that there are two reasons why our data are reliable and valid: (1) we made sure to exclude multivariate outliers in each study, and (2) our findings were consistent across studies, and in line with our main hypothesis.

<sup>5</sup> One item “I think it's morally wrong that rich children inherit a lot of money while poor children inherit nothing.” failed to significantly load into the Fairness factor in an EFA and also displayed low correlation with the total construct for Studies 1A-1B, and Study 2 and was removed from analyses.

**Table 1**  
Characteristics of the six studies.

Study number	Sample type	Study type	Starting <i>N</i>	Exclusions <i>N</i>	Final <i>N</i>	<i>N</i> <sub>female</sub>	<i>N</i> <sub>white</sub>	<i>M</i> <sub>age</sub> ( <i>SD</i> <sub>age</sub> )	Sensitivity ( $\rho$ )
1A	MTurk	Correlational	363	27	336	187	295	34.28 (12.37)	0.15
1B	MTurk	Experimental (null)	563	5	558	284	468	31.74 (10.63)	0.12
2	Student	Correlational	699	8	691	446	531	19.57 (2.39)	0.11
3A	MTurk	Experimental (null)	513	52	461	305	391	35.05 (12.64)	0.12
3B	MTurk	Experimental (null)	383	30	353	221	305	35.29 (13.28)	0.14
3C	MTurk	Experimental (null)	434	76	358	227	293	34.73 (12.73)	0.13

**Table 2**  
Means, SDs and Reliability Estimates for the Measures included in the Six Studies.

Measure	Study 1A		Study 1B		Study 2		Study 3A		Study 3B		Study 3C		Citation	Range
	Mean (SD)	$\alpha$ ( $\omega$ )	Mean (SD)	$\alpha$ ( $\omega$ )	Mean (SD)	$\alpha$ ( $\omega$ )	Mean (SD)	$\alpha$ ( $\omega$ )	Mean (SD)	$\alpha$ ( $\omega$ )	Mean (SD)	$\alpha$ ( $\omega$ )		
CFC	3.76 (0.71)	0.84 (0.83)	3.74 (0.68)	0.81 (0.84)	3.55 (0.62)	0.73 (0.73)	3.72 (0.73)	0.84 (0.84)	3.70 (0.73)	0.84 (0.84)	3.67 (0.72)	0.82 (0.82)	Strathman et al., 1994	1–5
Gratitude	5.56 (1.03)	0.84 (0.83)	5.24 (1.02)	0.84 (0.83)	5.85 (0.95)	0.78 (0.78)	5.65 (1.11)	0.87 (0.87)	5.72 (1.00)	0.82 (0.82)	5.64 (1.04)	0.85 (0.84)	McCullough et al., 2002	1–7
Indebtedness	4.82 (0.93)	0.64 (0.64)	4.83 (0.89)	0.60 (0.60)	4.48 (0.88)	0.59 (0.59)	4.85 (0.97)	0.66 (0.66)	4.85 (0.91)	0.63 (0.63)	4.84 (0.91)	0.64 (0.64)	Adapted McCullough et al., 2002	1–7
Fairness	4.45 (0.72)	0.69 (0.67)	4.78 (0.76)	0.70 (0.67)	4.43 (0.72)	0.70 (0.67)	–	–	–	–	–	–	Graham et al., 2011	1–6
Conscientiousness*	–	–	–	–	5.29 (1.16)	0.48	4.64 (0.96)	0.42	4.50 (1.01)	0.34	4.56 (1.00)	0.4	Rammstedt & John, 2007	1–6
Neuroticism*	–	–	–	–	3.28 (1.27)	0.48	3.23 (1.23)	0.51	3.32 (1.35)	0.65	3.24 (1.25)	0.58	Rammstedt & John, 2007	1–6
Agreeableness*	–	–	–	–	5.03 (1.00)	0.18	4.14 (1.02)	0.16	4.05 (1.00)	0.18	4.00 (1.00)	0.14	Rammstedt & John, 2007	1–6
Extraversion*	–	–	–	–	4.50 (1.39)	0.47	3.39 (1.18)	0.50	3.41 (1.15)	0.45	3.42 (1.19)	0.52	Rammstedt & John, 2007	1–6
Openness*	–	–	–	–	5.20 (1.07)	0.30	4.40 (1.09)	0.27	4.54 (1.06)	0.32	4.39 (1.10)	0.31	Rammstedt & John, 2007	1–6

Note: CFC = Consideration of Future Consequences. \*Only two items per measure were included, and thus instead of Cronbach's  $\alpha$  or McDonalds  $\omega$  we are reporting bivariate correlations. "–" = not available as measure was not included in the study. For Study 2, the BFI-10 was captured on a 1–7 scale.

difference by condition for any of the measures included in the study we collapsed across conditions to examine our hypotheses correlationally. The measures included in Study 1B were identical to those in Study 1A. means, SDs and reliability estimates for Study 1B can be found in Table 2.

## 2.2. Results

Results for the linear regression models discussed below can be found in Table 3. For both studies, a linear regression with CFC re-

**Table 3**  
Linear Regression Weights for the Consideration of Future Consequences Regressed on Trait Gratitude, Fairness and Indebtedness, in Studies 1A, 1B and 2.

Study 1A: <i>N</i> = 336							
	<i>b</i>	<i>SE</i>	<i>t</i>	$\beta$	<i>p</i>	95% CI	
Gratitude	0.22	0.04	6.04	0.31	<0.001	0.15	0.29
Fairness	0.09	0.05	1.75	0.09	0.081	–0.01	0.20
Indebtedness	0.01	0.04	0.15	0.01	0.881	–0.07	0.09
Study 1B: <i>N</i> = 558							
	<i>b</i>	<i>SE</i>	<i>t</i>	$\beta$	<i>p</i>	95% CI	
Gratitude	0.25	0.03	9.45	0.38	<0.001	0.20	0.30
Fairness	0.11	0.04	2.93	0.12	0.004	0.03	0.18
Indebtedness	–0.01	0.03	–0.34	–0.01	0.731	–0.07	0.05
Study 2: <i>N</i> = 689							
	<i>b</i>	<i>SE</i>	<i>t</i>	$\beta$	<i>p</i>	95% CI	
Gratitude	0.16	0.02	6.44	0.24	<0.001	0.11	0.21
Fairness	0.14	0.03	4.35	0.16	<0.001	0.08	0.21
Indebtedness	0.05	0.03	2.12	0.08	0.034	0.01	0.11

gressed on gratitude, fairness and indebtedness was conducted. For Study 1A, results showed that gratitude was positively and significantly associated with CFC while fairness and indebtedness were not significantly associated with CFC. For Study 1B, gratitude was once again significantly associated with increased CFC, and so was fairness, while indebtedness was not significantly associated with CFC.

## 2.3. Discussion

The first two studies supported our hypothesis that greater dispositional gratefulness in one's life would be associated with increased consideration of one's own future consequences. Further, we controlled for two alternative explanations (fairness and indebtedness) and gratitude remained significant even after accounting for their association with CFC. Study 2 aimed to further replicate these findings in a student sample, while also controlling for additional covariates which have been established as predictors of CFC.

## 3. Study 2

Our second study had two aims. First, it aimed to replicate the results of Study 1 in a younger sample (i.e. undergraduate students). Second, we wanted to control for personality facets that might explain individual differences in CFC.

### 3.1. Methods

#### 3.1.1. Participants

A sample of 699 undergraduate students were surveyed in a pre-screening survey at a large public university. After applying similar ex-



clusion criteria as the previous studies, 691 responses were retained. Detailed demographic information for Study 2 can be found in Table 1.

### 3.1.2. Materials and procedure

This study was correlational and thus the measures were displayed in a randomized order in the pre-screening survey. The same measures displayed in Studies 1A and 1B were used in Study 2. Scores for all measures in this study except for Fairness were displayed on a 7-point Likert scale. For all other measures, scores ranged from -3 to +3 (including 0). We recoded these values so that they would be on a Likert scale ranging from 1 to 5, 1-6 or 1-7 depending on the variable. To measure the BIG 5 personality traits (Agreeableness, Extraversion, Neuroticism, Openness, Conscientiousness), we used the Big Five Inventory-10 (BFI-10; Rammstedt & John, 2007). Each personality trait in the BFI-10 is comprised of two items. The BFI-10 was created as a short measure of personality with the intention of being used as a screening tool for larger panel studies or as a measure of personality in studies where participant time is severely limited (Rammstedt & John, 2007), which was the case for our investigation. Means, SDs and reliability estimates for Study 2 can be found in Table 2.

## 3.2. Results

### 3.2.1. Replication of studies 1A and 1B

First, we tested the same linear regression model as Studies 1A and 1B. Again, gratitude was significantly associated with increased CFC. Further, both indebtedness and fairness were significantly associated with increased CFC. These results can be found in full detail in Table 3.

### 3.2.2. Controlling for personality traits

In a linear regression model where CFC was regressed on gratitude, while controlling for indebtedness and the BIG-5 personality traits, gratitude emerged as a significant correlate of CFC. Indebtedness, and participants' scores on the traits of conscientiousness, and openness to experience were also significantly and positively associated with CFC. These results as well as the results from Studies 3A-3C can be found in full detail in Table 4.

**Table 4**

Linear Regression Weights for the Consideration of Future Consequences Regressed on Trait Gratitude, Indebtedness and the Five Facets of Personality, in Studies 2, and 3A-3C.

CFC regressed on	Study 2 (N = 689)							Study 3A (N = 461)						
	b	SE	t	$\beta$	p	95% CI		b	SE	t	$\beta$	p	95% CI	
Gratitude	0.08	0.03	3.01	0.12	0.003	0.03	0.13	0.13	0.03	4.07	0.20	<0.001	0.07	0.20
Indebtedness	0.06	0.02	2.29	0.08	0.023	0.01	0.11	0.04	0.03	1.24	0.06	0.217	-0.02	0.11
Conscientiousness	0.14	0.02	6.98	0.25	<0.001	0.10	0.18	0.11	0.04	2.87	0.14	0.004	0.03	0.18
Neuroticism	<0.01	0.02	-0.04	<0.01	0.968	-0.04	0.04	-0.05	0.03	1.85	-0.09	0.065	-0.11	0.00
Agreeableness	0.02	0.02	0.61	0.02	0.549	-0.03	0.06	0.00	0.03	-0.08	0.01	0.936	-0.07	0.06
Extraversion	-0.02	0.02	-1.54	-0.05	0.124	-0.06	0.01	0.02	0.03	0.58	0.03	0.563	-0.04	0.07
Openness	0.09	0.02	3.97	0.15	<0.001	0.04	0.13	0.08	0.03	2.84	0.13	0.005	0.03	0.14

  

CFC regressed on	Study 3B (N = 353)							Study 3C (N = 358)						
	b	SE	t	$\beta$	p	95% CI		b	SE	t	$\beta$	p	95% CI	
Gratitude	0.18	0.04	4.53	0.25	<0.001	0.10	0.26	0.20	0.04	5.47	0.29	<0.001	0.13	0.27
Indebtedness	-0.07	0.04	-1.72	-0.08	0.087	-0.14	0.01	0.09	0.04	2.43	0.12	0.016	0.02	0.16
Conscientiousness	0.19	0.04	4.86	0.27	<0.001	0.11	0.27	0.12	0.04	3.18	0.16	0.002	0.05	0.19
Neuroticism	-0.02	0.03	0.75	-0.04	0.453	-0.08	0.04	-0.02	0.03	0.64	-0.04	0.524	-0.04	0.08
Agreeableness	-0.04	0.04	-0.89	-0.05	0.375	-0.11	0.04	-0.04	0.04	-0.92	-0.05	0.360	-0.11	0.04
Extraversion	-0.10	0.03	-3.19	-0.17	0.002	-0.17	-0.04	-0.08	0.03	-2.53	-0.13	0.012	-0.14	-0.02
Openness	0.08	0.03	2.41	0.12	0.017	0.01	0.15	0.14	0.03	4.29	0.21	<0.001	0.08	0.20

Note: CFC = Consideration of Future Consequences. For Study 2 fairness was also included in the regression model:  $b = 0.12$ ,  $SE = 0.03$ ,  $\beta = 0.13$ ,  $t = 3.73$ ,  $p < .001$ , 95% C.I. [0.06, 0.18].

## 3.3. Discussion

Study 2 replicated and extended the findings of Studies 1A and 1B. In particular, gratitude was once again significantly associated with increased CFC both when controlling for fairness and indebtedness, and even when inserting measures of the five major personality traits in the model. Fairness, conscientiousness, openness and indebtedness were also significantly associated with increased CFC in this sample. In our final three studies we aimed to replicate these associations.

## 4. Studies 3A-3C

Our final three studies aimed to replicate the association of gratitude and CFC and further control for an individual's personality in three different MTurk samples in an attempt to provide more generalizable results for the association between trait gratitude and CFC.

### 4.1. Methods

#### 4.1.1. Participants

For Study 3A, a starting sample of 513 participants was recruited through MTurk. After applying exclusion criteria ( $N = 52$ ), a sample of 461 participants was retained. Detailed demographic information for Study 3A can be found in Table 1.

For Study 3B, a starting sample of 363 participants was recruited through MTurk. After applying exclusion criteria ( $N = 30$ , see Table 1), a sample of 336 participants was retained. Detailed demographic information for Study 3B can be found in Table 1.

For Study 3C, a starting sample of 434 participants was recruited through MTurk. After applying exclusion criteria ( $N = 76$ , see Table 1), a sample of 358 participants was retained. Detailed demographic information for Study 3C can be found in Table 1.

#### 4.1.2. Materials and procedure

Similar to Study 1B, these studies were experimental in their nature. They were intended as studies aiming to manipulate perceptions of past generations (Studies 3A and 3B) and gratitude (Study 3C). However, none of these manipulations were successful in doing so. In detail, for Study 3A participants were randomly assigned to one of three condi-

tions: (1) positive past generation condition, (2) negative past generation condition, and (3) control. In each condition participants were presented with a short story about how previous generations either paid a gas tax (positive condition) or did not pay a gas tax (negative condition), resulting in future generations benefiting (or not) from this action. In the control condition no such information was presented and instead participants were shown the history behind the creation of this gas tax. In Study 3B, a highly similar experiment was conducted, with the subject matter focusing on America's energy system. The three conditions were matching those of Study 3A (i.e., positive past generation, negative past generation, control). Study 3C Directly attempted to manipulate emotion towards past generations by asking people to reflect on how they felt towards actions made by past generations. Participants were randomly assigned to one of four conditions, asking to reflect about how: (1) grateful, (2) indebted, (3) resentful, and (4) happy they felt about past generations. Across all three experiments, no significant effect on the outcome measures was observed (i.e., no effect on perceptions of past generations). Further, no effect was observed on any of the trait measures used in the current investigation. Thus, given the lack of significant differences across conditions in all experiments, we collapsed across conditions to examine our hypothesis correlationally.

In all three studies, the same measures as Study 2 were displayed, except for the measure of fairness. All measures were displayed in Likert scales. Gratitude and indebtedness were measured on a 1–7 scale, the five personality traits were measured on a 1–6 scale, and CFC on a 1–5 scale. Means, SDs and reliability estimates for Studies 3A–3C can be found in Table 2.

## 4.2. Results

### 4.2.1. Study 3A

A Linear regression model was computed where CFC was regressed on gratitude, indebtedness and the BIG-5 personality traits. Once more, gratitude was significantly and positively associated with CFC. Further, participants' scores on conscientiousness and openness to experience were also associated with greater CFC.

### 4.2.2. Study 3B

A similar linear regression model as Studies 2 and 3A was computed. Consistent with previous our results, gratitude, and participants' conscientiousness and openness to experience scores were all positively associated with CFC. In this model, extraversion was significantly negatively associated with CFC as well.

### 4.2.3. Study 3C

In an identical linear regression model, once again gratitude, and participants' scores on conscientiousness, and openness to experience were all significantly associated with CFC. Further, indebtedness and extraversion also emerged as significant correlates as well.

## 4.3. Discussion

Across three separate samples we replicated the results of Study 2. From all the variables inserted in the linear regression models, gratitude, conscientiousness and openness to experience were the only variables consistently and significantly correlated with CFC across all three studies. Seeking to test our hypotheses while controlling for established predictors and alternative explanations, we reported results based on linear regression models. Bivariate correlations for each study however, are reported in the Supplementary Materials (see Tables S1–S3). Below we present meta analytical results across all studies to provide a more holistic picture of the data.

## 5. Findings across studies

In line with recent calls to meta-analyze findings across studies within a single investigation as a method to increase the understanding of presented results (Goh et al., 2016) we performed meta-analyses across all of our samples. Using the methodology and related material outlined in Goh et al. (2016), we used fixed effects, and then calculated the weighed mean effect size (i.e., correlation) across all studies included in the investigation, and utilized the Stouffer's Z test to obtain a summarizing *p*-value across all of our studies. In detail, we examined: (1) the association between gratitude and CFC; (2) indebtedness and CFC; (3) the different personality traits and gratitude; (4) the different personality traits with indebtedness. The correlations for each specific study can be found in the Supplementary Materials.

### 5.1. Association of gratitude, fairness and indebtedness with consideration of future consequences

In the sections that follow (see Sections 5.1 and 5.2) we are calculating the meta-correlation of gratitude, fairness and indebtedness with CFC and the five personality traits. The resulting coefficients should be interpreted based on recent effect size guidelines, which state that:  $r = 0.10$ ,  $r = 0.20$ , and  $r = 0.30$  reflect a small, medium and large effect sizes accordingly (Funder & Ozer, 2019; Gignac & Szodorai, 2016). Across all six studies, gratitude exhibited a small to moderate correlation with CFC: *rs* ranging from 0.28 to 0.41, all  $ps < 0.001$ . The average association across all studies was:  $r = 0.33$ ,  $SE = 0.02$ ,  $Z = 16.82$ ,  $p < .001$ , 95% CI [0.30, 0.37]. Fairness was included in three studies, exhibiting a small to moderate association with CFC: *rs* ranging from 0.13 to 0.25,  $ps < 0.05$ . The average association across all studies was:  $r = 0.21$ ,  $SE = 0.02$ ,  $Z = 8.50$ ,  $p < .001$ , 95% CI [0.16, 0.26]. Indebtedness on the other hand exhibited an inconsistent correlation with CFC. In some studies, there was no significant association (Studies 1A, 1B, 3A, and 3B), with *rs* ranging from 0.03 to 0.08, all  $ps > 0.05$ . In fact, in Study 1B the correlation was negative ( $r = -0.05$ ). In two studies a small correlation was observed: Study 2:  $r = 0.14$ ,  $p < .001$ ; Study 3C:  $r = 0.18$ ,  $p < .001$ . Across all studies a near zero association with CFC was observed:  $r = 0.06$ ,  $SE = 0.02$ ,  $Z = 2.99$ ,  $p = .003$ , 95% CI [0.02, 0.10].

### 5.2. Association of participants' personality traits scores with gratitude and indebtedness

Across Studies 2, and 3A–3C, scores on conscientiousness were positively associated with gratitude:  $r = 0.33$ ,  $SE = 0.02$ ,  $Z = 14.96$ ,  $p < .001$ , 95% CI [0.29, 0.37], while the association between conscientiousness scores and indebtedness was near zero:  $r = 0.05$ ,  $SE = 0.02$ ,  $Z = 2.14$ ,  $p = .032$ , 95% CI [0.00, 0.09]. Across the four studies, scores for extraversion were also positively associated with gratitude:  $r = 0.22$ ,  $SE = 0.02$ ,  $Z = 9.37$ ,  $p < .001$ , 95% CI [0.17, 0.26], and negatively associated with indebtedness:  $r = -0.10$ ,  $SE = 0.02$ ,  $Z = -4.17$ ,  $p < .001$ , 95% CI [-0.14, -0.05]. Agreeableness scores were positively associated with gratitude:  $r = 0.36$ ,  $SE = 0.02$ ,  $Z = 16.12$ ,  $p < .001$ , 95% CI [0.32, 0.40], and had no significant association with indebtedness:  $r = -0.03$ ,  $SE = 0.02$ ,  $Z = -1.43$ ,  $p = .162$ , 95% CI [-0.08, 0.01]. Neuroticism scores were negatively associated with gratitude:  $r = -0.25$ ,  $SE = 0.02$ ,  $Z = -10.77$ ,  $p < .001$ , 95% CI [-0.29, -0.20], but exhibited a near zero association with indebtedness:  $r = 0.07$ ,  $SE = 0.02$ ,  $Z = 3.17$ ,  $p < .001$ , 95% CI [0.03, 0.12]. Finally, scores on openness to experience was positively associated with gratitude:  $r = 0.22$ ,  $SE = 0.02$ ,  $Z = 9.78$ ,  $p < .001$ , 95% CI [0.18, 0.27], but had a near zero and non-significant correlation with indebtedness:  $r = 0.02$ ,  $SE = 0.02$ ,  $Z = 0.68$ ,  $p = .494$ , 95% CI [-0.03, 0.06]. Overall, these results suggest that gratitude seems to be both more strongly correlated with CFC than indebtedness, as well

as with participants' personality trait scores in a way that seems to promote individual well-being in the present and in the future.

## 6. General discussion

Across six studies (total  $N = 2758$ ) we found consistent evidence that greater dispositional gratitude, namely feeling more grateful in one's day to day life, was associated with greater consideration of one's future consequences. Extant research has highlighted that gratitude is associated with greater prosociality (M. Bartlett & DeSteno, 2006) and that grateful individuals tend to have more meaningful and higher-quality relationships (S.B. Algoe et al., 2016; Kubacka et al., 2011; Park et al., 2019). Further, research has linked gratitude to greater intergenerational beneficence (Barnett et al., 2019; H.M. Watkins & Goodwin, 2019). However, to date there is limited research to suggest that gratitude can increase intertemporal concern for one's own self (i.e. increase consideration of one's own actions in the future). In the present six studies we found that even when controlling for alternative explanations such as endorsement of the moral foundation of fairness or greater feelings of dispositional indebtedness in one's life, gratitude remained a significant correlate of CFC. Importantly, these results remained significant even when established predictors of CFC were accounted for (conscientiousness and the other personality traits, e.g., Strathman et al., 1994).

Supporting our hypothesis, and further highlighting the difference between gratitude and indebtedness, across all studies gratitude exhibited a moderate correlation with CFC while indebtedness exhibited a near zero association, when controlling for core personality traits. Another factor that differentiated gratitude from indebtedness is the consistent pattern of correlations between each construct and participants' personality scores. Gratitude was positively associated with scores on openness to experience, extraversion, conscientiousness, agreeableness, and negatively correlated with neuroticism. In contrast, indebtedness was only negatively associated with extraversion.

These results, together with other recent findings (masked for review), suggest that when intertemporal concerns for one's self as well as future others are at stake, decision makers should strive to promote feelings of gratitude and not of indebtedness. Research on intergenerational beneficence has highlighted that temporal self-continuity and the factors that promote it (Wade-Benzoni 2019; 2002; K.A. Wade-Benzoni & Tost, 2009) could be key mechanisms for addressing the issue of intertemporal and interpersonal discounting. Our findings add to this research by suggesting that having a grateful disposition can increase perceived temporal self-continuity of one's self. If an individual is considering the future consequences of their action to an elevated degree, then such an individual could be inclined to engage in intertemporal beneficence, even at personal cost in the present. Further, from an egoistical point of view, increased consideration of future consequences leads to more careful decision making, which can lead to better future life outcomes. Thus, we posit that increased dispositional gratitude is beneficial both to one's future self and to future others. This becomes especially relevant since there is extant research which has shown that interventions focusing on gratitude can be successfully implemented to help people foster more grateful dispositions and orientations towards life and others (e.g., by increasing relationship quality; S.B. Algoe, 2012; S.B. Algoe & Zhaoyang, 2015).

Despite the consistency in our results, this investigation was not without limitations. Perhaps the biggest limitation of the current investigation is the fact that four out of the six studies were originally null experiments. Although only one of these studies attempted to manipulate gratitude directly (Study 3C), the fact that the original purpose of the study was not consistent with the hypothesis tested here reduces the generalizability of the results. Nonetheless, our results are consistent across separate samples, including both students and the general popu-

lation, which suggests the results are robust. Future studies should aim to both replicate these results and extend them by potentially employing an intervention focusing on gratitude (e.g., Killen & Macaskill, 2014; Sztachańska et al., 2019) to provide evidence for a causal relationship between gratitude and CFC. Further, even though a sensitivity analysis suggested that our samples had enough power to detect relatively small correlations ( $\rho$ s ranging from 0.11 to 0.15), recent findings (Kretschmar & Gignac, 2019) have recommended a sample of  $N = 490$  as appropriate (for measures with  $\alpha \geq 0.70$ ). Based on these recommendations, three of our samples were relatively underpowered. Moreover, our measure of indebtedness displayed mediocre reliability, even though some consistent correlation patterns (with fairness) provided evidence for its validity.

Another limitation of the study is the use of short personality inventories. Although the correlation patterns and resulting meta-correlations were consistent across studies, the BFI-10 lack in content validity in comparison to more comprehensive measures of personality (e.g., NEO-PI-R). It is quite possible that the associations found in the current investigation could be stronger if a more comprehensive personality measure was used. Moreover, the low reliability of each measured personality trait reduces the validity of our findings. Nonetheless, we believe that our results are noteworthy because of the emerging consistent correlation patterns with regards to personality scores and other measures in the study were observed (see Tables S1-S3 in Supplementary Materials). We rationalize our choice for utilizing the BFI-10, as it is a measurement tool has been used thousands of times in the literature particularly when there are space constraints in a survey (which was indeed the case in our investigation). In future work, researchers should not only attempt to replicate the current results using a more comprehensive personality measure but also: (1) examine additional aspects of personality (i.e., the Dark Triad), and (2) conduct a cross-cultural investigation of the interplay between gratitude, indebtedness, personality and intertemporal concern both for one's future self as well as future others. We also wish to acknowledge that our choice to conduct correlational analyses comes with the cost of not accounting for potential measurement error, a fact that should be taken into consideration when interpreting the results at hand. Our studies were also conducted exclusively on convenience samples in the United States, limiting generalizability to other populations is limited. Our samples were primarily White and of a Western (and therefore more individualistic) culture. It is possible that in collectivist cultures, for example, feelings of indebtedness could contribute more to intertemporal beneficence.

Ultimately, the current evidence suggests that gratitude—but not feelings of indebtedness or a commitment to fairness—may play an important role in shaping how individuals relate to their future selves. In turn, this suggests that finding ways to encourage grateful dispositions may increase people's consideration of the future consequences of their actions, increasing the likelihood that people make better long-term decisions and plans.

## CRedit authorship contribution statement

**Stylianios Syropoulos:** Conceptualization, Methodology, Software, Validation, Formal analysis, Visualization, Writing – original draft, Writing – review & editing. **Ezra M. Markowitz:** Conceptualization, Investigation, Resources, Data curation, Writing – review & editing, Supervision.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.paid.2021.110911>.



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