FEELING GRATEFUL FOR THE BENEFITS OF LIFE, NO MATTER THE SOURCE
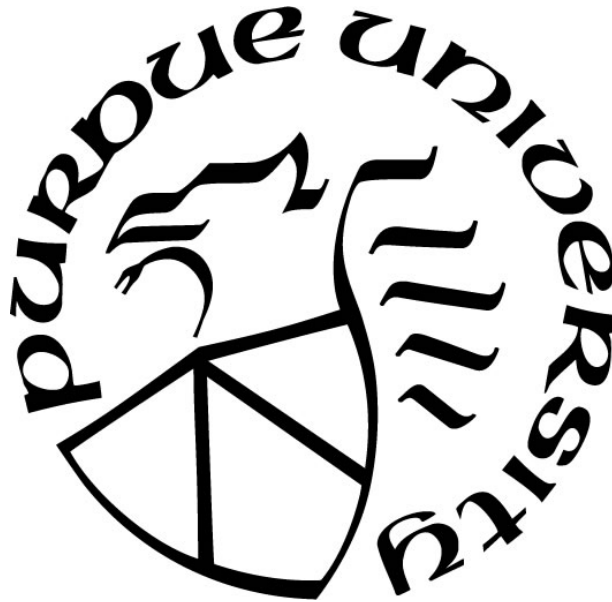
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ABSTRACT

Theorists conceptualize gratitude as incorporating either an *interpersonal perspective* in which an individual feels or gives thanks to another person as the source of a provided benefit, or an *impersonal perspective* in which one's feelings of gratitude are not necessarily directed to other human beings as the beneficial source, but rather feelings of gratitude are attributed to a nonhuman source (e.g., nature, fate, luck, God, the cosmos). This latter perspective maintains that not only do people feel gratitude for valued benefits provided by another person (i.e., interpersonal source), but people can also experience gratitude for valued benefits that do not emerge or originate from others (i.e., impersonal source). Theorists also posit that over time, people can take any particular benefit for granted (i.e., habituate), failing to experience feelings of gratitude because they presume that the availability of a benefit/source is stable and certain, and unlikely to be lost. By comparison, evidence suggests that perceiving uncertainty or the potential loss of a benefit/source inspires a greater sense of gratitude. Reflecting on the pragmatic uncertainty of finite benefits/resources that are frequently taken for granted should lead to enhanced feelings of gratefulness.

Although the majority of empirical work examining feelings and functions of gratitude is structured around an interpersonal source perspective in which people receive one-time benefits, investigations focused on gratitude for impersonal sources of benefits remain scant and understudied. The present research follows from McCullough's (2001) and Watkins' (2014) call to increase empirical research examining gratitude in contexts in which the source does not involve a human benefactor. The current work including a pilot test and four studies (N = 1459) offers such an examination. The findings from this initial set of studies demonstrated some evidence that those with pro-environmental attitudes exhibited increased gratitude for water when provided with specific information about water's value (vs an unrelated topic) (Study 1). I also found that people with more pro-environmental attitudes value water more when water is presented as a relatively more uncertain resource (Study 2). The effect of certainty on gratitude was replicated in Study 3, showing that those in a low certainty condition were more grateful for water than those in a high certainty condition. Moreover, gratitude for water predicted the intent to perform water conservation behaviors and interest in water conservation volunteering (Study 3). I also found some evidence that habituation mediated the effect between the perceived certainty of a benefit and lower gratitude, suggesting that people experience less gratitude for benefits they take for

granted, in part, because they think less about them (Study 4). However, this affect only appeared consistently among more liberal, pro-environmental people. The current research contributes to and expands gratitude theory and research by providing some initial evidence that feelings of gratitude can serve broader adaptive purposes than is currently theorized. Thus, gratitude not only helps people identify and bond with social benefactors, but it also may serve as a generalized psychological system that prompts people to recognize and positively respond to most any form of benefit/source.

INTRODUCTION

Gratitude has long been of interest to philosophers and religious scholars. Even a cursory examination of most major religions reveals a uniform emphasis on cultivating feelings of gratitude; this can be seen in the abundant number of religious writings, moral teachings, and traditional practices that promote the development and maintenance of a grateful perspective. According to the philosopher, Immanuel Kant, gratitude is nothing short of a duty, while ingratitude is considered loathsome. Similarly, both Georg Simmel and Adam Smith characterized feelings of gratefulness as a valued virtue for individual and societal well-being. More recently, psychological research, over the last 2 decades, has produced a plethora of theoretical and empirical work examining the structure, function, and cultivation of gratitude (for a review see Watkins, 2014; Wood, Froh, & Geraghty, 2010).

Across different empirical contexts, theorists have characterized gratitude as an emotional expression, a virtue, a dispositional trait, an emotional state, and as a means to cope with negative events (Algoe, Kurtz, Hilaire, 2016; Comte-Sponville, 2002; Wood, Joseph, Linley, 2007; Wood, Maltby, Stewart, Linley, & Joseph, 2008). Although certain operational definitions of gratitude are widely accepted, a general agreement among researchers concerning the basic situational nature of gratitude is still under some debate (Wood, et al., 2010). Theorists suggest that the fundamental conceptual difference may rest on whether the experience of gratitude is thought to inherently and necessarily require the involvement of other individuals. This conceptual perspective is captured in theorists' broad descriptions of gratitude in which the target of people's gratitude is characterized as resulting from either an *interpersonal* source (i.e., another human being) or an *impersonal* source (i.e., nature, fate, luck, universe, God, the cosmos) (Wirtz, Gordon, & Stalls, 2014; Wood, et al., 2010). Walker and colleagues (2016) also describe a similar conceptualization in which gratitude to a particular individual for a specific benefit is characterized as *targeted*, whereas gratitude not attributed to another person is characterized as *untargeted*. Likewise, Lambert and colleagues (2009) describe such constructs as *benefit-triggered* gratitude or *generalized* gratitude, whereas Steindl-Rast (2004) applies the terms, *personal* and *transpersonal* gratitude. For the current project, I adopt the term *interpersonal* to describe human benefactors as

the source of a benefit, whereas I use the term *impersonal*[1] to describe nonhuman agents as the source of a benefit.

In general, a typical gratitude context involves an originating source, external to the self, providing a benefit with the receiving individual feeling grateful to the source for the benefit (Watkins, 2014). Both the said benefit and the source of the benefit represent an integrated target for which a beneficiary feels a sense of gratitude. Simply put, the core foundation of gratitude is a felt response to a source for a provided benefit. Such benefits are characterized as goods, positive things, and even blessings (Emmons & McCullough, 2004; Watkins, 2014). Often described as valuable, desirable, and meaningful, benefits fulfill needs and from an evolutionary point of view are thought to both constitute necessary resources for survival and to encourage cooperative social behaviors (Algoe, 2012; McCullough, Kimeldorf, & Cohen, 2008; Poelker & Kuebli, 2014; Steindl-Rast, 2004; Wood et al., 2008).

From an *interpersonal* perspective, gratitude is typically conceptualized as occurring when a person intentionally provides an individual with a valued benefit (Algoe, 2012; Emmons & Mishra, 2011; Emmons & Shelton, 2002; McCullough, et al., 2008; Poelker & Kuebli, 2014; Steindl-Rast, 2004; Tsang, 2006; Wood et al., 2008). In an interpersonal case, a human benefactor represents the source, and the benefit can vary widely in kind and magnitude, and can include a gift, a favor, or a service provided by the benefactor to the beneficiary. In various contexts, the interpersonal source of a benefit can emerge from a host of different social relationships including strangers, sorority-sisters, siblings, and romantic partners (Algoe, Haidt, & Gabel, 2008; Amaro, 2017; Bar-Tal, Bar-Zohar, Greenberg, & Hermon, 1977). A consensus of the evidence indicates that experiencing a sense of gratitude for a benefit from an interpersonal source prompts prosocial behaviors, enhances relationship trust and satisfaction, reduces depression, relieves stress, fosters a sense of community, and increases emotional well-being and overall life satisfaction (Algoe, Gable, & Maisel, 2010; Bartlett & DeSteno, 2006; Davis et al., 2016; Emmons & McCullough, 2004; Emmons & Shelton, 2002; Harpham, 2004; Hill, Allenmand, & Roberts, 2013; Killen & Macaskill, 2015; Lin, 2015; Lyubomirsky, Dickerhoof, Boehm, & Sheldon, 2011; Rosmarin, Pirutinsky, Cohen, Galler, & Krumrei 2011).

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[1]Impersonal is defined by Merriam Webster dictionary as *not existing as a person; having no personal reference or connection, or in a grammatical context*, *expressing an action not attributable to a definite human subject*.

A number of conceptualizations also allow that feelings of gratitude can be experienced not only toward other people as a source, but also toward other sources external to the self, including nature, fate, luck, the universe, God, and the cosmos (Emmons, McCullough, & Tsang, 2003). Although gratitude is often felt toward another person, there is no inherent necessity that it requires an interpersonal context, that is, the source of a benefit need not be another person to inspire gratitude (Emmons & Crumpler, 2000). For example, benefits like being healthy, waking each morning, or escaping a disaster lead to increased feelings of gratitude, though the source of such benefits does not necessarily include a human benefactor (Emmons & McCullough, 2004; Moore, 1996; Teigen & Jensen 2010).

Following this viewpoint, theorists have described an *impersonal* experience in which gratitude for a benefit is not attributed necessarily to other human beings as the beneficial source. As Wirtz and colleagues (2014) argue, "impersonal perspectives on gratitude do not require the individual to attribute positive events or experiences to others' actions, nor do such perspectives focus on behavioral interactions, such as receiving gifts from a benefactor or expressing thanks to another person" (page 289). Rather, conceptualizations of gratitude can incorporate either an interpersonal perspective in which an individual feels or gives thanks to another as the source of a provided benefit, or an impersonal perspective in which one's feelings of gratitude are not specifically directed to a personal source (i.e., human benefactor), but rather to a nonhuman source (e.g., nature, fate, luck, God, the cosmos). For example, feelings of gratitude are associated with enjoying impersonal aspects of the environment including a basic appreciation for life or the simple admiration of nature (Watkins, Gibler, Mathews, & Kolts, 2005), which is nicely captured in Emmons (2004) definition of gratitude as ''a sense of thankfulness...in response to receiving a gift, whether the gift be a tangible benefit from a specific other or a moment of peaceful bliss evoked by natural beauty'' (p. 554). Wood and colleagues (2010) also posited that gratitude involves "a wider life orientation towards noticing and appreciating the positives in the world" (p. 891). In sum, gratitude can be characterized as an emotion that people feel for benefits emerging from either an interpersonal or impersonal source.

Although a good deal of research has examined gratitude occurring via an interpersonal source, investigations concerning impersonal sources of gratitude remain scant and the area remains understudied. However, we can glean evidence from research examining gratitude via an interpersonal perspective, which shows that various characteristics associated with a benefit (e.g.,

value, certainty, cost, salience) can enhance gratitude, which, in turn helps people identify the source of a benefit (i.e., benefactor) and can even increase people's motivation to nurture the source. However, little work has examined how these types of features, as well as other benefit characteristics might serve to influence impersonal feelings of gratitude or the behaviors that people engage in to nurture non-human sources of benefits. The present research focusing on impersonal sources of gratitude is an attempt to fill this gap, and follows from McCullough and colleagues (2001) and Watkins' (2014) call to increase empirical research examining gratitude in contexts in which the source does not involve a human benefactor, that is, another person is not viewed as responsible for providing the benefit.

Similar to an interpersonal perspective of gratitude, I expect that impersonal gratitude (i.e., toward a non-human source) will increase as a function of how much the benefit is perceived as valued, and whether the continued occurrence of the benefit is perceived as more or less uncertain. In addition, I explore people's motivation to engage in behaviors to maintain, preserve, and nurture the impersonal benefits and sources for which they feel grateful. In what follows, I discuss interpersonal sources of gratitude, outlining gratitude's process and function, and the factors that positively influence it, as well as the subsequent emotional and behavioral consequences that emerge as a function of such gratitude experiences. I also summarize the research to date concerning impersonal gratitude and explicate the current project's contribution to the existing literature and the rationale underlying the hypotheses. In doing so, I also discuss the relationship between interpersonal and impersonal gratitude, outlining similarities, differences, and potential areas of overlap.

Interpersonal Gratitude

Much of the research examining feelings of gratitude is grounded in an interpersonal perspective. As noted earlier, a key proposition of this theoretical conceptualization posits that a sense of gratitude emerges when an individual (i.e., beneficiary) recognizes that another person (i.e., benefactor) has intentionally provided him/her with a valued benefit. Simply put, the benefactor is the originating source of the benefit; in most cases, the benefit (e.g., a ride to the airport) fulfills a need (e.g., need for transportation to the airport) for the beneficiary, and the beneficiary feels gratitude toward the benefactor for providing the said benefit. Here, the benefit, large or small, comprise a nearly limitless array of options ranging from perfunctory acts that occur

throughout one's day (e.g., holding a door open, handing one an item) to benefits that are increasingly more costly in both effort and value (e.g., giving one a valuable gift, providing love and care in the context of an important relationship).

Some theorists suggest that gratitude only occurs via such an interpersonal perspective; proponents of this position argue that gratitude necessarily requires a social exchange in which an individual receives a benefit (e.g., gift, favor) from another person, that is, a human benefactor is the source of the benefit (e.g. McCullough, Kilpatrick, Emmons, & Larson, 2001; Trivers, 1971). Although other theorists argue for a broader gratitude perspective, most empirical and theoretical work has focused on gratitude as an interpersonal emotion (e.g. Konstan, 2016; Wood, et al., 2010). As a result, there is a good deal of research examining the functions of gratitude, typically centered on when and why people feel gratitude for benefits that are received from others.

Following from an interpersonal perspective, Algoe's (2012) Find, Bind, and Remind theory, posits that gratitude occurs as a response to a benefactor who provides an individual with a valued benefit. According to the theory, gratitude signals to the beneficiary that a benefactor (i.e., source) may be a friend, an ally, or a partner. Feelings of gratitude typically increase when the benefactor is viewed as acting for intrinsically motivated, altruistic, and beneficiary-centered reasons (Graham, 1988; Tsang, 2007; Wood et al., 2008). That is, rather than acting from self-centered ulterior motives, or situational requirements and demands, a benefactor is thought to provide a particular benefit because he/she cares for the recipient. For example, people are more grateful when they are selected to a sports team or receive a raffle ticket if they deem the benefactor as acting out of kindness, rather than random chance, or simply following an externally imposed rule (Graham, 1988; Tsang, 2007). Similarly, when people perceive that a benefactor's motivation is driven by a sincere desire to help, the recipient's feelings of gratitude increase (Wood et al., 2008). The resulting feeling of gratitude, in turn, motivates the recipient to develop a relational bond with the benefactor, and prompts the beneficiary to engage in relationship-building behaviors (Algoe & Haidt, 2009; Lambert & Finchanm 2011; Poelker & Kuebli, 2014; Wood et al., 2008).

Algoe argues that a sense of gratitude evolved to be felt toward and/or expressed to others who have provided the recipient with a benefit; as such, the theory posits that gratitude serves an adaptive interpersonal function. Specifically, feelings of gratitude help people identify and maintain mutually beneficial relationships with benefactors who represent a reliable and valuable social resource in that the benefactor is likely to continue helping the recipient survive and flourish

(Algoe, 2012; Algoe, Fredrickson, Gable, 2013; Algoe et al., 2016). Interpersonally, gratitude is thought to signal the presence of and to help people recognize the source of a benefit as a caring and helpful other, predisposing people to develop communal relationships with these valuable sources. Feelings of gratitude adaptively encourages/prompts the beneficiary to engage in behavior to promote, facilitate, and maintain a social bond with the human benefactor, which increases the likelihood that the originating source (i.e., benefactor) will continue to share/provide future benefits.

A broad range of research, examining the causes and consequences of gratitude from an interpersonal perspective has followed from Algoe and colleagues' functional account, and in large part, the findings are consistent with the Find, Bind, and Remind theory. For example, people feel increased gratitude when a benefit is perceived as more (vs. less) valued by the beneficiary, as more costly (e.g., in effort or money) to the benefactor, and as more responsive to the beneficiary's needs (Algoe et al., 2008; Wood, Brown, & Maltby, 2011; Wood et al., 2008). Likewise, an individual's feelings of gratitude toward his/her romantic partner increases as a function of the romantic partner's perceived responsiveness, characterized as the partner acknowledging and acting in accordance with the individual's specific needs (Algoe et al., 2016). More broadly, gratitude also increases to the degree that a benefit is perceived as contributing to a recipient's wellbeing (Algoe & Stanton, 2012). Similarly, gratitude interventions only affect wellbeing and relationship satisfaction when the benefactor is deemed "responsive," reflecting that the benefactor's actions were perceived as understanding, validating, and caring (Algoe & Zhaoyang, 2016).

Research examining the downstream social consequences of feeling gratitude also provides support for Algoe's proposition that gratitude serves an adaptive interpersonal function. That is, as a recipient's feelings of gratitude grow stronger, his/her motivation to promote social bonding is enhanced, and both the benefactor and beneficiary are more likely to provide additional benefits to each other. In support, research shows that a beneficiary tends to reciprocate more help to a benefactor as a direct function of the beneficiary's sense of gratitude (Bartlett & DeSteno, 2006). For instance, Lambert et al. (2010) found that after expressing gratitude to a benefactor, beneficiaries exhibited greater levels of community involvement, and a greater sense of responsibility to meet the benefactor's specific needs (Lambert et al., 2010). Likewise, those who express thankfulness are more likely to behave prosocially toward their benefactor (Grant & Gino,

2010; Tsang, & Martin, 2017). Moreover, people who experience more gratitude toward their romantic partner participate in more shared activities, exhibit a greater willingness to discuss relationship concerns, and experience increased feelings of warmth, which results in strengthening the relationship (Lambert & Fincham, 2011).

Evidence also shows that a beneficiary's feelings of gratitude consequently influence a benefactor's social behaviors. In general, when a benefactor is thanked for providing a benefit, he/she is more likely to exhibit increased socialness and to offer help to the beneficiary in the future (Grant & Gino, 2010; Tsang, & Martin, 2017). For example, participants (i.e., benefactors) who spent 15 minutes providing helpful writing feedback to a stranger (i.e., beneficiary), exhibited a significant increase in their intent to affiliate and express warmth to the beneficiary after the participant received a message from the beneficiary stating, *Thank you for all the time and effort you put into doing that for me* (Williams & Bartlett, 2014). Likewise, having a recipient add a simple *thank you* phrase for the receipt of a benefit (i.e., *thank you so much! I am really grateful*) increased a benefactor's overall sense of community. Similarly, thanking voters in a local election increased people's communal action and lead to a significant increase in voter turnout for the following term (Grant & Gino, 2010; Panagopoulos, 2011). In a straightforward illustration, the sense of gratitude that is expressed by a bed-ridden individual to his/her family caregivers is significantly and directly related to the increasing number of caregiving hours the family provides (Amaro, 2017). Simply put, feelings of gratitude promote social contact with a benefactor, enhance relationship maintenance behaviors, foster mutual feelings of warmth, and trigger a heightened sense of social community (Grant & Gino, 2010; Lambert & Fincham, 2011; Panagopoulos, 2011; Williams & Bartlett, 2014).

In sum, the evidence suggests that people's feelings of gratitude partly depend on the benefactor's perceived motivation for providing a particular benefit, and the situational context under which a benefit is provided. Gratitude increases when the benefactor is perceived as acting because of stable intrinsic motives rather than selfishness or duty. Several aspects associated with benefit value can also influence the degree to which people feel gratitude, such that gratitude increases when the benefit is perceived as more valued, as more costly to the benefactor, and as *better fitted* and responsive to a recipient's needs (Algoe et al., 2008; Algoe & Zhaoyang, 2016; Wood et al., 2011; Wood et al., 2008). Taken together, research examining an interpersonal perspective suggests that feelings of gratitude promote social bonding behaviors between a

benefactor and a beneficiary, ultimately serving to foster and maintain interpersonal sources of benefits, and building mutually rewarding social relationships in which future benefits will continue to be shared. In the next section, I discuss gratitude from an impersonal perspective summarizing its antecedent characteristics and functions, outlining the evidence to date, and where applicable, noting overlapping areas with an interpersonal perspective of gratitude.

Impersonal Gratitude

As discussed in the prior section, a good deal of gratitude research is based on an interpersonal perspective in which people feel a sense of gratitude when another person intentionally and directly provides them with a valued benefit. It is, however, also possible to feel grateful for benefits that do not emerge from the behavior or actions of other people. Various theoretical perspectives essentially agree that gratitude is a felt response to a received benefit, with the valued benefit emerging from a source external to the self (Watkins, 2014). With no doubt, benefits can be provided by other people, as the evidence from the Find, Bind, and Remind theory outlined earlier aptly demonstrates (Algoe, 2012).

However, several theoretical perspectives on gratitude also propose a broader characterization of what constitutes the perceived source of a particular benefit. For example, Watkin's (2014) perspective suggests that gratitude amplifies the *good* in one's life (i.e., the benefits), while Fredrickson (2004) posits that gratitude broadens and builds beneficial *resources*. Both perspectives discuss gratitude without specifying that other people must necessarily be the source of these benefits. Likewise, Wood and colleagues (2010) argue that gratitude is a general orientation toward all the positives in one's life— without requiring that these benefits originate from other people. Fagley (2012) also posits support for an overarching appreciation trait, which includes facets that constitute feelings of gratitude. This trait also measures the degree to which people value the positives in their life, and similar to other theoretical characterizations, people represent only one type of beneficial source, that is, people are not necessarily thought to be the only source of positive benefits (Wood, et al., 2008; Wood, et al., 2010). These various perspectives maintain that not only do people feel gratitude for the benefits provided by another person (i.e., interpersonal source), but people can also experience gratitude for benefits that do not emerge or originate from others (i.e., impersonal source).

In much the same way as the interpersonal perspective, the originating source of a benefit from an impersonal perspective can be ascribed as external to the self, emerging from nonhuman sources (e.g., ecosystem, environment, nature, fate, God, the universe, the cosmos). Similar to interpersonal conceptualizations, the form of a benefit is nearly boundless, and could simply include drinking water, sunshine, or a plentiful harvest. For instance, from ecosystem/nature (i.e., source) one may be grateful for the rain/sunshine (i.e., benefit) because it fills important needs (e.g., growth of food, potable water, etc.) that are required to maintain continued sustenance. As with gratitude from an interpersonal source, these benefits originate outside the self and are considered valued, desirable, need-satisfying, and necessary for survival (Algoe, 2012; McCullough et al., 2008; Poelker & Kuebli, 2014; Steindl-Rast, 2004; Wood et al., 2008).

Interpersonally, feelings of gratitude are thought to help an individual identify and pay attention to the source (i.e., another person) of a benefit and to encourage him/her to build and nurture social bonds with the person who provides a benefit (i.e. the originating source; Algoe, 2012). In a similar manner, increased gratitude from an impersonal perspective should motivate people to identify and nurture non-human sources of benefits (e.g., nature/environment); as a consequence, people should be open to orienting their behaviors (i.e., conserving and protecting potable drinking water) to maximize the potential future benefits that stem from such sources. For instance, nurturing an impersonal benefit/source might involve identifying the most useful benefits, investing in the source, protecting the source from external threat, expressing care and concern for the source to others, or limiting the harvesting of benefits from the source. In all, from an impersonal perspective, a sense of gratitude can be conceptualized as an emotion that triggers/signals positive responses aimed at the perceived source of a benefit, in this case, a non-human source.

Evidence for Impersonal Gratitude

There are evidentiary hints that offer partial support for the notion that people can and do feel gratitude for the receipt of a benefit, absent a clear and unambiguous human benefactor. For instance, not surprisingly, people predict that a child getting others' help on a task versus working alone should feel more gratitude, however, people still expect that the child working alone should also feel a non-trivial sense of gratitude (Graham & Barker, 1990). Likewise, people working alone on a task who report their success as entirely due to factors like luck or their own efforts still report

feeling gratitude for the subsequent positive outcome, despite the absence of a specific human source external to the self (Weiner, Russell, & Lerman, 1979). Research also demonstrates that people feel gratitude for other benefits that seem to lack a clear and specific human source/benefactor including for being alive, for being healthy, for being free, for the essential beauty of nature, and for simply waking up in the morning (Emmons & McCullough, 2004; Gordon et al., 2004; Moore, 1996; Watkins, Gibler, Mathew, Kolts, 2005).

Moreover, earlier work using autobiographical narratives also demonstrates that people can facilely report distinct experiences in which they felt either impersonal or interpersonal gratitude (Teigen, 1997). Whereas interpersonal gratitude was directed towards others (e.g., friends, family, and even strangers) as the source of the benefit, impersonal gratefulness was typically expressed for benefits arising from life in general, and for situations in which people attributed the source of their appreciated benefit to luck. For example, in the wake of a natural disaster, those who survive report feeling significantly grateful that nothing worse occurred (Teigen & Jensen 2011; Teigen 1997). Likewise, as noted earlier, people experience more gratitude when they perceive the benefit and source as potentially losable. For instance, Koo and colleagues (2008) found that feelings of gratitude increase when people are prompted to imagine (vs. not imagine) how they might feel if some past positive event had never happened (Koo et al., 2008).

The authors argued that when people imagine that a positive benefit might not have happened, it serves to focus their attention on the benefit, and makes the benefit more salient, resulting in increased feelings of gratitude for the benefit. Likewise, both theory and research posited and found that viewing one's life, itself, as an uncertain and limited resource increases impersonal gratitude. Specifically, when people were prompted to reflect on their own death, they reported greater feelings of gratitude (Frias, Watkins, Webber, & Froh, 2011). In Frias' words, "when one is fully confronted with the reality that life *might not be*, life itself is seen as a limited resource, and thus gratitude for life increases" (pg.159).

Other circumstances that threaten the certainty or potential loss of one's current benefits, including chronic illness, reminders of death, and the threat of natural disasters/catastrophes also lead people to experience an increased sense of gratitude. As noted earlier, people who experience a mortality salience manipulation (i.e., imagining one's death) report increased gratefulness for life itself, and for simply being alive (Frias, Watkins, Webber, & Froh, 2011). Likewise, people who suffer from chronic heart disease report a greater overall appreciation for life, and for even

just waking up in the morning (Sacco, Park, Suresh, & Bliss, 2014). A sense of gratitude is also one of the most common and frequent emotions experienced by survivors of natural disasters. Similar to those suffering from a chronic illness or exposed to mortality salience, natural disaster survivors report increased gratitude for life, itself, and thankfulness that they did not experience worse loss as a result of the disaster (Teigen, 1997; Tiegen & Jensen, 2010). Moreover, data collected before and after the 9/11 attacks indicated that students' level of gratitude for general life values (e.g., freedom, safety, and American ideals) significantly increased, post-disaster (Gordon, Musher-Eizenmann, Holub, & Dalrymple 2004).

Although the evidence is scant and relatively circumstantial, it suggests that people may feel gratitude for benefits that emerge from more impersonal types of sources, ones that do not necessarily stem from another person. That is, rather than others being the only source from which one can obtain a benefit, people may perceive a particular benefit as originating from more impersonal sources including nature, God, fate, luck, the ecosystem, or simply the cosmos. While these impersonal types of sources are often anthropomorphized (e.g. lady luck, mother nature, Jesus), they nonetheless appear to be absent certain key interpersonal characteristics, including mutual responsiveness, interactive communication, and intrinsic motivation (of the benefactor) that typically underlie an interpersonal perspective of gratitude.

Contrasts Between Impersonal and Interpersonal Gratitude

As noted above, impersonal beneficial sources may represent a qualitatively different type of source in comparison to when a human benefactor is viewed as the source of a particular benefit. Notably, impersonal benefit/sources lack a specific animate originator to which one ascribes the source characteristics described earlier including intention, cost, and a shared reciprocal relationship, rendering these features of the gratitude situation somewhat inapplicable to an impersonal context. Moreover, the attentional process and cues by which an individual recognizes that he/she has received a benefit from an impersonal source is likely different than how one recognizes that he/she has received a benefit from another person. Generally, impersonal benefits may be less salient and explicit, making them harder to notice compared to benefits that stem from another person. In part, this is because, favors, gifts, or support from another person tend to be traceable to specific acts or interactions with attendant signals from the human benefactor, indicating that a gift was given, which typically triggers feelings of gratitude. Conversely,

impersonally sourced benefits (e.g., water) often exist to be *taken advantage of*, and they are often utilized automatically over longer periods of time, and a benefit (water) and source (ecosystem) are not typically salient in conscious thought. Similarly, since water as a benefit is always available it may be perceived as a resource *to be taken* rather than something that is provided or given from a source.

Likewise, although there are similarities and even a potentially mutual relationship, the expression of gratitude from an impersonal source perspective may be qualitatively and experientially different than feelings of gratitude expressed toward other people (i.e., an interpersonal source). A host of communication norms exist for the expression of gratitude during interpersonal circumstances, people can say "thank you" or "I am grateful to you for ___." While someone might feel grateful for a benefit derived from an impersonal source, there are fewer standards for expressing gratitude for these types of benefit outside a religious perspective in which one thanks God. Nonetheless, people can still express feelings of gratitude and appreciation, in general, for an impersonal benefit and its originating source.

It is also plausible that gratitude for a benefit that is perceived as emerging via an impersonal source might have functional effects that are different than the functional effects associated with an interpersonal gratitude perspective. As described earlier, both theory and research suggest that gratitude emerging from an interpersonal source may serve an adaptive function by helping people to identify, build relational bonds with, and engage in behavior to nurture social sources of benefits (i.e., caring others, human benefactor; Algoe, 2012). In a similar manner, impersonal gratitude may serve an analogous function by helping people to identify, appreciate, and even engage in actions to preserve non-human sources of benefits. Some theorists posit that gratitude may even serve a broader adaptive function, irrespective of the actual source of a benefit, that is, gratitude may prompt people to identify and engage in behavior that promotes the general maintenance of any kind of beneficial source. This broader functional approach can be seen in Fitzgerald's (1998) definition of "gratitude as a warm sense of appreciation and goodwill towards a person or thing paired with the disposition to act positively toward that person or thing" (pg. 120). Likewise, this perspective is also consistent with the Broaden and Build theory in which positive emotions (e.g., gratitude) prompt people to act in evolutionarily adaptive ways to cultivate various "personal resources" of many kinds (Fredrickson, 2004). Watkins (2014) also suggests that gratitude is an emotion that *amplifies the good* more generally, in that gratitude increases the

salience of those things that contribute to an individual's wellbeing, regardless of the originating source, which in turn, enhances and promotes the individual's ability to increase his/her subjective wellbeing. From Wood and colleagues (2010), we also find a similar proposition that gratitude may serve as an indicator of any and all positive benefits in people's life, and may prompt people to engage in productive responses aimed at protecting and maintaining both the desirable benefit and the originating source of the benefit. In sum, these theoretical positions suggest that people feel gratitude for positive benefits that can originate from a host of varied sources, including broadly, both human benefactors and nonhuman source, and gratitude may prompt people to build, maintain, enhance, or protect beneficial sources.

Although theorists have posited that gratitude may serve a broader adaptive function that prompts the recognition and maintenance of any beneficial source, there is scant research examining the proposition that gratitude helps people find and nurture nonhuman (i.e., impersonal) sources of benefits. Indirect evidence, however, suggests that gratitude is associated with attentional biases, which may lead people to attend to benefits that emerge from a non-human source. Specifically, trait gratitude is correlated with dispositional measures of optimism, positive memory bias, and positive reframing, all of which are characterized by the increased tendency to attentively notice the positive, useful, and good things in one's life, regardless of whether the source of the benefit is social or non-social (Kelberer, Kraines, & Wells, 2018; McCullough et al., 2002; Segerstrom, 2001; Watkins, Grimm, & Kolts 2004; Wood et al., 2007). Additional clues that gratitude prompts people to nurture and maintain impersonal sources of benefit comes from evidence linking gratitude to an internal locus of control (Watkins, Woodward, Stone, & Kolts, 2003). An internal locus of control is characterized by the belief that one is responsible for the goods in one's life, and that one's actions have a meaningful impact on the occurrence or absence of such goods, again irrespective of the emergent source of the goods (Ajzen, 2002). Those who possess such a perspective should be more likely to act to preserve such goods (i.e. benefits). Likewise, feelings of gratitude are also linked to positive coping strategies (Wood et al., 2007), which are often characterized by people actively engaging in behavior/actions to preserve beneficial sources, although in this case, the benefit is derived from other people (Henderson, Roberto, & Kamo, 2009; Twigg, 2013).

Taken together, the work discussed above suggests that feelings of gratitude may trigger an attributional state in which an individual is motivated to actively protect and preserve both a

benefit and the source of said benefit, whether the source be an interpersonal or impersonal one. As such I reasoned that the evidence, though scant, underscores the notion that people can experience gratitude for the receipt of a benefit that originates from non-human (i.e., impersonal) sources. Moreover, feelings of impersonal gratitude for a particular benefit may motivate people to identify, preserve, and nurture non-human sources, in much the same way that interpersonal gratitude is thought to motivate people to increase social and relational bonds with a human benefactor.

Potential Factors Influencing Impersonal Gratitude

Although impersonal gratitude differs from interpersonal gratitude, research on interpersonal gratitude provides a general template to identify possible factors that promote impersonal gratitude. To briefly summarize, research examining factors that promote interpersonal gratitude suggest that there are key characteristics of the source and the benefit that can influence how much gratitude people experience (Wood et al., 2008). Such features include the perception that the source and benefit are valued, costly to the benefactor, uncertain (i.e., potentially losable), and sufficiently fit to the beneficiary's needs. Specifically, when a beneficiary deems a benefit of greater (vs. lesser) value, the gratitude they feel towards a human benefactor (i.e., source) increases (Poelker & Kuebli, 2014; Wood et al., 2008). Similarly, a beneficiary's felt gratitude increases when he/she perceives that the benefactor has accrued greater costs (e.g., more effort or more money) for providing a particular benefit, even controlling for the benefit's judged value (Algoe et al., 2008; Tesser, Gatewood, & Driver, 1968; Wood et al., 2008). Likewise, research using a vignette design indicates that gratitude is functionally related to the benefactor's perceived effort, for instance, *how hard did the giver try to find an appropriate gift*; this effect remains even after holding actual liking for the gift constant (Poelker & Kuebli, 2014). The factors that influence feelings of interpersonal gratitude (e.g., value and certainty) suggest prospective features that may also influence feelings of impersonal gratitude, although, some features may generalize more readily to an impersonal perspective than others. Among those factors identified in past research, the value of the benefit may be the most relevant to impersonal gratitude.

In addition to research on interpersonal gratitude, there is general work on gratitude and related work from other fields that offer additional hints concerning the factors that might promote feelings of impersonal gratitude. As outlined earlier, people can experience situations in which

they express impersonal gratitude for life in general, and that gratitude increases when people imagine situations that threaten the loss or worsening of a valued benefit, or even when they reflect on the loss of their own life (Frias et al., 2011; Gordon et al., 2004; Koo et al., 2008; Sacco et al., 2014). Akin to reminding people that their life itself is a source of benefits and is limited and uncertain, I reasoned that imagining the uncertainty or fragility of other types of potentially time-constrained benefits/resources, ones that are potentially finite (e.g., water, temperate climate) should also lead to enhanced feelings of gratefulness. That is, imagining the potential uncertainty of a natural benefit/resource might mirror Frias and colleagues (2011) work in which they showed that when an individual was prompted to reflect on the loss or uncertainty of a limited and finite resource (i.e. the loss of life) it triggered increased feelings of gratitude, in Frias' case, for life itself.

Frias et al. (2011) also posit that people typically assume that they have relatively easy access to desired benefits, and typically perceive the availability and receipt of these benefits as very stable and quite certain. Over time people can habituate to the assumptions that a benefit will be accessible and readily available, and as such, positive emotions including gratitude for these benefits falls to a relatively low set-point (Diener, Lucas, & Scollon, 2009; Lambert, Fincham, Stillman, & Dean, 2009; Frijda 1988; 2007). Indeed, Frias (2011) argued that people are typically prone to taking general life-oriented resources for granted, primarily because the beneficial resource superficially appears to be constant, and may be perfunctorily imagined as a boundless and limitless benefit/resource, unless an event occurs that brings to light the misplaced or forgotten value of a particular benefit and source.

People can take any particular type of benefit for granted, failing to experience appropriate gratitude because they may presume that the availability of a benefit/source is certain and unlikely to be lost. When people perceive that a source is likely to provide benefits with certainty, they should be more prone to taking the benefit for granted, and subsequently feel less grateful for the benefit. By comparison, evidence suggests that perceiving the potential loss or uncertainty of a benefit/source inspires a greater sense of gratitude. For instance, people who imagine experiencing the loss of an already acquired benefit tend to exhibit greater feelings of gratitude (Aldler & Fagley, 2005). Specifically, those who agree with the statement "*I appreciate the things I have now, because I know anything I have can be taken away from me at any given time*" express more gratefulness. Such individuals are less prone to take a benefit *for granted* and may exhibit greater

awareness that benefits are not certain. Interestingly, people who are more dispositionally sensitive to potential loss not only feel more grateful in general, but they report higher levels of subjective wellbeing.

From an impersonal perspective, people could experience increased gratitude for a benefit (e.g., water, sunshine) that originates from the environment/nature (i.e., source) when they are prompted to imagine that this benefit/resource is often taken for granted and it could be lost, or if they are reminded that the future quality and availability of the source and the benefit is not a certainty. Reflecting on the pragmatic uncertainty of finite benefits/resources, ones that are frequently taken for granted, should lead to enhanced feelings of gratefulness.

In short, the aim of the current set of studies is to examine whether impersonal gratitude (i.e., toward a non-human source) increases as a function of how much the benefit is perceived as valued, and whether the continued occurrence of the benefit is perceived as more or less uncertain, and the degree to which these gratitude features impact people's subjective well-being. In addition, I explore people's motivation to engage in behaviors to maintain, preserve, and nurture the impersonal benefits and sources for which they feel grateful (in this case focusing on the impersonal benefit of clean water from the source of the ecosystem). An initial pilot test assessed the kinds of interpersonal/impersonal things people feel grateful for and how common gratitude is for such sources. Study 1 examines whether the relationship between perceptions of benefit value and feelings of gratitude generalize to a situation in which the benefit is absent a human benefactor. Study 2 investigates whether framing the continued receipt of an ongoing benefit as uncertain (vs. certain) influences people's feelings of gratitude. Study 3 replicates Study 2 by examining the relationship between perceived benefit certainty and feelings of gratitude; moreover, Study 3 examines whether feelings of gratitude predict motivation and behavior to protect the benefit/source. Finally, Study 4 expands Study 2 and 3 by examining habituation to a benefit, a mechanism by which the perceived certainty of a benefit might relate to decreased feelings of gratitude.

PILOT TEST

Given the scarcity of research on impersonal gratitude, the initial pilot test was designed to capture a basic descriptive account of what impersonal and interpersonal sources people feel grateful for and how common gratitude is for such sources. In addition, I assessed two individual difference variables that might relate to an increased tendency to feel gratitude toward non-human sources—namely, religiosity, in which people may experience gratitude toward non-human sources because they feel gratitude to God, and anthropomorphism in which people ascribe human-like intentions and qualities to non-human sources and as such may feel gratitude for perceived benefits.

Methods

Consistent with procedures employed in past work (Emmons & McCullough 2003) participants listed ten things they feel grateful for in rank order from most to least. Participants were given no prompts for possible objects of gratitude. After writing their list, participants were asked to categorize the source of each item as either interpersonal or impersonal. Before categorizing, participants read:

> When a person feels grateful for a benefit, it is possible to name the source from which that benefit came. For instance, if you felt grateful for having clean water to drink, you might list the environment as the source of that benefit. Alternatively, if you felt grateful for help that a friend gave you, you might list your friend as the source. For each of the items you listed please indicate in your opinion whether that source is another person or NOT a person (e.g. fate, luck, the universe, nature). Please also briefly describe that source in the space provided.

Participants categorized each benefit as coming from a human Source or coming from a non-human source, after which participants briefly described/characterized the source. I computed the total number of non-human sources each participant listed, which ranged from 0 (all benefits were listed as originating from a human source) to 10 (all benefits were listed as originating from a non-human source). Additionally, participants completed the 7-item Duke Religiosity scale, which measures religious belief and behavior (see appendix B) and the 15-item Anthropomorphism scale, which measures the tendency to ascribe human traits to non-human things (see Appendix G).

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Participants

I sampled 120 participants (46 female) who completed the pilot study through Mturk in exchange for $1.00. The sample was 72.5% White, 12.5% Black, 5.83% Hispanic, and 9 % other.

Results and Discussion

Participants reported a total of 1090 things for which they feel grateful. Of those, participants self-described 44.7% of their own sources of gratitude as originating from a non-human source and 55.3% as originating from another person. This finding suggests that people may consider impersonal sources of gratitude about as commonly as interpersonal sources of gratitude. Furthermore, I performed a text analysis to find the frequency of responses that mentioned water. Notably, water was reported as a source of gratitude only 10 times, suggesting natural gratitude for water is relatively low.

I regressed the number of non-human sources onto anthropomorphism and religiosity, each in a separate model. Religiosity was a significant predictor of non-human source ($B = -0.07$, $SE = 0.03$, $p = 0.025$), such that more religious people listed fewer non-human agents as the originating source of a benefit. Likewise, anthropomorphism was a significant predictor of non-human sources ($B = -0.49$, $SE = 0.21$, $p = 0.019$), such that those who anthropomorphize more listed fewer benefits as originating from a non-human source.

The general finding demonstrates that impersonal gratitude is relatively common—when asked to list ten things one feels grateful for, nearly half of the benefits were described as originating from a non-human source. Although the findings are tentative, they suggest that impersonal gratitude may not be simply explained or categorized as just a special case of interpersonal gratitude directed at an imagined target (e.g., God), or an anthropomorphized representation of the ecosystem (e.g. Mother Earth). If that were the case, we would expect those who are highly religious or those who are likely to use anthropomorphized judgments to list being grateful for more benefits that emerge from non-human sources. However, that was not the case; those individuals listed fewer benefits as originating from a non-human source. The absence of a positive relationship between anthropomorphizing/religiosity and the frequency of non-human gratitude sources suggests that people can feel gratitude for impersonal sources and not necessarily because they ascribe humanized qualities to these sources.

STUDY 1

Typically conceptualized as a response for a benefit received from an external source, gratitude is characterized as an emotional state that prompts people to *recognize the good*, *acknowledge the value and meaning of something*, and *focus on and appreciate the positive aspects of life* (Aldler & Fagley 2005; Watkins, 2014; Wood, et al., 2010). Representative positive benefits typically entail anything that is perceived by the recipient as valued, meaningful, and/or as fulfilling one's needs, large and small. For example, research from an interpersonal perspective has examined how and why people experience gratitude across a variety of benefits including ice-cream cones, raffle tickets, small gifts of money, and the social-emotional support provided by loved ones (Algoe & Zhaoyang, 2016; Poelker & Kuebli 2014; Tsang, 2007; Wood et al., 2008).

Gratitude, as theorists posit, helps people identify/recognize beneficial circumstances that are relevant to their wellbeing and survival. For instance, from the Find, Bind, and Remind theory, Algoe notes that "gratitude *signals* a perceived communal relationship orientation from the benefactor," and similarly, Watkins' (2014) Goodness Amplification theory states that "gratitude *increases the signal strength* of whom and what is good in one's life," while Emmons and colleagues (2008) describe gratitude as an evolutionarily adaptive *benefit detector*. An important element underlying these characterizations of gratitude is the received benefit for which feelings of gratitude emerge, that is, the *meaningful something*, the *positive aspects of life*, or the essential *good* in one's life.

I noted earlier that the characteristics associated with a particular benefit can significantly influence the degree to which an individual feels a sense of gratitude. One important feature that influences feelings of gratitude is the benefit's perceived value in the eyes of the recipient. Among features shown to determine interpersonal gratitude, value may be one of the most applicable to the case of impersonal gratitude. As both research and theory from an interpersonal perspective show, gratitude signals the presence of a benefit received from a human benefactor, and the gratitude signal strengthens when the beneficiary perceives the benefit as more (vs. less) valued (Poelker & Kuebli, 2014; Wood et al., 2008). The value of any particular interpersonal benefit has been widely operationalized with research indicating that gratitude increases as a function of how much the benefit is liked, how much the benefit costs the benefactor in money or effort, and to what extent the benefit fulfills the recipient's important/desired needs (Algoe, et al., 2016; Poelker

& Kuebli, 2014; Wood, Brown, & Maltby, 2011; Wood et al., 2008). Beyond demonstrating the key importance of perceived benefit value to feelings of gratitude, prior research also illustrates the wide variation with which researchers operationalize the notion of value.

While most research examining the factors that influence gratitude has been limited to benefits received from a human benefactor, the present work aims to extend our theoretical understanding by examining gratitude from an impersonal perspective in which the benefit emerges from a nonhuman source. As noted earlier, a good deal of the work on value reveals that interpersonal-oriented benefits leading to increased gratitude often involve the receipt of a gift, a favor, or supportive help (Algoe, et al., 2008; Wood et al., 2008; Wood et al., 2011). These types of interpersonal benefits tend to occur periodically and are not necessarily construed as a benefit that continues in an ongoing manner over time. For instance, one does not typically expect a friend to keep giving him/her money or doing favors each day. This is not to say that people fail to experience gratitude for interpersonal benefits that can unfold consistently and occur repeatedly over time. For example, people can experience an overall sense of gratitude for the panoply of social-emotional benefits, large and small that loved ones regularly provide (Algoe & Zhaoyang, 2016). Likewise, I reasoned that impersonal contexts might often involve a host of benefits (e.g., potable water, clean air, ample food, environmental aesthetics) that a beneficiary uses incrementally and consistently over an extended period of time, in a seemingly perpetual manner, and/or the *used* benefit appears superficially to exist in a constant and enduring state. Much in the same way that one is grateful for the enduring valued benefits that one's romantic partner may provide, one should, likewise experience increased gratitude for ongoing impersonal benefits (e.g., water) that are perceived as more versus less valued.

The current study examines the effect of an impersonal benefit's perceived value on the degree to which people experience increased gratitude. Specifically, I focus on the sense of gratitude that people experience for a benefit (e.g., water, air, sunshine) that emerges from a particular source (e.g. the ecosystem/environment). Following prior work, I reasoned that the value of an impersonal benefit can be operationalized by presenting its benefits as fulfilling ones' needs to a greater or lesser degree. This characterization of value is well established in the interpersonal gratitude literature. For example, an individual's sense of gratitude for a romantic partner's beneficial action increases as a function of whether the individual perceives the action as more or less responsive in fulfilling his/her important social and interpersonal needs and desires (Algoe, et

al., 2016; Algoe & Stanton 2012). As with benefits from an interpersonal source, benefits from an impersonal source originate outside the self, and may be considered as more or less valued to the extent that people perceive the benefit as satisfying important life needs (i.e., edible food, potable water, etc.; Algoe, 2012; McCullough, et al., 2008; Poelker & Kuebli, 2014; Steindl-Rast, 2004; Wood et al., 2008).

Although evidence indicates that value (widely defined) from an interpersonal context influences gratitude, there is no work examining how the perceived value of a benefit might affect gratitude from an impersonal perspective. With the current study, I posit that a benefit should be more or less valued in terms of fulfilling important needs regardless of a benefit's source, hence I expect that the effects of perceived value should generalize to benefits from an impersonal source. Specifically, I hypothesize that when a benefit from an impersonal source is perceived as more (vs. less) valued (i.e., fulfills desired needs to a greater degree) it should lead one to exhibit a greater sense of gratitude for the benefit (and the source).

To assess how the perceived value of a benefit relates to feelings of gratitude, I manipulated the perceived value of the resource of water using a set of brief narrative descriptions; such vignette manipulations have been used successfully in prior work (e.g. Poelker & Kuebli, 2014; Tesser, et al., 1968; Wood et al., 2008). Specifically, I used four vignette conditions: a high value condition, a low value condition, an unrelated neutral condition, and a basic definition condition; each is detailed in the methods section.

Hypothesis 1: An impersonal benefit that is perceived to be of greater (vs. less)

value (i.e., fulfills relevant needs) should lead to a greater sense of gratitude for the

benefit.

Methods

Participants

I sampled 343 undergraduate students (201 female) at a large midwestern university who completed the study in exchange for course credit. Conceptually similar studies examining gratitude found an effect size of partial $\eta^2 = 0.024$. With alpha set at .05 and power set at .8, a

sample size of 236 would be necessary to detect effects of condition across 4 groups. The sample was 35.6% Asian, 4.7% Black, 6.4% Hispanic, 1.2% Native American, 0.9% Pacific Islander, 57.4% white, 1.2% other. On average, the sample was 19.37 years old.

Materials

In the present study, participants were randomly assigned to read one of the four narrative conditions (i.e., high value, low value, neutral, basic definition) on a computer screen; they were given two minutes to read the high value, water process, or neutral vignette, or 30 seconds to read the definition vignette.

High value condition. In the key experimental condition, participants read a statement (approximately 450 words) describing the valued benefits and the basic needs that water fulfills. The description is consistent with theoretical and empirical work, which indicates that benefit value is functionally linked to a benefit's utility and its capacity to satisfy basic needs (Algoe, et al., 2016; Algoe & Stanton 2012; Poelker & Kuebli, 2014; Watkins 2014; Wood et al., 2008). Participants in the high value condition read the following vignette:

> The Earth's natural water ecosystem is a resource that takes many forms and has allowed our planet to flourish and grow for billions of years. Every drop of water that runs across or through our planet is a part of this system – be it from streams, rivers, lakes, seas, or oceans. The water ecosystem also includes the Earth's accumulation of ice and snow, as well as the water droplets that fall from vapor, clouds, and fog. Our entire water ecosystem is a fully interconnected and unified source of water. Every drop is part of a single cyclical source that involves the processes of evaporation, condensation, and precipitation. As the originating source of our water, the Earth's water ecosystem has essentially functioned in its present cyclical form for billions of years, dating to the early formation of our planet.
>
> Although people understand the general operation of our water ecosystem, we do not typically spend much time or effort thinking about the nearly limitless kinds of positive life needs that water actually fulfills for us. To start, you have a vitally important need to drink water. Your body requires at least one liter of water per day to maintain essential life functions. Even the other liquids you drink are mostly water by volume (e.g., coffee, juice, soda, tea, or milk). Likewise, the irrigation of agricultural crops is wholly dependent on a continual and uninterrupted source of water to grow and sustain our food supply (e.g., fruits, vegetables, grains, and livestock). You also need fresh water to maintain your personal health, cleanliness, and safety; you clean your body on a daily basis with a shower/bath, you do laundry

to wash your dirty clothes, you use a toilet for sewage removal, and you have ready access to fire protection systems (e.g., sprinklers and hydrants) – all of these health and cleanliness needs crucially depend on the constant availability of fresh water. Water is also essential in generating the electricity that drives our power grids; indeed, water is involved in producing over 90% of your power needs. Even for your clothing needs, you will find that water is an indispensable component; all fabric treatment processes rely on an ample and dependable supply of water. From time immemorial, water has also provided serene and tranquil outlets that fulfill your relaxation and recreational needs. Whether it be hiking by forest streams, canoeing in rivers, frolicking in the ocean, or even swimming in our pools, people desire and enjoy the beauty of water.

Although you may not often think about the benefits of water and the ecological source from which water emerges, water, nonetheless, is critical to the flourishing of your life. Water is a vital element for most of the things you depend on, and water allows you to consistently satisfy and fulfill many of your daily needs.

Water process condition. For the water process condition, participants read a statement (approximately 450 words) that simply describes the processes associated with the water cycle (e.g. evaporation, condensation etc.). This condition uses language and formatting like the high value condition, controlling for length, subject matter, and language, but includes no direct mention of benefits or value. Participants in this condition read:

The Earth's natural water ecosystem is a resource that takes many forms and has allowed our planet to develop for billions of years. Every drop of water that runs across or through our planet is a part of this system – be it from streams, rivers, lakes, seas, or oceans. The water ecosystem also includes the Earth's accumulation of ice and snow, as well as the water droplets that fall from vapor, clouds, and fog. Our entire water ecosystem is fully interconnected and unified. Every drop is part of a single cyclical system that involves the processes of evaporation, condensation, and precipitation. The Earth's water ecosystem has essentially functioned in its present cyclical form for billions of years, dating to the early formation of our planet.

Although people understand the general operation of our water ecosystem, they do not typically spend much time thinking about the weather processes that happen in the water ecosystem. The water ecosystem is straightforward; to start, water falls from the clouds as precipitation (rain). Precipitation occurs because the temperature in a high-altitude atmosphere is low, causing water vapor to change into tiny particles of ice/water droplets, a process called condensation. These smaller droplets combine to make larger droplets, and as they unite together, they form clouds. When these larger droplets lose their heat energy due to lower temperature, the clouds release precipitation in the form of rain; if the temperature is very low, the water droplets fall as snow. We describe the process of rainwater moving across

the earth's surface as runoff. As rain descends into the ground it flows toward the lowest elevation areas. At this point the water starts to form into streams and rivers, which merge with larger bodies of water (like lakes), and eventually ends up in the ocean. Not all rainwater runoff flows into rivers, some water penetrates into the soil by a process known as infiltration. When water seeps into the soil, it increases ground water levels; the sponge-like rocks that hold this underground water are known as aquifers. Once the rainwater is on the earth's surface it absorbs heat energy from the sun, turning the water into vapors. Water bodies including the oceans, seas, lakes, and rivers are the source of evaporation, and via the evaporation process, water moves from the hydrosphere to the atmosphere. As ground water dries it becomes water vapor and rises into the atmosphere. Sometimes solid ice can convert directly into water vapor without melting into a liquid first. This process is called sublimation and also increases the amount of water vapor in the air. Ground water is also absorbed by plants, and via a process known as transpiration, water directly re-enters the atmosphere through evaporation from a plant's leaves and stems.

Although people may not often think about water, they understand that water cycles through a number of different processes.

Neutral condition. In the neutral condition, participants read a statement (approximately 450 words) describing a topic unrelated to water: the production of a cardboard box.

Corrugated boxes, which are produced in specially designed box plant factories are designed to be unusually strong and durable. Most boxes comprise corrugated paperboard, which contain layers of air columns, which act as cushion to keep a box's content secure, safe, and protected. The key raw material in the corrugating process is paper, although there are many different grades of paper from which to choose for each layer of a box. The paper is first fed through a set of preheated rollers in order to prepare it for being processed through a corrugating roller system. Steam is forced through both of these sets of rollers at 175-180 psi (pounds per square inch), and as the paper moves along the rollers, the temperatures can reach 365 degrees Fahrenheit. At this point, the corrugated rolls are covered with guide flutes; the size of the flute creates the width of the corrugations. When the heated paper passes between the corrugating rolls, the flutes trap and bend the paper to form the middle of the corrugated cardboard. A finished piece of corrugated cardboard is comprised of a single corrugated layer sandwiched between two liners. From here, the corrugated paper moves to a single-facer glue station where one layer of liner is glued to each corrugated layer. The combined layers advance to a double backer glue station where the final outer layer is affixed, after which the cardboard is passed over steam-heated plates, which cures and sets the glue. At the end of the corrugation process, the cardboard is trimmed and cut into large sheets, or box blanks, which slide into a stacking machine that loads them onto a platform. Printing dyes and patterns are prepared on a large, flexible, rubber or tin sheet. Once the cardboard is trimmed into large sheets, it is fed through a series of rollers, where

each sheet is trimmed, printed, cut, scored, folded, and glued to form a complete box. The finished boxes are stacked and sent to a banding machine where they are wrapped securely and stored.

Definition condition. I also included a second neutral condition, which consists of a simple definition of water. While this condition raises the concept of water, it does so in a minimal way absent any value judgments concerning water.

Merriam Webster defines "water" as an odorless, tasteless, colorless liquid. Its chemical formula is H_2O. In large amounts it appears to be blue. It freezes at $0°$ C and boils at $100°$ C. Many chemicals dissolve in water.

Gratitude measures. After reading the vignette, participants completed three items to indicate how much they feel grateful, thankful, and appreciative for water (anchored at 1 = not at all to 7 = very). These items are adapted from the Gratitude Adjective checklist (GAC; McCullough, et al., 2002), and constitute the primary dependent variable to assess gratitude. The questions about gratitude for water were embedded in a larger questionnaire assessing gratitude for other targets. The additional gratitude target questions serve to obscure the purpose of the study (see Appendix A for the gratitude adjective checklist items and distractors).

Manipulation checks. Upon finishing these items, participants completed measures to assess perceived value using value items adapted from Wood and colleagues (2008) gratitude scale. Specifically, participants indicated, "How valuable is water is to you," "How much do you like the benefits of water," and "how much do you like the water ecosystem, which is the source of water" on a scale anchored at 1 (not at all) to 7 (very). Participants also completed a manipulation check assessing the degree to which water fulfills their needs. I again used Wood and colleague's gratitude scale to adapt four items to assess need fulfillment. Specifically, "Does water fulfill your needs", anchored on a scale at 1 (not at all) to 7 (very much), "How important is water to you, anchored at 1 = not at all, 2 = slightly, 3 = moderately, 4 = very, 5 = extremely, "How useful is water," anchored at 1 = completely useless, 2 = slightly useful, 3 = moderately useful, 4 = very useful, 5 = extremely useful, and "How many of your distinct needs does water fulfill, using the following a scale 1 = none, 2 = very few, 3 = fairly few, 4 = a moderate number, 5 = fairly

many, 6 = very many, 7 = all of my needs. Because these questions are measured on different scales, their aggregate score was simply summed rather than averaged, to create a water needfulness scale.

Individual difference measures. In addition, participants completed a number of individual difference measures, including items to assess environmental attitudes, political orientation, religious attitudes, tendency to anthropomorphize non-human targets, locus of control, and trait gratitude. These measures were assessed in random order. In what follows, I outline the rationale behind our inclusion of these individual difference measures and offer hypotheses regarding their predicted influence on gratitude.

In addressing the effect of benefit features on impersonal gratitude, it is important to acknowledge the individual differences that might contribute to differences in gratitude feelings, and may even influence the way people interpret information concerning the characteristics of a benefit/source. Specifically, religiosity may relate to feelings of gratitude and may impact people's sense of gratefulness for natural resources (Hayward, Krause, Ironson, Hill, & Emmons, 2016). Overall, religiosity is positively related to gratitude (Hayward, Krause, Ironson, Hill, & Emmons, 2016), and religion may be particularly relevant to impersonal gratitude for natural resources because religious people tend to view these types of benefits interpersonally, as beneficial gifts from the divine. Thus, I included the Duke University Religion Index as a possible covariate (Koenig, & Büssing, 2010; see Appendix B). Likewise, people's political and environmental conservation attitudes may also impact people's feelings of impersonal gratitude for benefits that are derived from an environmental source. It is plausible that people with a more conservative, pro-industrial attitude are somewhat more skeptical of statements regarding the value of natural resources. As such, participants also completed the International Personality Item Pool (IPIP) liberalism scale, which includes ten political statements anchored at 1 (*strongly agree*) to 7 (*strongly disagree*) (Goldberg, 1999; see Appendix C), and a single item measure of political orientation "*Where on the following scale of political orientation would you place yourself?*" anchored at *1 = (extremely conservative)* to *9 (extremely liberal)*. Participants also completed the ten-item Eco-centric Concern Scale from the Environmental Attitudes Inventory (Milfont & Duckitt, 2010; see Appendix D), which assesses beliefs concerning the intrinsic value of nature using a scale anchored at 1 (*strongly agree*) to 7 (*strongly disagree*). Moreover, as Wood and

colleagues (2008) posit, trait gratitude may influence how people perceive and appraise specific benefit qualities, which may in turn influence their state gratitude. For instance, people higher in trait gratitude rate the exact same favor as more valuable, costly, and kindly than those with lower trait gratitude, and this difference influences how much state gratitude they feel for that benefit. Thus, participants completed the Gratitude Questionnaire 6 (GQ6; McCullough, 2013; see Appendix E), which includes six statements about people's overall feelings of gratitude on a scale anchored at 1 (*strongly agree*) to 7 (*strongly disagree*). Furthermore, to assess locus of control I used the personal control subscale of the Spheres of Control Scale, since such attributions influence people's perception that their actions can meaningfully impact the source of a benefit and locus of control has been shown to relate to gratitude (see appendix F; SOC -3; Paulhus & Van Selst, 1990; Watkins et al., 2003). Finally, participants completed the Individual Differences in Anthropomorphism Questionnaire (see appendix G; IDAQ; Waytz, Cacioppo, & Epley, 2010). This scale assesses the degree to which people ascribe human attributes to non-human objects and may account for the degree to which people apply interpersonal judgements to impersonal sources of benefits. Measures of state positive emotion were also assessed to examine how possible determinants of gratitude affect other positive emotions; to do so, I used the general positive affect and joviality subscales of the PANAS X (see Appendix H, Watson & Clark, 1994). Participants also completed a five-item satisfaction with life questionnaire (Diener, Emmons, Larsen, & Griffin, 1985; see Appendix M) and reported demographic variables including age, gender, race, and socioeconomic status (see Appendix I).

Results and Discussion

Manipulation Checks

To assess the manipulation of water value, I regressed needfulness of water on to the four narrative conditions (dummy coded, high value, water process, water definition, box statement). There was a significant effect of narrative condition, such that those who read about the value of water and its benefits reported significantly more need ($M = 21.67$, $SD = 1.6$) for water than those who read about the unrelated neutral (box) topic ($M = 20.62$, $SD = 2.43$, $B = -1.05$, $SE = 0.32$, $p = .001$) or the definition of water ($M = 20.62$, $SD = 2.28$, $B = -1.05$, $SE = 0.32$, $p = .001$). There

was no difference in need for water between the high value condition and the water process condition ($M = 21.15$, $SD = 2.12$, $p = .11$).

Moreover, those in the high value condition also reported that water was more valuable ($M = 6.4$, $SD = 0.62$) than those in the water definition condition ($M = 6.03$, $SD = 0.97$, $B = -0.37$, $SE = 0.12$, $p = .001$). Similarly, those in the water process condition rated water as more valuable ($M = 6.31$, $SD = 0.66$) than those in the water definition condition ($B = -0.28$, $SE = 0.11$, $p = .015$). However, there was no difference in water value between the high value condition and the neutral box condition ($M = 6.34$, $SD = 0.72$, $p = .60$) or the water process condition ($M = 6.31$, $SD = 0.66$, $p = .43$).

Effect of Condition and Individual Differences on Gratitude

Simple correlations among all measured variables were calculated. See Table 1 for means, standard deviations, scale reliabilities, and correlation coefficients for all measured variables. Notably, gratitude for water was significantly, positively correlated with both the value and needfulness of water.

For the initial examination, I regressed state gratitude for water onto the four narrative conditions (i.e., high value, water process, water definition, box). There were trending effects such that those in the high value condition reported more state gratitude ($M = 6.50$, $SD = 0.81$) than those in the neutral box condition ($M = 6.25$, $SD = 1.19$), $B = 0.25$, $SE = 0.146$, $p = .083$. However, there was no difference in sate gratitude across the high value condition and the water process condition ($M = 6.51$, $SD = .70$, $p = .98$) and the water definition condition ($M = 6.33$, $SD = 1.03$, $p = .24$).

I also regressed state gratitude onto the narrative conditions paired with one individual difference variable (i.e., environmental attitudes, trait gratitude, religiosity, political attitudes, anthropomorphism, and locus of control) and their two-way interaction.

Table 1. Means, Standard Deviations, Reliability, and Correlations for Measured Variables in Study 1

Variable	M	SD	α	1	2	3	4	5	6	7	8	9	10	11
1. State Gratitude for Water	6.40	0.96	.91											
2. Water Need	21.01	2.17	.63	.31*										
3. Water Value	6.27	0.77	.68	.39*	.47*									
4. Religiosity	13.17	6.47	.93	.15*	.10	.12*								
5. Pro-environmentalism	5.82	0.79	.83	.14*	.18*	.25*	-.04							
6. Political Conservativism	3.90	0.86	.76	-.14*	-.13*	-.09	-.49*	.26*						
7. Trait Gratitude	5.83	0.90	.81	.28*	.21*	.31*	.26*	.22*	-.17*					
8. Internal Locus of Control	5.29	0.83	.81	.21*	.16*	.17*	.21*	.21*	-.24*	.50*				
9. Anthropomorphism	3.08	0.90	.85	.14*	.16*	.06	-.08	.07	.01	-.08	-.05			
10. Subjective Well-being	4.86	1.22	.84	.10	.16*	.16*	.19*	.06	-.27*	.54*	.37*	-.01		
11. PANAS Joviality	2.68	0.96	.93	.21*	.13*	.16*	.13*	.06	-.25*	.34*	.33*	.09	.44*	
12. PANAS General	2.81	0.76	.89	.26*	.20*	.16*	.11*	.10	-.26*	.31*	.40*	.16*	.44*	.79*

Note. M and SD are used to represent mean and standard deviation, respectively. PANAS(joy) and PANAS(gen) represent the Joviality and General subscales of the Positive and Negative Affect Scale, with higher values indicating more positive affect.

* indicates p < .05.

The first regression indicated a main effect for environmental attitudes (B = 0.172, 95%CI [.054, 0.289], SE = 0.065, t = 2.649, p = .008), such that those with more pro-environmental attitudes exhibited more gratitude. The analysis also produced a main effect for the narrative conditions such that those in the high value condition displayed significantly more gratitude than those in the neutral box condition, B = 2.566, 95%CI [0.159, 4.97], SE = 1.228, t = 2.089, p = .037. These main effects were further qualified by a trending environmental attitude X condition interaction effect (B = 0.396, 95%CI [-0.016, .808], SE = 0.210, t = 1.897 p = .059, see Figure 1). As expected, those with a low pro-environmental attitude (-1 SD) expressed significantly more gratitude in the high value condition compared to the neutral box condition, B = 0.886, 95%CI [0.102, 1.67], SE = .40, t = 2.05, p = .045, whereas those higher in environmental attitudes (+1 SD) exhibited no gratitude difference, B = 0.22, 95%CI [-0.764, 1.20], SE = 0.502, t = 0.44, p = .65.

Regressing state gratitude onto the narrative conditions and trait gratitude indicated a main effect of trait gratitude, such that having more trait gratitude was associated with having more state gratitude, B = 0.211, 95%CI [0.09, 4.13], SE = 0.103, t = 2.05 p = .041. Additionally there was a main effect of condition such that state gratitude was greater in the high value condition compared to the neutral box condition, B = 2.452, 95%CI [0.682, 4.230], SE = 0.907, t = 2.7, p = .007. Moreover, there was a significant condition x trait gratitude interaction (B = 0.377, 95%CI [0.076, .678], SE = 0.154, t = 2.45, p = .015; See Figure 2). Further analyses showed that when trait gratitude was low (-1 SD) state gratitude was significantly higher in the high value condition compared to the neutral box condition, B = 1.142, 95%CI [.341, 1.943], SE = 0.409, t = 3.47, p = .001). Conversely, when trait gratitude was high (+1 SD) state gratitude did not differ between the high value and neutral box conditions, B = 0.19, 95%CI [-0.22, 0.60], SE = 0.21, t = 0.93, p = .35.
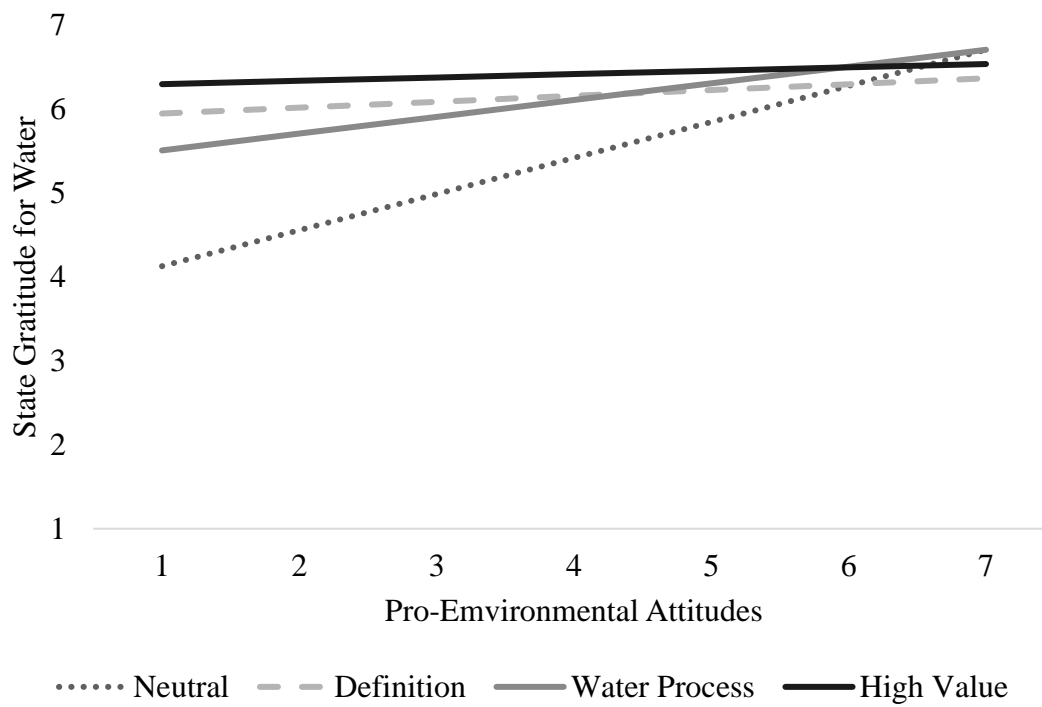
Figure 1. Interaction effect between environmental attitudes and narrative condition on state gratitude from Study 1.
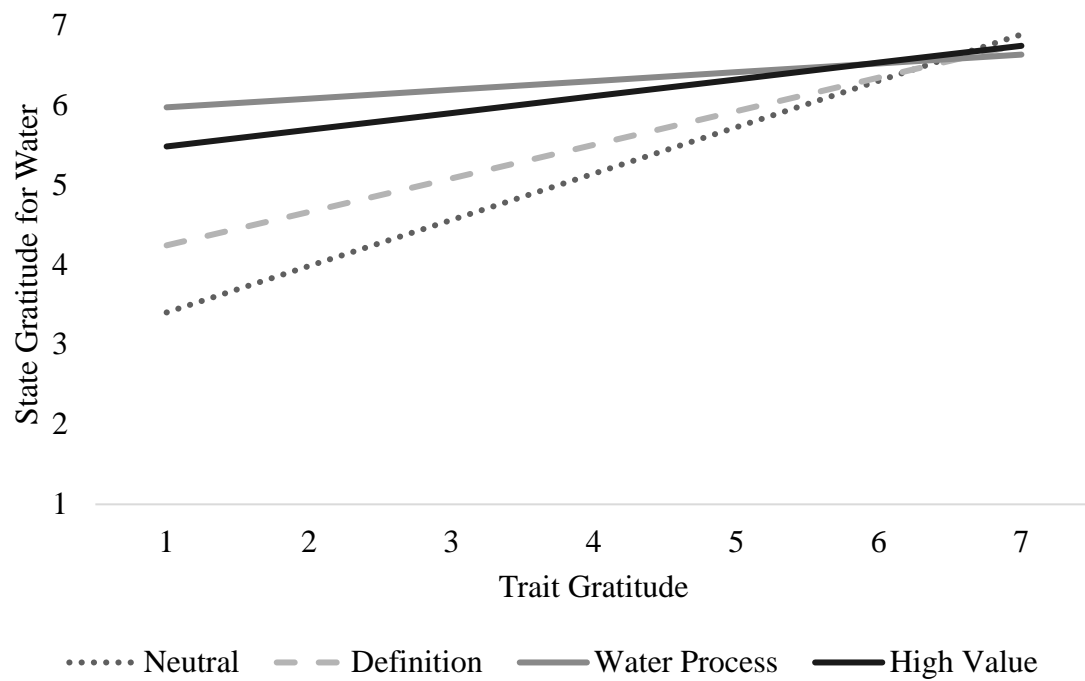
Figure 2. Interaction effect between environmental attitudes and narrative condition on state gratitude from Study 1.

In the model including political orientation as a moderator, I found a main effect, such that more conservative people experienced less gratitude for water, B = -0.33, 95%CI [-.55, -.11], SE = 0.114, t = 2.92 p = .003. No other significant effects emerged (ps > .12). For the model including anthropomorphism, there was a trending effect, such that more anthropomorphizing was associated with increased gratitude, B = 0.18, 95%CI [0.09, 4.13], SE = 0.102, t = 1.80 p = .073. No other significant effects emerged (ps > .40). For locus of control model, I found a significant main effect, such that those with a more internal locus of control were more grateful B = 0.289, 95%CI [0.044, 0.534], SE = 0.125, t = 2.29 p = .022. No other significant effects emerged (ps > .43). In the model with religiosity as a moderator, I found no significant effects (all ps > .11).

Mediation Analyses

I used Hayes Process Model Macro with 5000 Bootstrap simulated samples to test two mediational effects: one in which narrative condition predicts needfulness of water, which predicts gratitude for water, and another test in which narrative condition predicts value of water, which predicts gratitude for water. For these analyses, the narrative condition variable was collapsed to reflect the difference between the high value condition and the aggregate of the three control conditions.

The first analysis showed a significant indirect mediation effect, such that the high value condition predicted the degree to which water fulfilled needs (β = 0.876, SE = .267, p = .001), which in turn predicted state gratitude for water (β = 0.136, SE = 0.023, p < .001). The overall indirect effect was significant, (β = 0.119, SE = 0.037, 95% CI [0.059, 0.203].

The second analysis also revealed an indirect mediation effect, such that the high value condition predicted the degree to which water was viewed as valuable (β = 0.174, SE = .096, p = .069), which in turn predicted state gratitude for water (β = 0.4828, SE = 0.063, p < .001). The overall indirect effect was significant, (β = 0.084, SE = 0.041, 95% CI [0.013, 0.172].

Supplementary Analyses

I also completed some exploratory analyses. I examined the effect of the narrative conditions on general positive emotion and joviality. There were no significant effects of on joviality (ps > .53) or positive emotion (ps > .12).

In addition, recall that one narrative condition discussed cardboard boxes and one of the distractor items assessed state gratitude for cardboard boxes, thus I examined the effect of narrative condition on gratitude for cardboard boxes. Interestingly, those in the box condition reported significantly more gratitude for cardboard than those in the water process condition ($B = 0.678$, 95% CI [0.21, 1.13], $SE = 0.237$, $t = 2.86$, $p = .004$), those in the definition condition ($B = 0.769$, 95% CI [0.30, 1.24], $SE = 0.238$, $t = 3.23$, $p = .001$), and trending more gratitude for cardboard than those in the high value condition ($B = 0.463$, 95% CI [-0.01, 0.931], $SE = 0.239$, $t = 1.93$, $p = .054$).

I also examined skew and kurtosis for the key outcome variable, state gratitude for water. The measure had a kurtosis of 6.35, indicating a leptokurtic distribution, and a skewness of -2.24, indicating the presence of negative skew. An examination of the frequency distribution showed that 55.4% of the sample reported a 7 (out of 7) for gratitude for water. Further, I examined the frequency distribution of all the targets for gratitude and found that between 40% to 50% of all respondents indicated feeling the maximum amount of gratitude for almost all of the potential targets of gratitude (water, friends, family, clothes, life itself, food, education, and a place to sleep). The uniformity with which participants reported the highest level of gratitude across all conditions may indicate the presence of a ceiling effect.

Discussion

The results of Study 1 offer some preliminary evidence that the value of a benefit relates to gratitude for that benefit when it does not originate from another person. Specifically, those in the high value and water process conditions indicated that water was more valuable and need-fulfilling in comparison to those in the definition condition and neutral box condition. I unexpectedly found no difference in value/needfulness between the high value and the water process condition. One explanation of this finding is that reminding people of the processes underlying the natural water system might increase the apparent value of the water system by highlighting the complexity and vast forces that enable the water system to function. This conclusion is consistent with previous work showing there are multiple ways to manipulate the value of a benefit (Algoe, et al., 2016; Poelker & Kuebli, 2014; Wood, Brown, & Maltby, 2011; Wood et al., 2008).

The results also revealed that narrative condition interacted with environmental attitudes to influence state gratitude. In general, the more people favor protecting the environment, the more gratitude they express for water. In other words, at high levels of environmental attitude there are no differences between narrative conditions and state gratitude is uniformly high. In contrast, when environmental attitudes are low those in the high value condition display higher state gratitude for water than those in the neutral box condition.

Likewise, the narrative condition also interacted with dispositional gratitude to influence state gratitude, such that people higher in dispositional gratitude exhibit more state gratitude for water. At high levels of trait gratitude no differences emerge between narrative conditions and state gratitude is uniformly high. However, when trait gratitude is low, people in the high value condition exhibit higher state gratitude for water compared to those in the neutral box condition.

One interpretation of this finding is that those who are typically inclined to feel minimal gratitude for water (low trait gratitude or low environmental attitudes) can be induced to feel more gratitude after being exposed to information about the value of water. A statement indicating water's value increases gratitude for water among those who might otherwise tend toward lower levels of gratitude. The narrative value condition might have a stronger effect on such people because they have more room to improve in terms of gratitude. For those whose dispositions already incline them to naturally feel more grateful, the narrative value condition might have little effect because such people are already reporting very high levels of gratitude, and such ceiling effects may mask potential differences for those higher in dispositional gratitude.

Other aspects of the results emphasize the possible interference of ceiling effects. Almost all of the gratitude measures (for water and all other targets) showed that most respondents chose the highest value of the measurement scale. This suggests that people had a tendency to indicate that they were highly grateful for everything, no matter the circumstances. This finding stands in contrast to our pilot study results, which showed that people only reported water as a source of gratitude 10 times out of 1090 reports. From these pilot findings, I suggest that people might over-report their gratitude for water, especially if they have been reminded about water. Such over-reporting might stem from social desirability given that gratitude is a generally desirable trait. From these findings, I adjusted the scale anchors for the gratitude measure in the subsequent studies.

I also examined the effect of narrative condition on positive emotion. There was no effect of condition on general positive emotion, consistent with the interpretation that increases in gratitude between conditions may be specific to gratitude and not an overall increase in positive emotion.

Overall, this work provides initial evidence that some processes underlying gratitude for benefits received from others function similarly to gratitude felt for benefits that have no apparent human benefactor. In previous work examining interpersonal gratitude, the perceived value of a benefit has been shown to impact feelings of gratitude (Wood et al., 2008). The present study expands on this finding, showing that the more people value an impersonal benefit like natural water resources, the more gratitude they feel for those resources. Furthermore, this work provides evidence consistent with past work that state gratitude depends in part on individual differences, specifically, in the current study, trait gratitude and environmental attitudes. This finding is consistent with past work on interpersonal gratitude showing that pre-existing attitudes about the source of the benefit and trait gratitude can influence the degree of gratitude one feels for a particular benefit (Wood et al., 2008; Algoe & Zhaoyang, 2016).

STUDY 2

Whereas Study 1 examined and showed the effect of benefit value on impersonal gratitude, Study 2 expands the exploration of impersonal gratitude by investigating the impact of a novel factor on feelings of gratitude: benefit uncertainty. Often, people who experience loss avow a common aphorism: "I never really appreciated what I had, until I didn't have it anymore." In other words, people may experience limited gratitude for a benefit until the absence of the benefit prompts them to recognize the benefit's value and relevance, triggering a post-hoc experience of increased gratitude. This is consistent with the philosophy of the Greek Stoics, who advised people to imagine the loss or absence of valued things as an emotional mechanism to instill and maintain a healthy level of appreciation (Irvine, 2008).

Finding an element of truth in such lay wisdom, I posit that the degree to which people experience impersonal gratitude relates to the certainty with which people perceive that a given source will continue to provide relevant and valued benefits. Put simply, if an individual perceives that an impersonal benefit's continued occurrence is relatively guaranteed, he/she may take the benefit for granted, and subsequently experience less gratitude for the benefit and its originating source. Conversely, if people perceive that the continued receipt of a benefit is uncertain, they should be less inclined to take the benefit for granted, and as such, they should experience more gratitude for the benefit and source. In what follows, I outline the underlying rationale and review both the theory and research that offers support for the proposed relationship between impersonal gratitude and benefit certainty.

Theorists make a compelling argument that interpersonal gratitude signals the presence of important, positive beneficial sources, motivates people to build and expand personal resources, and prompts people to behave in a manner that fosters and promotes social bonding with the source, thus bolstering the likelihood that the beneficiary will continue to receive these social benefits in the future (Algoe, 2012; Fredrickson, 2004; Wood at al., 2010). I reasoned that because gratitude prompts the cultivation of beneficial sources, which enhances the likelihood of continued benefits, feelings of gratitude should be sensitive to signals that indicate whether or not it would be possible and fruitful to cultivate a relationship with the source. The certainty with which people presume a benefit will occur may represent one such signal.

For instance, a beneficiary may perceive that benefits (current or future) from a source are nearly guaranteed to occur with a high degree of certainty, irrespective of how he/she behaves towards the source. Due to the presumed certainty of receiving the benefit, the beneficiary may be less motivated to engage in grateful behavior to enhance the continued receipt of future benefits from the originating source. Some impersonal benefits can occur with an obvious degree of presumed certainty, for instance, one can imagine the benefits of light and heat that are associated with the sun. For all intent and purposes, people can presume that the sun will rise each morning regardless of how they behave toward the sun, or even if they feel little gratitude for the sun's benefits. Put differently, people's presumed inability to behaviorally affect such sources and benefits, coupled with the perceived certainty of the benefit's occurrence, may neutralize or impede people's motivation to strengthen and protect these beneficial sources, and as such, people should experience less gratitude for the benefits. This mechanism is similar to other motivational processes which are aimed at preventing people from inefficiently engaging in redundant behaviors to continue pursuing an outcome that has already occurred (Bagozzi & Pieters, 1998; Forster, Lieberman, & Higgins, 2005). The perceived certainty of a benefit should influence the degree to which people feel gratitude, because, in part, gratitude occurs to bolster the likelihood that future benefits will continue to occur, and it would seem that when a benefit is presumed to occur continuously with near 100% certainty, people will feel relatively less inclined to engage in behavior to ensure the continuation of the benefits, and will likely experience less gratitude.

Moreover, indirect hints concerning uncertainty emerge in Watkins' (2014) theoretical analysis in which he describes how the perceived "gratuitousness" of a benefit influences people's sense of gratitude. His use of gratuitousness refers to something that is given, done, or bestowed freely and voluntarily without return benefit or compensation expected (Merriam-Webster). Watkins further argues that when perceived gratuitousness is high, the provided gift/benefit is often considered as relatively unexpected and surprising, which, in turn, kindles increased levels of gratitude (Watkins, 2014). This reasoning partly explains why gratitude is typically lower when a beneficiary perceives that the benefactor is providing the benefit because of a requirement rather than for gratuitous motivations. For instance, children experience less gratitude for being chosen as a team member when the choice is mandated by a league policy. Hence, they perceive their assignment to the team as expected and unsurprising; that is, assignment to the team was guaranteed and certain. By comparison, children experience more gratitude when their assignment

to the team is done voluntarily and freely. In this case, they may perceive their assignment to the team as relatively unexpected and surprising; that is, assignment to the team was uncertain and not guaranteed (Graham, 1988). Watkins's theoretical perspective describing some interpersonal benefits as unexpected and surprising indirectly links the perceived uncertainty of receiving a benefit to the degree to which people experience an increased sense of gratitude. Following this work, I reasoned that perceiving the receipt of an impersonal benefit as uncertain (vs. certain) should lead people to experience increased gratitude, much in the same manner that people experience more gratitude for unexpected and surprising benefits.

An underlying rationale connecting feelings of gratitude to the certainty of a benefit may also involve the degree to which people become emotionally habituated to a particular benefit. We find support linking benefit certainty and habituation to gratitude in Watkins' (2014) proposition that "when a benefit is experienced consistently we adapt to it, tend to take it for granted, and then fail to notice or appreciate it (pg. 111)." As described by Frijda (1988; 2007), the Emotional Law of Habituation states that events may elicit strong emotions at the outset, but as the eliciting event continues to recur, emotional reactions to the ongoing event diminish to a relatively low set point. Moreover, when people habituate to an event, the event is considered less important, less attention-grabbing, and the event has less impact on people's emotions, including feelings of gratitude (Dijksterhuis & Smith, 2002; Frijda, 1988; Rankin et al., 2009; Watkins, 2014). Thus, when people regard a source as consistently providing reliable access to a predictable benefit, they may perceive the availability of the benefit with near certainty, and thus, may habituate to the benefit. To the extent a benefit is perceived as certain people should habituate to it, and the more they habituate, the less they should feel gratitude for that benefit. Conversely, if receipt of the benefit is uncertain, people should be less likely to habituate, and feelings of gratitude should increase.

Although there is no direct work examining certainty and gratitude, a number of studies reveal that positive emotions tend to increase when people imagine how a positive benefit that has already occurred might not have actually happened (Gordon et al., 2004; Koo et al., 2008; Sacco et al., 2014). Likewise, situations that indirectly highlight the idea that valued benefits might cease to exist prompt increased feelings of gratitude. For instance, gratitude increases when people reflect on their own death, and people feel more gratitude after experiencing and surviving a life-threatening illness, or when they imagine that the personal consequences of a natural disaster could have been worse (Frias et al., 2011; Sacco et al., 2014; Teigen, 1997; Teigen & Jensen, 2010).

Although these research examples did not examine uncertainty, they indirectly represent situations that conceptually relate to the perceived uncertainty of receiving a benefit. That is, experiencing near *misses* or imagining how some benefit might have never been, or even reflecting on the loss of one's life may underscore the notion that some benefits in life are not guaranteed and should not be taken for granted, and when these experiences do occur people feel increased gratitude. In a similar manner, I reasoned that if people perceive the receipt of an impersonal benefit (e.g. water supplies) as uncertain (vs. certain) and potentially limited or finite, they should experience heightened feelings of gratitude.

Moreover, research examining the scarcity of goods offers indirect support for a potential relationship between feelings of gratitude and the perceived certainty of receiving a benefit. For instance, people often perceive goods or resources that are scarce (vs. not scarce) to be of greater value (Lynn, 1991). Characterizing goods as scarce indicates that the goods are restricted in quantity, and are not plentiful or abundant, and may be difficult to attain. I posit that scarcity of goods is akin to suggesting that the receipt of a benefit is quite uncertain. As such, uncertain (vs. certain) benefits should likewise be more valued, and when benefits are perceived as more valued, people experience increased feelings of gratitude (Wood et al., 2008).

Other supportive evidence indicates that people experience less gratitude for the same benefit (i.e., getting a ride) when their own mother (vs. stranger) provides the benefit (Bar-Tal et al., 1977). Although there are various reasons that a mother's help perceptually differs from a stranger's help, one potential distinction that may partly explain the finding may lie in the certainty with which an individual normatively expects to receive help from each respective source, that is, his/her mother or a stranger. As theorists note, a person would typically expect his/her mother to offer help, whereas a stranger offering help would be relatively unexpected and surprising (Watkins, 2014). Said differently, with a relatively high degree of certainty, people generally assume and would not be surprised if their mother provided them with help (i.e., benefit). And because the mother-child bond, on average, is relatively strong and unconditional, people typically presume that they do not have to engage in "*extra bonding behavior*" to increase the already greater likelihood of receiving their mother's help. In other words, they might be quite certain that their mother will help them regardless of whether they express feelings of gratitude to her. As discussed earlier, perceiving the receipt of a benefit as more certain (e.g. a mother's help) can lead people to habituate to the benefit, consequently decreasing how much gratitude one feels for the benefit. In

comparison, habituation to a benefit is less likely to happen when people perceive the receipt of a benefit as more uncertain (e.g. a stranger's help), and to the extent the benefit is perceived as uncertain, people should experience more gratitude for the benefit.

Although indirect evidence and theory are supportive, there is no work to date that examines the relationship between perceived certainty and impersonal gratitude. The current study is an attempt to fill this gap. Following both theory and research, I reasoned that the certainty with which people perceive that a given source will continue to provide valued benefits should influence the degree to which people experience impersonal gratitude.

> Hypothesis 2: An impersonal benefit that is perceived to be more (vs. less) uncertain (i.e., there is a meaningful likelihood that the ongoing benefit will be lost) should lead to a greater sense of gratitude for the benefit (and source).

To assess the degree to which perceived benefit uncertainty relates to feelings of gratitude, I manipulate perceptions of benefit uncertainty using four vignettes conceptually similar to those used in Study 1. Specifically, participants will be assigned to a higher certainty condition, a lower certainty condition, or to one of the two control conditions (i.e., neutral or definition condition) used in Study 1.

Methods

Participants

Subjects were recruited via Amazon's Mechanical Turk (limited to those who reported that they lived in the United States) and paid $1 for participation. An initial sample of 388 responses were recorded. Of those, 59 responses were removed from the dataset for suspected illegitimate responding (e.g. not following instructions, suspected bot responses), leaving a final sample of 329 (129 female) respondents. Study 2's power an analysis was based on the same literature noted in Study 1. With alpha set to .05 and power set to .8, the present design examining four groups require a sample size of 236. The final sample self-described as 7.9% Asian, 9.1% Black, 4.9% Hispanic, 4.3% Native American, 76.3% White, and 0.9% other. The sample was on average 40.42 years old.

Materials

In the present study, participants were randomly assigned to read one of four narrative conditions (i.e., higher certainty, lower certainty, neutral, or definition; using the same reading time procedures as used in Study 1). The construction of the higher and lower certainty vignettes (approximately 400 words) are based on and adapted from prior work (e.g., Frias et al., 2011; Koo et al., 2008; Sacco et al., 2014; Tiegen et al., 1997; 2011).

Low certainty condition. In brief, participants in the low certainty condition read a statement describing how the benefits of water are fragile and could be lost.

> The Earth's natural water ecosystem is a resource that takes many forms and extends all over the world. Although you may not often think about how you use water and the ecological source from which it emerges, water, nonetheless, is a vital element of life and of your daily needs. While the water ecosystem is an important source of benefits, it is also very fragile and its benefits could be easily lost. Because the water system is so inter-connected, a problem in one part of the system can negatively impact the water ecosystem on a larger scale. As such, the water ecosystem can be disrupted very easily by human-made or natural weather occurrences and these disruptions can be permanent. For instance, if a toxic substance enters the ground water, it may be impossible to remove and local groundwater can be forever tainted. Similarly, in ocean-side communities, natural droughts lower fresh-water levels and salty sea water flows into these empty spaces. The salt makes rivers and ground water forever unsuitable for humans, plants, and animals. To illustrate how such issues can affect you, consider areas of sub-Saharan Africa, which are experiencing a severe water crisis. These problems also affect local communities closer to home. Flint Michigan is infamously still struggling with severe lead contaminated water problems. Additionally, at one point the Cuyahoga River running through Cleveland Ohio was so heavily polluted that the water itself caught fire. Vast stretches of the American southwest and California are also currently struggling with water shortages from over-use. These communities must ration their water to cope. Even if your community hasn't lost access to water, it has likely experienced serious water concerns, including aging water utilities, growing pollution, and increasing water use, which all place increasing burdens and pressure on your water supply.
>
> Because of these many reasons, unfortunately the safety of your water ecosystem is insecure and it can be severely disrupted by various concerns. As a result, your water accessibility remains very uncertain and may not always continue to provide you with its many benefits.

High certainty condition. In the high certainty condition, participants read a vignette describing the robustness of the water ecosystem and its continued accessibility.

The Earth's natural water ecosystem is a resource that takes many forms and extends all over the world. Although we may not often think about how we use it and the ecological source from which it emerges, water is a vital element of life. Importantly, the water ecosystem is a very secure system and its continued access is considered fully reliable and dependable. The water process is an enormous global system, and no major issues could realistically upset the entirety of our water ecosystem. Indeed, the water ecosystem has functioned in much the same way for billions of years, since the very birth of the earth, surviving many major natural ecological challenges. Perhaps some natural or human-made impurity could contaminate a small region of water temporarily, but the processes involved in the global water cycle have significant power to refresh and revitalize contaminated areas quickly. For instance, sponge-like underground rock structures naturally filter ground water and evaporation carries away water while leaving behind any contaminants. When this water returns to the earth as rain, it is distilled and pure. Because of processes like these and the vastness of the natural water cycle, the availability of our water is essentially guaranteed. To illustrate how robust and reliable our water ecosystem is, consider that some ancient communities in Asia and Europe have received pure water from the same wells or rivers for thousands of years without interruption. Making the water we enjoy even more certain, city, state, and national government agencies using modern science and engineering exist to ensure the continued availability of our water sources.

Because of these many reasons, you can be comfortably assured that our water ecosystem is reliable and durable, and with a near sense of complete certainty, you can expect that water will continue to provide you with the many benefits that you currently enjoy.

In addition to the high and low certainty conditions, Study 2 also used the same two control vignettes used in Study 1, including the neutral box condition and the definition condition listing the Merriam-webster definition of water.

Procedure

        Gratitude measure. Following exposure to the vignette, participants completed the same 3 items from the Gratitude Adjective checklist (i.e., grateful, thankful, and appreciative) that were used in Study 1, again embedded within distractor items. These 3 items constitute the primary dependent variable. Study 1 showed that ceiling effects might have influenced the responses to these gratitude items, thus, the anchor points of the responses were adjusted. Specifically, the 1 to 7 scale was anchored at 1 = not at all grateful, 4 = very grateful, and 7 = the most grateful I have ever felt. The adjustment appeared to be successful, with only 28% of the sample reporting the highest levels of gratitude and skew (-0.92) and kurtosis (0.59) in acceptable ranges (between +2 and -2; Gravetter & Wallnau, 2012).

        Manipulation checks and certainty beliefs. After completing these items, participants completed 20 manipulation check items to assess the degree to which participants view the availability of water as certain/uncertain (i.e., see Appendix J). These items come from the Intergovernmental Panel on Climate Change Likelihood scale (Mastrandrea et al., 2010), which provides standardized/validated language to assess people's certainty beliefs that a given event will occur using two separate response forms. For instance, items from the first scale include, "How likely is it you will have access to fresh water when you need it, for the rest of your life" using the following scale: 1 (exceptionally unlikely that I will have water access), 2 (very unlikely that I will have water access), 3 (unlikely that I will have water access (, 4 (about as likely as not that I will have water access), 5 (likely that I will have water access), 6 (very likely that I will have water access, and 7 (virtually certain that I will have water access). For the second part of the scale, participants respond to the same questions using probability responses: 1 (0 - 1 % probability I will have water access), 2 (0 - 10% probability I will have water access), 3 (0-33% probability I will have water access), 4 (33-66% probability I will have water access), 5 (66-100% probability I will have water access), 6 (90-100% probability I will have water access), 7 (99-100% probability I will have water access). In addition, participants answered the same value manipulation checks that were used in Study 1. While Study 2 focuses on the effects of certainty on gratitude rather than value, there is some reason to believe that perceptions of certainty may relate to value, given that rare and uncertain commodities tend to be rated as more valued (e.g. relationship between scarcity and value; Lynn, 1991).

Individual difference measures. Moreover, participants completed a shortened subset of the same individual difference measures used in Study 1, including shortened versions of full scales used in Study 1. Specifically, participants completed single item measures of religiosity and spirituality items from the Duke Religion Index, the single item liberalism-conservativism question from the IPIP Liberalism scale, the full Eco-centric Concern Scale from the Environmental Attitudes Inventory, and the full GQ6 trait gratitude scale. Participants also completed a five-item satisfaction with life questionnaire (Diener, Emmons, Larsen, & Griffin, 1985; see Appendix M) and provided the same demographic information as in Study 1.

Results and Discussion

Manipulation Check

To examine the effect of the narrative statements, I regressed certainty beliefs of water onto the four narrative conditions (high certainty, low certainty, definition of water, and neutral box). There was a significant effect of narrative condition such that those who read that water resources were low certainty perceived continued access to water as less certain ($M = 5.00$, $SD = 0.96$) than those who read that water resources were highly certain ($M = 5.31$, $SD = 1.03$), $B = 0.31$, 95% CI [0.001, 0.600], $SE = 0.154$, $t = 2.02$, $p = .044$. The low certainty condition did not differ from the neutral condition ($M = 5.26$, $SD = 0.85$) or the definition condition ($M = 5.12$, $SD = 1.04$), $ps > .12$). Likewise, the high certainty condition did not differ from the two neutral control groups, $ps > .188$.

Effects of Condition and Individual Differences on Gratitude

Correlations, means, standard deviations and reliabilities of all measured variables are reported in Table 2. Unexpectedly, water certainty beliefs did not correlate with gratitude for water ($p > .05$). However, subjective wellbeing was significantly correlated with state gratitude for water.

Table 2. Means, Standard Deviations, Reliability and Correlations For Measured Variables in Study 2

Variable	M	SD	α	1	2	3	4	5	6	7	8
1. State Gratitude for Water	5.82	1.13	.91								
2. Certainty of Water	5.17	0.99	.92	.05							
3. Political Conservativism	4.51	2.44	-	.06	-.04						
4. Religiosity	3.96	2.21	-	.17*	-.11*	.43*					
5. Spirituality	4.44	2.08	-	.22*	-.21*	.29*	.72*				
6. Water Value	6.52	0.76	.79	.31*	.28*	-.08	-.04	-.04			
7. Pro-environmentalism	5.75	1.02	.87	.19*	.41*	-.34*	-.24*	-.18*	.48*		
8. Trait Gratitude	5.46	1.15	.86	.36*	.27*	.03	.15*	.24*	.34*	.43*	
9. Subjective Well-being	4.66	1.45	.92	.22*	-.05	.21*	.29*	.31*	.07	-.12*	.41*

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. The confidence interval is a plausible range of population correlations that could have caused the sample correlation (Cumming, 2014).

* indicates *p* < .05.

As an initial test of main hypotheses, I examined the effect of narrative condition on gratitude for water by regressing state gratitude onto the narrative conditions. State gratitude did not differ between the low certainty condition ($M = 5.84$, $SD = 1.08$), the high certainty condition ($M = 5.88$, $SD = 1.13$), the definition condition, ($M = 5.88$, $SD = 1.12$), or the neutral condition ($M = 5.62$, $SD = 1.21$), all $ps > 0.22$. As a supplemental test, I also regressed state gratitude onto the narrative conditions paired with one individual difference (i.e., environmental attitudes, trait gratitude, religiosity, spirituality, and political attitudes) and their two-way interactions.

In the model in which trait gratitude was included, there was a significant main effect of trait gratitude, such that those with higher trait gratitude exhibited more state gratitude, $B = 0.37$, 95% CI [0.268, 0.472], $SE = 0.051$, $t = 7.19$, $p < .001$. There was also a significant main effect of condition, such that those in the low certainty condition were more grateful than those in the neutral box condition $B = 0.37$, 95% CI [0.03, 0.71], $SE = 0.174$, $t = 2.12$, $p = .03$. The interaction was not significant, $p = .101$. When religiosity was included in the model, there was a main effect, such that more religious people were more grateful, $B = 0.10$, 95% CI [-0.007, 0.207], $SE = 0.055$, $t = 1.948$, $p = .05$. No other significant effects emerged, $ps > .51$. In the model in which spirituality was included as a moderator, there was a significant effect of spirituality such that more spiritual people were more grateful, $B = 0.19$, 95% CI [0.070, 0.310], $SE = 0.061$, $t = 3.24$, $p = .001$. No other significant effects emerged, $ps > .11$. No significant effects emerged in the model including political orientation ($ps > .56$) or environmental attitudes ($ps > .14$).

I also regressed state gratitude for water onto certainty beliefs paired with one individual difference variable (i.e., environmental attitude, trait gratitude, religiosity, spirituality, political orientation, value of water), and their two-way interactions.

When religiosity was included in the model, there was a significant main effect of religiosity, such that more religious people were less grateful, $B = -0.33$, 95% CI [-0.63, -0.03], $SE = 0.154$, $t = 2.16$, $p = .005$. Additionally, there was a nearly significant effect of certainty beliefs, such that more certainty was associated with less gratitude $B = -0.257$, 95% CI [-0.522, 0.007], $SE = 0.135$, $t = 1.90$, $p = .057$. The interaction was not significant, $p = .34$.

For the model including water value, there was a main effect of certainty, such that greater certainty was associated with less gratitude $B = -1.05$, 95% CI [-2.11, 0.01], $SE = 0.541$, $t = 1.93$, $p = .054$; the effect of water value was not significant $B = -0.08$, 95% CI [-0.321, 0.161], $SE = 0.123$, $t = 0.71$, $p = .477$. The main effect was qualified by an interaction effect $B = 0.049$, 95% CI

[0.000, 0.980], *SE* = 0.025, *t* = 1.93, *p* = .054. Probing the interaction revealed that water value positively predicted state gratitude for water when certainty belief was high (+1 *SD*), *B* = 0.351, 95% CI [0.200, 0.502] *SE* = 0.077, *t* = 4.56, *p* < .001. However, when certainty belief was low (-1 *SD*), the relationship between water value and gratitude weakened, moving to non-significance, *B* = 0.089, 95% CI [-0.003, 0.181], *SE* = 0.047, *t* = 1.90, *p* = .062, see Figure 3.

No significant effects emerged in the models that included, respectively, environmental attitudes (*p*s > .65), trait gratitude (*p*s > .17), spirituality (*p*s > .19), or political orientation (*p*s > .31).

Effects of Condition and Individual Differences on Water Value

I also conducted models in which water value was regressed onto narrative condition paired with one individual difference measure (i.e., environmental attitude, trait gratitude, religiosity, spirituality, political orientation) and their two-way interaction.

In the model including environmental attitudes, there was a significant main effect of environmental attitudes, such that pro-environmental attitudes were associated with greater water value, *B* = 0.211, 95% CI [0.062, 0.360], *SE* = 0.076, *t* = 2.771, *p* = .006. Similarly, there was a significant effect of narrative condition, such that those in the low certainty condition indicated water was more valuable than those in the neutral box condition (*B* = 1.533, 95% CI [0.209, 2.857], *SE* = 0.676, *t* = 2.26, *p* = .024) and those in the definition condition (*B* = 1.186, 95% CI [0.034, 2.335], *SE* = 0.586, *t* = 2.03, *p* = .044); no difference emerged between the low certainty and high certainty conditions (*p* > .11). These main effects were qualified by a significant interaction effect (*B* = 0.256, 95% CI [0.032, 0.481], *SE* = 0.115, *t* = 2.22, *p* = .027). Probes at low environmental attitudes (-1 *SD*) revealed an effect, such that those in the low certainty condition perceived water as more valuable (*M* = 6.37, *SD* =0.58) than those in the neutral box condition (*M* = 5.96, *SD* = .96), *p* = .057. Conversely, high environmental attitudes (+1 *SD*), revealed a cross-over effect, such that those in the uncertain condition perceived water as significantly *less* valuable (*M* = 6.65, *SD* = 0.58) than those in the neutral box condition (*M* = 6.84, *SD* = .4), *p* = .038.

For the model with trait gratitude, I found a significant main effect of trait gratitude such that higher trait gratitude is associated with greater water value, *B* = 0.189, 95% CI [0.056, 0.322], *SE* = 0.068, *t* = 2.78, *p* = .005. No other significant effects emerged (*p*s > 0.43).
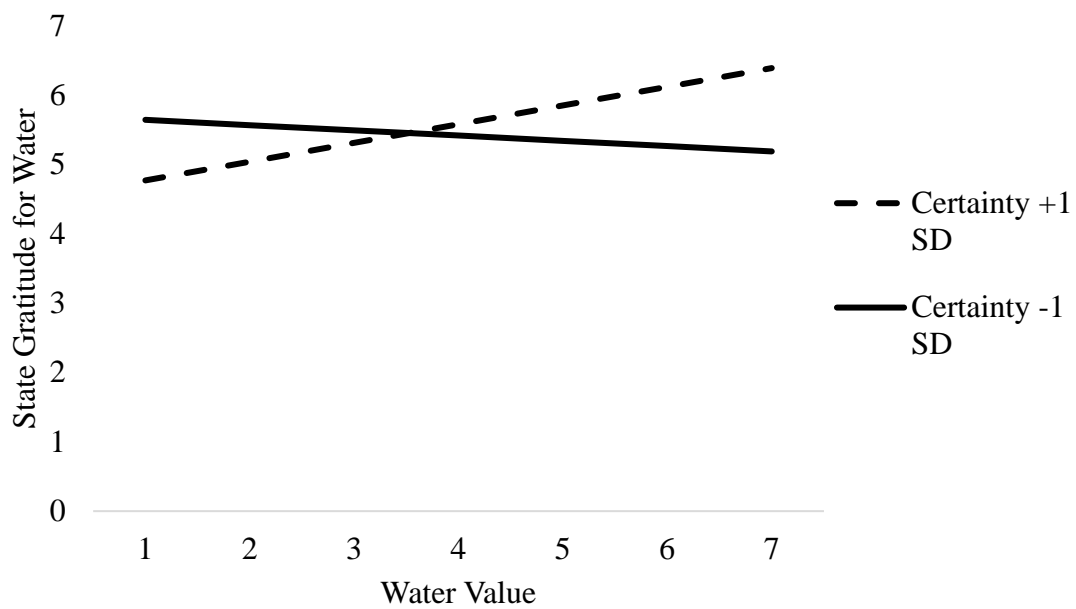
Figure 3. Effect of rating of water value on state gratitude for water at different levels of measured certainty beliefs from Study 2.

No significant effects emerged in the models that included, respectively, religiosity (ps > .29), spirituality (ps > .19), or political orientation (ps > .56).

Discussion

Lay wisdom, philosophy, and theory, suggest that gratitude for a given benefit should increase when that benefit is seen as uncertain and decrease when a benefit is consistently guaranteed to be available (Frias, et al., 2011; Watkins 2014, Irvine 2008). When a resource is dependably available, those who enjoy it begin to expect its presence, habituate to it, and take it for granted (Watkins 2014; Frijda 1986). Conversely, when people are reminded that a benefit might be lost, appreciation for that benefit and related positive emotions like gratitude should increase, motivating the beneficiary to make the most of and protect the potentially losable benefit. Indeed, past work has shown that gratitude tends to increase in circumstances that highlight the fleeting nature of the goods in life, like reminders of death or near misses with disasters (Frias et al., 2011; Teigen, 1997). Study 2 provides the first empirical test of the relationship between certainty and gratitude.

While Study 2 provided evidence that the narrative manipulations successfully altered beliefs about the certainty with which water resources were available, there was no main effect of either narrative condition or certainty on state gratitude, contrary to predictions. Despite this, Study 2 did demonstrate some qualified relationships between manipulated water certainty and gratitude. Specifically, when individual differences in trait gratitude are statistically controlled, those in the low certainty condition did express more gratitude for water than those exposed to a neutral statement about an unrelated topic. Similarly, greater measured certainty beliefs about accessibility to water predict lower gratitude, when religiosity is also statistically controlled in the model. These results are consistent with findings in Study 1 and past research showing that gratitude for a particular benefit is partially a function of individual differences in trait gratitude that can alter the way people interpret and appreciate particular benefits (wood et al., 2008). By controlling for these influences and thus reducing error variance, it may have been easier to observe the effects of narrative condition on state gratitude. While qualified, these findings provide some initial evidence that manipulated or measured certainty of water relates to gratitude for water in expected ways.

Similarly, those in the low water certainty narrative rated water resources as more valuable, but only if they were low in pro-environmental attitudes. This finding is consistent with research

showing that benefit uncertainty should relate to benefit value because uncertain resources are scarce and scarcity is a cue for value (Lynn, 1991). Furthermore, these results are consistent with Study 1 because predicted conditional differences emerged among those low in environmental attitudes, suggesting that such narrative manipulations may have their greatest effect among those who have the most room to improve. While no effect on gratitude was obtained, this relationship between certainty narrative condition and value may still be meaningful since benefit value is relative to benefit gratitude.

Finally, Study 2 showed that certainty beliefs relate to gratitude for water, but only when judgements of water value are also considered. That is, water value predicts gratitude for the resource when there is high certainty that water will be consistently available. While this result implies that beliefs about the certainty of a benefit are relevant to gratitude judgements, this result was unpredicted. One interpretation of this result is that benefit value inspires greater gratitude but only if there is some possibility that one will be able to access the valuable thing. If certainty is very low such that one is not sure they will be able to access the resource at all, it would make sense not to appreciate it regardless of its value since you functionally don't have the benefit.

Overall, these findings suggest a few conclusions. First, Study 2 fits with the findings of Study 1 in showing that environmental attitudes, trait gratitude, and momentary judgements about the value of water consistently emerge as moderators or covariates of the effect narrative condition has on perceptions of water's value and gratitude for water. Additionally, Study 2 provides initial evidence that the certainty with which a benefit is available does impact gratitude for that benefit. This work expands our current understanding of gratitude by identifying a novel factor that affects benefit gratitude and the related variable of benefit value.

STUDY 3

The first two experiments focused on possible antecedents (i.e., value, uncertainty) that promote or constrain feelings of impersonal gratitude. With Experiment 3, I examine whether feelings of gratitude for an impersonal benefit influence people's motivation/behavior to preserve and bolster the originating source of the benefit. To the best of my knowledge, there is no work investigating the resulting behavioral motivations associated with impersonal gratitude. However, suggestive traces can be gleaned from both theory and research examining feelings of gratitude for interpersonal benefits. In what follows, I outline relevant work and summarize the underlying rationale.

As noted in the introduction, theorists following the Find, Bind, and Remind model propose an evolutionarily adaptive account to explain the essential functions of interpersonal gratitude (Algoe, 2012). Specifically, Algoe and colleagues propose that feelings of interpersonal gratitude signals that a benefactor cares for the beneficiary and is providing a valued benefit for intrinsic beneficiary-centered motives. Accordingly, when a caring benefactor is identified, feelings of gratitude prompt the beneficiary to build, develop, and enhance social and relational bonds with the benefactor. Such bonding behavior includes increased communal motivation and pro-relationship behaviors, which in turn, increases/maintains the likelihood of receiving future benefits from the benefactor (Algoe, 2012; Grant & Gino, 2010; Panagopoulos, 2011; Williams & Bartlett, 2014). In support, ample evidence reveals that gratitude for an interpersonal benefit results in beneficiaries experiencing a host of relationship-building motivations, for instance, they experience increased intentions to affiliate, greater levels of relationship commitment, and an enhanced sense of shared community felt toward the benefactor (Gino & Gino, 2010; Lambert & Fincham, 2011; Williams & Bartlett, 2014). Evidence further shows that feelings of interpersonal gratitude, and the subsequent social bonding behaviors that emerge do actually serve to increase the likelihood that a benefactor will continue to provide additional benefits, ultimately increasing the beneficiary's general wellbeing (Alkozei, Smith, & Killgore, 2018; Clark, Northrop, & Barkshire, 1988; Crano & Sivacek, 1982; Goldman, Seever, & Seever, 1982; Grant & Gino, 2010; McCullough, et al., 2003; Rind & Bordia, 1995). Overall, gratitude promotes behaviors that adaptively foster interpersonal sources of benefit, functioning to develop mutually rewarding

social relationships and the further communal exchange of benefits, which subsequently promotes and increases people's sense of wellbeing.

In accord with the Find, Bind, and Remind Theory, interpersonal gratitude is typically felt toward other people (i.e., human benefactor). As noted earlier, gratitude helps beneficiaries recognize and identify the source (i.e., others) of a benefit, and functions to encourage bonding behaviors that promote the likelihood that the source will continue to provide valued benefits, which have known positive consequences for the beneficiary's survival and overall wellbeing (Algoe, 2012). By comparison, situations that involve impersonal gratitude comprise benefits that emerge from non-human sources (e.g., benefits that stem from the natural environment; food, water, air). Whereas interpersonal gratitude serves to identify the human source of a benefit and is thought to promote social behaviors to nurture and maintain a social relationship with the source (i.e., a human benefactor), I posit that impersonal gratitude may function in a more generalized manner beyond enhancing the facilitation of social and relational bonds, and might more generally prompt behaviors to nurture and build impersonal sources of benefits. Specifically, impersonal gratitude should also help people identify the non-human source of a benefit and likewise, should encourage favorable and constructive behaviors that serve to promote and safeguard a beneficial source, in this case, a non-human source.

Various theoretical accounts of gratitude have proposed a similar perspective, suggesting, in general, that beyond the building of social and relational bonds, gratitude may also prompt an array of facilitative behaviors that maintain and cultivate any form of benefit that occurs in one's life. For instance, Fitzgerald (1998) posits that feelings of gratitude inculcate a dispositional tendency to behave in a positive and helpful manner aimed at a beneficial source, be it a person or a thing. Similarly, the Broaden and Build theory suggests that positive emotions like gratitude may prompt people to behave in ways that serve to cultivate and build resources (i.e., beneficial sources) of many different kinds (Fredrickson, 2004). Likewise, Wood and colleagues (2010) argue that feelings of gratitude occur in response to any number of positive benefits in life and encourage productive responses that build and protect such benefits.

Consistent with these theoretical accounts, feelings of gratitude for an impersonal benefit should heighten people's motivation to engage in positive behaviors that serve to sustain and cultivate the originating source of a benefit. To date, however, no research has examined this proposition, although limited evidence offers some indirect support. For example, feelings of

gratitude are positively correlated with an internal locus of control (Watkins et al., 2003). This suggests that increased gratitude may be linked to the belief that one is responsible for the goods/resources in one's life, and that one's actions can meaningfully impact the occurrence or absence of these goods (Ajzen, 2002). As such, I reasoned that experiencing increased feelings of gratitude might prompt people to behave in a manner that preserves and nurtures the beneficial resources in their life. Moreover, feeling grateful for the benefit of surviving a natural disaster is positively associated with people engaging in active disaster coping behaviors, and likewise, dispositionally grateful people often cope with troublesome situations by actively engaging in remedial behavior (Henderson, Roberto, & Kamo, 2009; Wood, et al., 2007). Examples of active coping behavior may comprise resource protection efforts, including, for example, people's flood disaster behaviors (e.g., building levees, moving their property to higher ground, or searching through debris for their salvageable possessions; Twigg, 2013). In such cases, grateful people dynamically engage in behavior to protect and sustain their material benefits from continued or impending loss. Research also shows that feelings of gratitude are negatively correlated with materialism, which describes the tendency to link self-value to the monetary value of one's material goods (Lambert, Fincham, Stillman, & Dean, 2009). This suggests that the characteristically negative behaviors associated with materialism (e.g., overly wasteful consumption, increased purchasing of disposable products, and less pro-environmental behaviors (e.g., not recycling, not using recycled goods) (Kilbourne & Pickett, 2008) may be partly constrained by increased feelings of gratitude.

Although some theorists advance the proposal that impersonal gratitude should increase people's motivation to engage in behavior to protect non-human sources of benefits, to date, no work has examined this proposition. The current study is an attempt to fill this gap. Taken together, the supporting lines of work, although indirect and correlational, serve to partly support the idea that feeling more grateful for impersonal benefits/sources (water, sun) should amplify the frequency with which people (or people's motivation to) engage in benefit protection behavior to protect, maintain, and nurture such resources, including a variety of pro-environmental types of behaviors (e.g., environmentally-conscious purchasing, recycling, reduced consumption). For Study 3, I examine the degree to which increased feelings of gratitude influences people's motivation (and behavior) to actively protect and maintain an impersonal benefit/source and whether such motivation, in turn, increases people's overall wellbeing.

Hypothesis 3: Feelings of increased gratitude for an impersonal benefit should enhance people's motivation (and behavior) to protect/maintain/bolster/nurture the integrity of the beneficial source, and consequently such behavior should increase subjective well-being.

Methods

Participants

I sampled 303 undergraduate students at a large midwestern university who completed the study in exchange for course credit. Seven participants were removed from the dataset for failing to follow directions, leaving a final sample of 296 (98 female). Study 3's power an analysis was based on the same literature noted in Study 1 and 2. With alpha set to .05 and power set to .8, the present design examining four groups require a sample size of 236. The final sample was 26.4% Asian, 4.4% Black, 6.1% Hispanic, 1.4% Native American, 1% Pacific Islander, 65.9% white, 1% other. The average age of the sample was 19.62 years.

Materials

Study 3 used the same vignettes in Study 2 to manipulate perceptions of water's certainty/uncertainty, including a high certainty condition, low certainty condition, and the two neutral conditions (i.e., water definition or neutral box condition).

Procedure

Gratitude measures. After reading the vignette, participants completed three items (same as in Study 1) to indicate how much they feel grateful, thankful, and appreciative for water right now. As in Study 2, the scaling of these items was adjusted to reduce ceiling effects (anchored at 1 = not at all; 4 = very; to 7 = the most I have ever felt). These items are adapted from the Gratitude

Adjective checklist (GAC; McCullough, et al., 2002), and constitute the primary dependent variable to assess gratitude. These items were embedded among distractors as in the preceding studies.

Manipulation check, certainty, individual differences. After finishing these items, participants completed the same manipulation check used in Study 1 to assess perceived value using a value item adapted from Wood and colleagues (2008) gratitude scale. Participants also completed the same manipulation check items used in Study 2 to assess the degree to which participants view the availability of water as certain/uncertain (items adapted from the Intergovernmental Panel on Climate Change Likelihood scale, Mastrandrea et al., 2010). Moreover, participants completed the same individual difference measures used in Study 1 (i.e., the full Duke Religion Index, the full IPIP Liberalism scale, the full Eco-centric Concern Scale from the Environmental Attitudes Inventory, the full GQ6 trait gratitude scale, the full Spheres of Control Scale, PANAS-X, and the full IDAQ anthropomorphism scale), and they also provided the same demographic information as in the prior studies. Additionally, participants also completed a five-item satisfaction with life questionnaire (Diener, Emmons, Larsen, & Griffin, 1985; see Appendix M).

Water resource protection motivation and behavior. At this point, participants completed a seven-item scale to measure their intention to engage in water conservation behaviors. Specifically, I used a water conservation behavioral intention questionnaire employed in environmental behavior research (Clark & Finley, 2007; see Appendix N). Specifically, participants indicated their intentions to perform seven common water conservation behaviors in the next year using a seven-point scale anchored at 1 – Strongly Disagree and 7 – Strongly Agree. After completing these items, I assessed a direct measure of water conservation behavioral intentions by providing participants with a pamphlet about a water conservation organization and asking whether participants would assent to providing their email to the organization in order that the agency might contact them about environmental volunteer activities in their area. Participants answered two questions about their willingness to volunteer. Volunteering interests were assessed

with a single item assessing "how interested you are in participating in such volunteer activities" on a seven-point scale anchored at 1 = not at all to 7 = very. Participants also had the opportunity to provide their email to the conservation organization and their decision to provide contact information or not was recorded. This decision represented our main measure of water protection behavior (see Appendix O for pamphlet).

Results and Discussion

Manipulation Checks

All analyses in Study 3 were performed in a multiple regression linear model framework. Initially, I tested the effect of narrative condition on ratings of how certain participants view the future availability of water. Those who in the low certainty condition ($M = 5.01$, $SD = 0.94$) perceived water as significantly less certain than those in the high certainty condition ($M = 5.37$, $SD = 0.82$, $B = 0.354$, 95% CI [0.082, 0.626], $SE = 0.139$, $t = 2.54$, $p = .012$), those in the definition condition ($M = 5.59$, $SD = 0.78$, $B = 0.577$, 95% CI [0.305, 0.849], $SE = 0.139$, $t = 4.14$, $p < .001$), or those in the box condition ($M = 5.37$, $SD = 0.81$, $B = 0.328$, 95% CI [0.056, 0. 660], $SE = 0.139$, $t = 2.36$, $p = .019$), confirming that the manipulation was successful. As with Study 2, perceived certainty did not differ between the high certainty condition and the two control groups, ps > .10

Effects of Condition and Individual Difference on Gratitude

Correlations were computed between all measured variables. Means, standard deviations, and correlation coefficients are reported in Table 3. Examination of these simple correlations shows that ratings of water value significantly correlates with gratitude for water. However, ratings about the certainty beliefs that water resources will continue to be accessible did not correlate with gratitude for water. Finally, state gratitude for water was significantly, positively correlated with subjective wellbeing.

Table 3. Means, Standard Deviations, Reliability, and Correlations Among Measured Variables in Study 3

Variable	M	SD	α	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. State Gratitude for Water	5.62	1.23	.95														
2. Water Certainty Belief	5.33	0.86	.91	.03													
3. Water Value	6.26	0.84	.76	.31*	.05												
4. Conservation Intent	3.57	0.63	.70	.26*	-.12*	.21*											
5. Religiosity	1.27	0.27	.92	.11	.04	.12*	.00										
6. Pro-Environmentalism	5.65	0.93	.87	.19*	-.04	.43*	.27*	-.13*									
7. Political Conservativism	3.94	0.92	.79	-.15*	-.17*	-.05	.09	.53*	-.25*								
8. Trait Gratitude	5.61	0.95	.79	.25*	.08	.35*	.18*	.19*	.41*	-.11							
9. Internal Locus of Control	5.08	0.80	.78	.14*	.14*	.24*	.15*	.12*	.35*	-.11	.49*						
10. Anthropomorphism	3.17	0.99	.86	.23*	-.09	.04	.18*	.14*	-.02	-.09	-.04	-.09					
11. Subjective Well-being	4.62	1.27	.84	.30*	.04	.17*	.10	.23*	.10	-.21*	.47*	.35*	.19*				
12. PANAS Joviality	2.57	1.00	.94	.29*	.07	.08	.18*	.30*	-.06	-.25*	.19*	.22*	.25*	.45*			
13. PANAS General	2.72	0.83	.91	.26*	.08	.15*	.22*	.35*	.00	-.27*	.26*	.31*	.27*	.42*	.81*		
14. Volunteer Interest	3.92	2.08	—	.20*	-.22*	.10	.37*	.05	.21*	.14*	.08	.01	.19*	.09	.21*	.25*	
15. Volunteer Solicitation	25%	—	—	.08	-.19	.03	.12*	.03	.18*	.10	.01	-.04	.08	-.01	.04	.09	.51**

Note. Percentage of participants who offered their email to receive volunteer information are provided for volunteer solicitation. Point Biserial correlations are provided for the volunteer solicitation row.

* indicates significance with p < .05.

Initial analyses indicated a significant effect of narrative condition on state gratitude for water. Those in the low certainty condition were more grateful for water ($M = 5.76$, $SD = 1.17$) than those in the high certainty condition ($M = 5.35$, $SD = 1.32$, $B = 0.418$, 95% CI [0.098, 0. 810], $SE = 0.200$, $t = 2.09$, $p = .037$); no significant differences emerged between the low certainty condition and the neutral box condition ($M = 5.53$, $SD = 1.30$) and the definition condition ($M = 5.84$, $SD = 1.08$), all ps > .24. Additionally, those in the high certainty condition were less grateful than those in the definition condition, $B = 0.489$, 95% CI [0.133, 0. 845], $SE = 0.202$, $t = 2.43$, $p = .016$.

I also examined models in which condition was paired with one individual difference (i.e. environmentalism, trait gratitude, political orientation, religiosity, locus of control, and anthropomorphism) and their two-way interaction in predicting state gratitude.

In the model including environmental attitudes, there was a significant main effect of environmentalism, such that more pro-environmental attitudes were associated with more gratitude, $B = 0.431$, 95% CI [0.184, 0. 668], $SE = 0.126$, $t = 3.424$, $p < .001$; no other significant effects emerged, ps > .25. For the model including trait gratitude, there was a main effect of trait gratitude, $B = 0.271$, 95% CI [-.001, 0. 543], $SE = 0.139$, $t = 1.95$, $p = .052$; no other significant effects emerged, ps > .43.

No significant effects emerged in the models that included, respectively, political orientation, religiosity, and locus of control, ps > .11.

Effects of Condition and Measured Variables on Resource Protection Behavior

There was a significant effect of narrative condition on the main behavioral outcomes regarding water conservation and volunteering. Those who read about the uncertainty of water indicated more interest in water conservation volunteer activities ($M = 4.31$, $SD = 2.06$) than those in the definition condition ($M = 3.59$, $SD = 1.83$, $B = 0.722$, 95% CI [0.056, 0. 660], $SE = 0.343$, $t = 2.11$, $p = .036$). There was no significant difference in volunteering interest between the low certainty condition and the neutral box condition ($M = 3.96$, $SD = 2.08$) or the high certainty condition ($M = 3.82$, $SD = 2.31$), ps > .15.

A logistic regression examining the likelihood that a participant provided his/her email to receive information about volunteer activities showed differences between narrative conditions. In the low certainty condition, 32% of participants offered their email, in the neutral box condition,

27% of participants offered their email, in the high certainty condition, 24% of participants offered their email, and in the definition condition, 17% of participants offered their email. Specifically, participants in the low certainty condition were significantly more likely to sign up for the EPA mailing list (1.88 times more likely) than those in the definition condition, B = -0.795, 95% CI [-1.56, -0.075], SE = 0.394, t = 2.02, p = .043. There were no significant differences between the low certainty condition, the neutral condition, and the high certainty condition (ps > .27).

I also examined the effect of condition on intent to perform common water conservation behaviors (low certainty (M = 3.64, SD = 0.57), neutral box (M =3.53, SD = 0.65), high certainty (M = 3.58, SD = 0.69), and definition (M = 3.51, SD = 0.61)). There was no significant difference across conditions, ps > .217

Furthermore, gratitude for water significantly, positively correlated with interest in water conservation volunteer activity and intent to perform common conservation behaviors, but not with the decision to offer one's email (see Table 3). Similarly, judgements that access to water is more certain negatively correlated with intent to perform common water conservation behaviors, interest in EPA volunteer activities, and the decision to sign up to receive emails. Thus, the more certain people were about access to water, the less interested they were in behaviors to protect water.

I also examined the potential interaction effects between narrative condition and individual differences (i.e., religiosity, environmental attitudes, political conservativism, trait gratitude, locus of control, and anthropomorphism) on volunteering decision, volunteer interest, and intent to perform water conservation behaviors.

The first set of models examined volunteering interest as the outcome. For the analysis with environmental attitudes only a significant main effect from environmental attitudes emerged, B = 0.795, 95% CI [0.580, 1.100], SE = 0.215, t = 3.7, p < .001, no other effects reached significance (ps > .06). With trait anthropomorphism as the moderator, I found a significant effect of anthropomorphism, such that those who anthropomorphize to a greater degree were more interested in volunteering, B = 0.846, 95% CI [0.098, 0. 810], SE = 0.240, t = 3.53, p < .001; no other effects reached significance (ps > .06). No significant effects emerged in the models that included, respectively, trait gratitude, religiosity, political orientation, and locus of control (ps > .08).

The second set of models involved logistic regressions in which I examined the log odds of the volunteering decision. For the model with environmental attitudes, there was a main effect

of environmental attitudes, $B = 0.566$, 95% CI [-0.006, 0. 1.138], $SE = 0.292$, $t = 1.936$, $p = .052$); no other effects reached significance, ps $> .76$. Across the models that included trait gratitude, religiosity, political orientation, locus of control, and anthropomorphism as moderators, no significant effects emerged, ps $> .07$.

The last set of models examined the intention to perform water conservation behaviors as the outcome. The first analysis indicated a significant main effect of environmental attitudes, such that more pro-environmental attitudes were associated with greater intention to conserve water, $B = 0.192$, 95% CI [0.063, 0. 321], $SE = 0.066$, $t = 2.90$, $p = .004$. No other effects were significant, ps $> .57$. In the second model, trait gratitude emerged as a significant predictor of water conservation intention, such that more dispositionally grateful people are more likely to conserve water, $B = 0.198$, 95% CI [0.055, 0. 341], $SE = 0.073$, $t = 2.70$, $p = .007$. No other effects reached significance, ps $> .21$. In the third model locus of control significantly predicted conservation intention, such that a greater internal locus of control was associated with increased conservation intention, $B = 0.178$, 95% CI [0.013, 0. 343], $SE = 0.084$, $t = 2.12$, $p = .034$. No other effects reached significance, ps $> .31$. Across the models in which religiosity, political orientation, and anthropomorphism were included as moderators, no effect reached significance, ps $> .07$.

Mediation Analyses

I also examined mediational models that test the effect of narrative condition on volunteer interest, volunteer solicitation, and water conservation intent via the proposed process variables of water certainty beliefs and water gratitude. First, I created a dummy code that contrasts the uncertain vs. the certain narrative condition (this excludes participants in the neutral conditions). While traditional mediational analyses can accommodate dummy-coded predictor variables representing manipulated conditions, only one such dummy code can be analyzed per model. This means that only one group contrast can be tested in a single model and multiple groups must be either aggregated or excluded. I chose to test the contrast between the high certain and low certainty narrative condition, since these represent the two most prototypical levels of our independent variable (most certainty vs least). Analyses were performed in Hayes process Macro in SPSS using 5000 bootstraps.

First I tested three models in which the certain versus uncertain narrative conditions predicted state gratitude for water as the mediator, which in turn predicted volunteer decision,[2] interest in volunteering, or intent to perform common water conservation behaviors as outcomes, each in a separate model. Gratitude significantly mediated the indirect effect between the predictor of narrative condition and volunteer decision ($\beta = 0.145$, 95% CI = [.006, .449]), interest in volunteering ($\beta = 0.248$, 95% CI = [.040, .514]), and water conservation behavior intent ($\beta = 0.085$, 95% CI = [.018, .163]).

The next set of models was structured similarly, except beliefs about the certainty of water were entered as the mediator. This second set of models examined the effect of high certainty vs low certainty condition through certainty beliefs as the mediator, on the same three outcomes. Certainty beliefs significantly mediated the indirect effect between the predictor of narrative condition and volunteer decision ($\beta = 0.328$, 95% CI = [.079, .747]), interest in volunteering ($\beta = 0.251$, 95% CI = [.049, .538]), and water conservation behavior intent ($\beta = 0.030$, 95% CI = [.002, .098]).

Finally, I tested three more models in which the certain vs uncertain narrative condition predicted the first mediator of certainty beliefs, which predicted the second mediator of gratitude, which in turn predicted volunteering decision, interest in volunteering, or intent to perform conservation behavior, each separately (Model 6 of Hayes process Macro; see Figure 4). While the models predicting volunteer decision and conservation behavior intent showed a non-significant indirect effect through the mediators, the model predicting interest in volunteering was significant. That is, in the overall two-mediator model, there was a significant effect of narrative condition (high certainty vs low certainty) on certainty beliefs such that people were less certain about access to water in the low certainty condition ($\beta = 0.354$, $p = .017$). There was a trending effect of certainty beliefs on state gratitude for water such that the more certain people were, the less gratitude they felt ($\beta = -0.194$, $p = .108$). Subsequently, both certainty beliefs ($\beta = -0.608$, $p = .002$). and gratitude ($\beta = 0.526$, $p < .001$) predicted interest in volunteering for water conservation efforts. The overall indirect model from narrative condition through certainty, to gratitude, to volunteer interest was significant ($\beta = 0.036$, 95% CI = [.001, .1376]).

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[2]This model which predicts the dichotomous outcome of agreeing to receive emails about volunteer opportunities or no used a logistic regression framework.
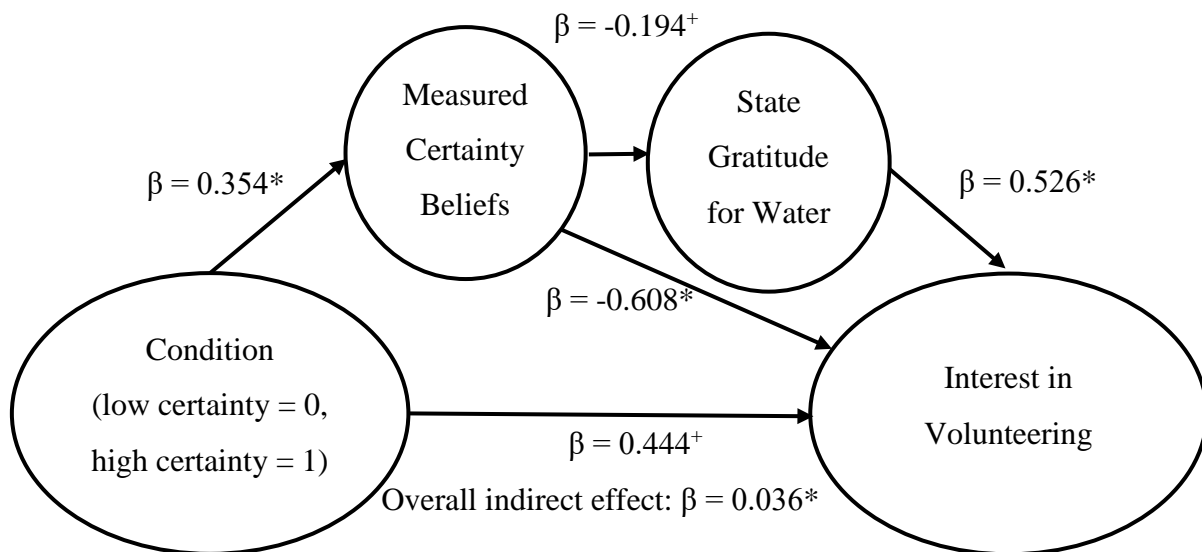
Figure 4. Mediation models and coefficients from Study 3.

Supplementary Analyses

To help rule out the alternative explanation that the narrative conditions affect positive emotion or mood more generally, I examined the effect of narrative condition on each the general positivity and joviality subscales of the PANAS. There were no significant differences between narrative conditions in overall positive mood (all ps > .14).

Discussion

Realizing that one could lose an important benefit should lead one to appreciate it more and that appreciation in turn should encourage one to protect, preserve, and promote that resource. This claim follows from major theorizing and research surrounding the purpose of gratitude in the context of interpersonal relationships. The more grateful one feels for another person's favor, the more relationship building behaviors the benefactor and beneficiary engage in (Algoe & Haidt, 2009; Lambert & Fincham, 2011). Thus, theorists have proposed gratitude possesses a social-resource-promotion function, building and maintaining bonds with those who help us thrive (Algoe, 2012).

Study 3 offers the first evidence that gratitude's functions might operate more broadly, encouraging people to promote any resource in life for which they feel grateful, even those that do not originate from another person. Study 3 replicates Study 2, showing that statements about the certainty of water access affect both certainty beliefs about the continued access to water and state gratitude for water. Furthermore, Study 3 expands on Study 2 by demonstrating that narrative condition differences, perceptions of water certainty, and gratitude for water relate to various water conservation behaviors including intent to perform common conservation behaviors, interest in volunteering, and the decision to solicit water-conservation volunteering opportunities. In particular, the present study offers mediational evidence consistent with the notion that information about access to water affects beliefs about water certainty, which affects gratitude for water, and ultimately impacts interest in water conservation volunteering.

This study builds on previous gratitude research, suggesting that gratitude may do more than promote social resources, and is consistent with the notion that gratitude serves the function of a general resource managing system (e.g., helps people identify the sources of benefits in life,

highlights sources in need of attention due to a tenuous state, and promotes behaviors to preserve those resources).

STUDY 4 OVERVIEW

Study 2 and 3 provide an initial test of the relationship between the certainty of a benefit/source and gratitude for that benefit. In Study 4 I aim to replicate and expand that finding. Specifically, Study 4 will attempt to replicate the relationship between certainty and gratitude using a correlational design. Moreover, Study 4 will build on Study 2 and 3 by exploring a potential psychological mechanism – namely, habituation, which may mediate the relationship between certainty and gratitude, and influence potential downstream outcomes associated with gratitude.

Earlier I noted that one explanation for why the certainty of a benefit may influence feelings of gratitude involves the process of habituation. That is, if a benefit is perceived to be available with certainty, people may assume that they can consistently, frequently, and dependably take advantage of the benefit. According to Frijda's (1986; 2007) law of emotional habituation and Watkin's theorizing on factors that influence gratitude, people tend to adapt to, habituate to, and take for granted benefits that are consistent and frequently received, resulting in diminished feelings of gratitude for the said benefit. While theorists have noted that emotional habituation (i.e., taking benefits for granted) may influence the degree to which people experience gratitude, no research has examined the role of habituation in gratitude. Study 3 is an attempt to fill this gap; in what follows I briefly outline the underlying rationale.

Emotional habituation is the process by which emotional reactions to a typically evocative stimulus diminish over repeated exposure to the eliciting stimulus (Frijda 1988; 2007). Frijda posits that habituation occurs because *changes* in the positive/negative impact of a stimulus are more relevant to survival than the absolute positive or negative quality of the stimulus per se. For instance, the appearance of a new asset should be more emotionally impactful than the continued presence of an equally beneficial asset. As such, Frijda argues that the perception of change is a key determinant of whether habituation occurs. For example, when circumstances change such that a new benefit is attained, the benefit evokes positive emotions (e.g., gratitude). However, as time passes and the availability of the benefit essentially remains consistent and relatively unchanged, the felt intensity of positive emotions for the benefit will diminish in spite of (indeed, on account of) the continued absolute positive impact of the benefit. Put differently, although the benefit/resource continues to provide positive outcomes in one's life, the benefit is nonetheless rendered less important over time by virtue of the unchanging consistency of the benefit. Because

the availability of the benefit/resource is perceived as unlikely to change, people adapt to its presence, regard it as typical, common, and unremarkable. However, if the impact of the benefit/resource changes for the worse, then the benefit's importance and influence on emotion should rebound.

In general, habituation is evidenced when an increase in the frequency of a stimulus is related to a reduction in the emotional or behavioral reaction to that stimulus (e.g. Dijksterhuis & Smith, 2002). When the frequency of access to a benefit is perceived as increasing or decreasing, it may functionally influence the perceived certainty/uncertainty of continued access to a benefit. Hence, when people perceive that access to a benefit may be uncertain or lost it may disrupt habituation to the benefit and affect feelings of gratitude. Frijda (1988), in fact, posits that the mere *perception* of change may be sufficient to interrupt habituation. When people perceive that a stimulus' positive/negative effects have changed (or are likely to change), the stimulus' importance and emotional impact should increase. This suggests that perceiving access to a benefit as more uncertain should be relevant to habituation, in that benefit uncertainty raises concerns that the continued receipt of a benefit might change.

The effect of habituation on feelings of gratitude is also demonstrated by changes in other social-cognitive outcomes that co-occur with the habituation process. When a stimulus is habituated, the stimulus is less attention-grabbing, evaluated as less important, is less likely to enter conscious thought, and can result in increasing related habitual behaviors (Cohen, Eckhardt, & Schagat, 1998; Kang & Lakshmanan, 2017; Rankin et al. 2009; Schell Wynn, Dawson, Sinaii, & Niebala, 2000). These cognitive processes offer possible mechanisms for how habituation diminishes people's emotional and behavioral responses. Given that an unchanging stimulus tends to draw less attention and cognitive effort, downstream responses involving emotional and behavioral responses should similarly decrease. Most relevant to the present study, measures involving the habitual use of water and the attention paid to water stimuli serve as proxies to assess habituation.

In summary, perceiving that the continued receipt of a benefit is uncertain should increasingly draw people's attention to the positive benefit, and should consequently decrease the likelihood of habituation, subsequently increasing feelings of gratitude for the benefit. Stated differently, perceiving that the continued receipt of a benefit is certain and unchanging should lead one to habituate to the benefit. Habituating to the benefit should lead people to feel less gratitude.

I expect the findings from Study 4 to show that habituation mediates the relationship between benefit certainty and feelings of gratitude.

For Study 4 I will employ a correlational design, measuring individual differences in water access certainty, attention toward water via a memory/recall procedure, individual differences in water-use habits, and gratitude for the benefits of water.

Hypothesis 4: Increased feelings of gratitude should be associated with greater benefit uncertainty, and this relationship should be mediated by increased habituation (i.e., attention, habit usage).

Methods

Participants

Participants recruited from Amazon's Mechanical Turk, completed the study in exchange for $1. The test population was limited to accounts located in the United States. Initially, 364 responses were collected. Of those, 88 were discarded for failing to follow directions or providing illegitimate responses. For a simultaneous model with 9 predictors, power analyses, with alpha set to .05 and power to .8, indicate a minimum sample size of 75, based on relevant effect sizes reported in the literature. However given the scope of the other studies in this package and the practical extent of the resources available, I aimed to oversample and collect approximately 250 participants, which would enable the study to detect small effect size changes per predictor (partial R^2 change = .03). Of the final sample of 276 (126 female, 3 gender unreported), the sample self-reported as 9.4% Asian, 11.6% Black, 5.1% Hispanic, 4% Native American, 72.8% White, and 1.1% other. On average the sample was 46.09 years old.

Procedure

  Certainty beliefs measure. Participants first completed the same measure of certainty beliefs that water resources will continue to be available used in Study 2 and 3 (items from the Intergovernmental Panel on Climate Change Likelihood scale; Mastrandrea et al., 2010), after which they completed a measure of attention toward water-related stimuli.

  Habituation and attention to water measures. Attention was measured using a cued recall paradigm. While technically a memory test, recall tests are sensitive to differences in attention, since attention is a necessary first step in the memory encoding of explicit information (e.g. Craik, Naveh-Benjamin, Ishaik, & Anderson, 2000). To the degree that attention for a stimulus is greater, there is a greater chance that participants will encode and recall that information. Participants were presented with 40 words, 20 of which involved water or its uses (e.g. river, flow, wash), whereas the other 20 words were neutral words unrelated to water. All words were presented in random order. Participants were informed that their memory on the words will be tested, and that they would be given three minutes to study the word list. After a distractor task (counting down from 1000 by threes for 1 minute), participants were asked to recall as many of the words as possible. The proportion of correctly recalled water words served as the measure of water-attention (for a list of recall stimuli, see Appendix K).

  To measure the habitual use of water, participants completed items from the Self-Report Habit Index, adapted to reference the use of water (Verplanken & Orbell, 2003). For the present study, this overall scale is referred to as the habitual use of water scale. The scale begins with the presentation of the target behavior: *using water is something I do…* followed by six items that assess the automaticity and frequency of that behavior. Participants provide responses on a seven-point scale anchored at *1 = strongly disagree* and *7 = strongly agree* (for the habitual use questionnaires, see Appendix L)

Gratitude and individual differences. Additionally, participants reported their gratitude for water in the present moment by completing the same gratitude adjective questionnaire that was used in studies 1 and 2. Following the gratitude measure, participants also completed a five-item satisfaction with life questionnaire (Diener, Emmons, Larsen, & Griffin, 1985; see Appendix M). Afterward, participants completed the same abbreviated individual difference measures used in Study 2 (i.e., perceived value of water, the Duke Religion single item measures of religiosity and spirituality, the single item political orientation question from the IPIP Liberalism scale, the Eco-centric Concern Scale from the Environmental Attitudes Inventory, and the GQ6 trait gratitude scale), participants also provided the same demographic information as in the prior studies.

<div align="center">

Results

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Factor Analysis of Habituation Measure

Pearson correlations among study variables were calculated and are presented with means, standard deviations, and reliabilities in Table 4. Notably, the Verplanken and Orbell (2003) habitual water use scale did not correlate with state gratitude for water. I examined the item-level correlations between state gratitude for water and the individual items of the habitual use of water scale. Some item-level correlations were positive, while others were negative (see Table 5). Given the multifaceted relationship between gratitude and the items of the habitual use of water scale, I completed a factor analysis of the items of the habitual use of water scale. Two factors emerged with eigenvalues above 1.0. Three items (Using water is something… I do automatically, … that makes me feel weird if I don't do it, and … that belongs to my daily/ weekly/monthly routine) loaded onto the first factor, which was titled the 'routine use of water' factor. Three items (Using water is something… I do without thinking, … I start doing without realizing it, … I have no need to think about doing) loaded onto the second factor, which was titled the 'thoughtless use of water' factor. Based on the results of this factor analysis, two 3-item subscales were computed from the habitual use of water items, one for the thoughtless use of water and one for the routine use of water. Subsequent analyses were performed with the entire aggregate habitual use of water scale, the routine use of water subscale, and the thoughtless use of water subscale separately.

Table 4. . Means, Standard Deviations, Reliability and Correlations With Confidence Intervals of Measured Variables in Study 4

Variable	M	SD	α	1	2	3	4	5	6	7	8	9	10	11	12
1. State Gratitude for Water	5.67	1.22	.89												
2. Water Certainty Belief	5.28	0.95	.91	.05											
3. Habitual Use of Water	5.81	1.03	.83	-.07	.23*										
4. Thoughtless Use of Water	5.55	1.37	.78	-.12*	.21*	.94*									
5. Routine Use of Water	6.17	0.90	.66	.05	.27*	.73*	.49*								
6. Water Words Recalled	8.37	5.08	—	-.08	-.08	-.05	-.01	-.12*							
7. Religiosity	3.93	2.26	—	.12*	-.17*	-.24*	-.20*	-.24*	.02						
8. Spirituality	4.37	2.15	—	.23*	-.21*	-.16*	-.16*	-.12	.05	.70*					
9. Political Conservativism	4.43	2.40	—	.04	-.13*	-.1	-.1	-.1	-.01	.40*	.30*				
10. Reported Value of Water	6.42	0.76	.73	.27*	.31*	.25*	.14*	.40*	-.07	-.14*	-.05	-.17*			
11. Pro-environmental Attitude	5.66	0.99	.86	.20*	.32*	.30*	.17*	.48*	-.11	-.34*	-.20*	-.28*	.57*		
12. Trait Gratitude	5.54	0.99	.78	.36*	.27*	.27*	.20*	.32*	-.09	.03	.15*	.03	.47*	.41*	
13. Subjective Well-being	4.85	1.37	.9	.17*	.03	-.06	-.06	-.07	.05	.24*	.15*	.30*	.05	-0.1	.30*

Note. * indicates $p < .05$.

Table 5. Item-Level Intercorrelations Between Habit Items and State Gratitude

Variable	1	2	3	4	5	6
1. State Gratitude for Water						
2. Using water is something I do automatically	.06					
3. Using water is something that makes me feel weird if I do not do it	-.01	.46*				
4. Using water is something I do without thinking	-.07	.49*	.50*			
5. Using water is something that belongs to my routine	.08	.47*	.29*	.31*		
6. Using water is something I start doing without realizing it	-.09	.26*	.32*	.52*	.15*	
7. Using water is something I have no need to think about doing	-.14*	.30*	.29*	.61*	.21*	.50*

Note. * indicates p < .05

Main Analyses: Relations Between Certainty, Habit, And Gratitude

The measured certainty with which people believe they will have continued access to water positively correlates with the aggregate habitual use of water scale, the thoughtless use of water subscale, and the routine use of water subscale. However, unexpectedly, certainty beliefs neither correlate with gratitude for water nor the number of water words recalled.

In examining the relationship between habituation and gratitude, the thoughtless use of water significantly, negatively correlated with gratitude for water. However, state gratitude was not significantly predicted by the overall habitual use of water scale, the routine use of water subscale, or the total number of water words recalled.

I also constructed models that examined the effect of each of measure of habituation (water recall, habitual use of water, thoughtless use subscale, and routine use subscale), each paired with one individual difference (trait gratitude, religiosity, spirituality, political orientation, and environmental attitudes) and their two-way interactions on state gratitude.

The first set of models examine the effect of the full habitual use scale and individual difference moderator on state gratitude.

In the model including religiosity as the moderator, there was a significant effect, such that more habitual use was associated with less gratitude, $B = -0.367$, 95% CI [-.394, 0.040], $SE = 0.167$, $t = 2.20$, $p = .029$. There was also a trending effect of religiosity, such that more religious participants were less grateful, $B = -0.375$, 95% CI [-0.775, 0.030], $SE = 0.207$, $t = 1.82$, $p = .07$. These main effects were qualified by a significant interaction effect, $B = -0.073$, 95% CI [0.005, 0.140], $SE = 0.034$, $t = 2.13$, $p = .034$. Subsequent probes show that when religiosity is low (-1 SD), the habitual use of water significantly, negatively effects state gratitude, $B = -0.524$, 95% CI [-.876, -0.171], $SE = 0.180$, $t = 2.91$, $p = .005$. In contrast, when religiosity is high (+1 SD), habitual water use did not significantly affect state gratitude, $p = .16$.

When political orientation is included as a moderator, I found a significant negative main effects of habitual use of water ($B = -0.427$, 95% CI [-.741, -0.113], $SE = 0.160$, $t = 2.67$, $p = .008$) and political conservativism on state gratitude ($B = -0.407$, 95% CI [-.865, -0.183], $SE = 0.174$, $t = 2.33$, $p = .020$). These main effects are qualified by a significant two-way interaction between political orientation and habitual use of water, $B = 0.072$, 95% CI 0.016, 0.128], $SE = 0.029$, $t = 2.46$, $p = .014$. Probes reveal that when political conservativism is low (-1 SD), there is a significant negative relationship between habitual use of water and state gratitude, $B = -0.461$, 95% CI [-.749,

-0.173], $SE = 0.147$, $t = 3.15$, $p = .002$. However, when political conservativism is high (+1 SD), there is no effect of habitual use of water on gratitude, $p = .681$.

With pro-environmental attitudes as a moderator, the analysis revealed a significant positive relationship between environmental attitudes and gratitude, $B = 1.205$, 95% CI [0.343, 2.067], $SE = 0.440$, $t = 2.74$, $p = .007$; the effect of habitual use of water was non-significant, but trending in the expected direction, $p = .09$. The main effects were qualified by a significant two-way interaction between habitual use of water and environmental attitudes, $B = .159$, 95% CI [0.010, 0.308], $SE = 0.076$, $t = 2.10$, $p = .036$. Probes of the interaction showed a negative relationship between habitual water use and gratitude when environmentalism is high (+1 SD, $B = -0.53$, 95% CI [-0.918, -0.142], $SE = 0.198$, $t = 2.67$, $p = .010$), but no significant relationship when environmentalism is low (-1 SD, $p = .803$). No significant effects emerged with trait gratitude ($ps > .14$) and spirituality ($ps > .10$) as the moderator.

The second set of models examined the effect of the routine use of water, individual differences, and their two-way interactions on gratitude for water.

In the model including religiosity, there was a trending effect of the routine use of water on gratitude, such that more routine use was associated with less gratitude, $B = -0.373$, 95% CI [-804, -0.058], $SE = 0.220$, $t = 1.70$, $p = .091$. Additionally, there was a main effect of religiosity, such that more religious participants were less grateful, $B = -0.565$, 95% CI [-0.775, -0.038], $SE = 0.269$, $t = 2.10$, $p = .037$. The main effects were qualified by a significant interaction effect between routine use of water and religiosity, $B = .100$, 95% CI [0.020, 0.180], $SE = 0.041$, $t = 2.40$, $p = .014$. Probes show that when religiosity is low (-1 SD), there are significant negative effects of the routine use of water on state gratitude, $B = -0.667$, 95% CI [-1.159, -0.175], $SE = 0.251$, $t = 2.66$, $p = .010$. By comparison, when religiosity is high (+1 SD), the habitual use of water does not significantly effect state gratitude, $p = .17$.

With political orientation as a moderator, I found significant negative effects of routine use of water ($B = -0.340$, 95% CI [-.663, -0.017], $SE = 0.165$, $t = 2.06$, $p = .040$) and political conservativism on state gratitude ($B = -0.528$, 95% CI [-.906, -0.15], $SE = 0.193$, $t = 2.74$, $p = .006$). The main effects are qualified by a significant two-way interaction between political orientation and routine use of water, $B = 0.089$, 95% CI 0.028, 0.15], $SE = 0.031$, $t = 2.89$, $p = .004$. Probes of the interaction showed that when political conservativism is low (-1 SD), there is a significant negative relationship between routine use of water and state gratitude, $B = -0.335$, 95% CI [-.635,

-0.035], *SE* = 0.153, *t* = 2.20, *p* =.031. However, when political conservativism is high (+1 *SD*), no significant effect emerges, *p* = .06.

When I included pro-environmental attitudes as a moderator, the analysis indicated a significant positive relationship between environmental attitudes and state gratitude, *B* = 1.523, 95% CI [0.523, 2.523], *SE* = 0.513, *t* = 2.98, *p* =.003. The main effect of routine use of water was also significant, such that more routine use of water was associated with more gratitude *B* = 0.968, 95% CI [0.121, 1.815], *SE* = 0.432, *t* = 2.24, *p* =.026. These main effects were again qualified by a significant two-way interaction between routine use of water and environmental attitudes, *B* = 0.203, 95% CI [.0420, 0.364], *SE* = 0.082, *t* = 2.47, *p* =.014. Probes of the interaction show that there is a negative relationship between routine water use and gratitude when environmentalism is high (+1 *SD*, *B* = -0.753, 95% CI [-1.357, -0.149], *SE* = 0.308, *t* = 2.44, *p* =.018), but no relationship when environmentalism is low (-1 *SD*, *p* = .751). No significant effects emerged when for the model included trait gratitude (*p*s > .38) or spirituality as a moderator (*p*s > .14).

The last two sets of models examined the effect of the number of water words recalled and the thoughtless use of water, individual differences, and their respective two-way interactions on state gratitude. Across both models, no effects were significant, *p*s > .11.

Mediational Analyses

Finally, I tested the hypothesized mediational model in which beliefs about the certainty of water access predict the habitual use of water, which in turn predicts state gratitude for water, using Hayes process MACRO in SPSS with 5000 bootstraps. First, I examined a model in which the original, entire aggregated habitual use of water measure was included as the mediator. This overall model was non-significant (indirect effect *p* > .05). I also examined a similar model in which routine use of water was entered as the mediator. The overall indirect effect for this model was also non-significant (indirect effect *p* > .05). Entering recall of water words as a mediator also resulted in a non-significant indirect effect (*p* < .05).

In the model for which the thoughtless use of water subscale was entered as the mediator, certainty of water access predicted thoughtless use of water (*β* = .312, *SE* = 0.086, *p* < .001), which in turn predicted state gratitude for water (*β* = -.118, *SE* = 0.055, *p* =.032) and the overall indirect model was significant (*β* = -0.037, *SE* = 0.019, 95% CI [-0.087, -0.008]).

Discussion

Studies 2 and 3 suggest that people feel less gratitude for a benefit when they think that this benefit is available with certainty versus when that benefit appears to be uncertain. Study 4 was aimed at building on those results by testing a potential process that could partly explain this relationship. Research and theory put forward the process of emotional habituation as an explanation (Frijda, 1986; 2007; Watkins, 2014). When a person encounters a new emotionally evocative situation, their emotional reactions tend to start strong, then diminish as the once-new situation persists. Theorists further suggest that even the mere perception of change/stability might trigger these processes. The process of habituation takes place in part through related cognitive processes like the diminishment of attention, explicit thought, and importance accorded to the habituated stimuli (Cohen, Eckhardt, & Schagat, 1998; Kang & Lakshmanan, 2017; Rankin et al. 2009; Schell Wynn, Dawson, Sinaii, & Niebala, 2000). Study 4 tested whether the relationship between benefit certainty and benefit gratitude can be partly explained by changes in these indicators of habituation.

Overall, Study 4 provides some evidence in support of this explanation. Beliefs of how certain water resources are positively related with the habitual use of water and its two subscales (thoughtless use of water and routine use of water). In turn the thoughtless use of water was negatively correlated with gratitude for water's benefits, such that the less one tends to think about their water use, the less gratitude they report. The mediational model examining the link from certainty to thoughtless use, to lower gratitude was also significant.

While neither the overall habitual use of water scale nor the routine use of water scale directly predicted gratitude, both these variables interacted with political conservativism, religiosity, and environmental attitudes. These three variables are inter-related in that they are all meaningful to social conservativism or the desire to maintain traditional American values and politics. Uniformly across these interactions a similar pattern emerged. Among those who were more politically and culturally liberal (i.e. low in political conservativism, low in religiosity, or high in pro-environmental attitudes) there were significant negative relationships between the routine use of water and gratitude, such that greater habituation was associated with less gratitude. Overall, these findings seem to suggest that using a benefit without thinking much about it is inimical toward appreciating that resource across most people. Similarly, using that resource

according to a regular routine seems to diminish gratitude for water among liberal people, but not more conservative people.

A potential interaction effect with social/political conservativism was anticipated, although the exact pattern was unpredicted. Such social/political orientations have been shown to affect the way people think about natural resources like water. Liberal people tend to view natural benefits as valuable for their own sake whereas more conservative people feel that the value of natural resources lies in their utility for people (Milfont & Duckitt, 2010). This difference could explain the present findings. When a person uses water thoughtfully (vs thoughtlessly/automatically) their tendency to think about what the water means, how it is useful, or how it is affected might inspire gratitude across political/social orientations because the act of stopping and thinking reminds one of the importance of water either as a utility or as a good in itself. That is, both conservatives and liberals can find something to appreciate about water if they stop to think about its meaning when they use it. Conversely, the attention-grabbing (vs routine) use of water might have little bearing on the appreciation of those who only care about the downstream uses of water and not the intrinsic value of the water itself. Using water in a (non-routine) way that directs attention to the water itself might still inspire gratitude among liberal people because such people find value in water itself without having to consider its downstream utility. In other words, the saliency of water itself (how routinely or it is used) might inspire gratitude in those who find water itself intrinsically meaningful. If one does not see much intrinsic value in water apart from its utility, then one might not be more or less appreciative when their attention is drawn to the water itself.

In all, this work contributes to theory by replicating the connection between certainty and gratitude, add by examining a novel process variable—namely habituation to gratitude. While this work demonstrates the pertinence of habit to impersonal resources (e.g. water, air) it should also be relevant to the appreciation of any benefit that is used over time, whether it is impersonal or interpersonal.

GENERAL DISCUSSION

Gratitude is the emotional recognition of a benefit that emerges from an outside source, paired with a disposition to act positively toward that source (Fitzgerald 1998; Watkins, 2014). This broad definition is built from a number of theoretical accounts, all of which hold the aim to explain why people experience feelings of gratitude. Watkins' (2014, p 8) Goodness amplification theory contends that gratitude "identifies who and what is good for individuals …[and] organizes cognitive and behavioral resources to clearly identify the things and people that are important to their well-being." Similarly, Algoe's (2012) Find, Bind, and Remind theory proffers that gratitude helps people identify important others and form/expand relationships with those others. Fredrickson's (2004) broaden and build theory posits that positive emotions like gratitude serve evolutionarily adaptive purposes by promoting valued and important resources. These perspectives share a common ground in their focal assertion that gratitude helps people identify and adaptively respond to important benefits in life, with downstream consequences for people's physical, social, and psychological well-being.

Past work has explored important implications of gratitude for social relationships, investigating why people feel grateful to others and what interpersonal effects emerge from feeling grateful. This work has identified the effects of gratitude in response to a multitude of common everyday social benefits (e.g., emotional support of a partner, the exchange of monetary or material gifts, the sharing of food, and being accepted for play activities; Graham, 1988; Poelker & Kuebli, 2014; Wood et al., 2008). Overall this work demonstrates that people feel more gratitude when others provide benefits that are considered more costly, responsive to needs, valuable, and offered with caring intent (Algoe et al., 2008; Algoe & Zhaoyang, 2016; Poelker & Kuebli, 2014; Wood et al., 2008). When people feel grateful towards others, they build bonds with the benefactor, seeking social contact, expressing warmth and commitment, and developing a sense of community with the benefactor (Algoe, 2012; Grant & Gino, 2010; Lambert & Fincham, 2011; Panagopoulos, 2011; Williams & Bartlett, 2014). General conclusions built on this work suggest that gratitude serves a social function – building relationships with people who reliably provide useful benefits, toward the end of promoting cooperation, and ultimately furthering the wellbeing of both the benefactor and the beneficiary (Algoe, 2012).

Research on the general causes and subsequent effects of interpersonal gratitude provides critical insight into the nature of gratitude. However, other potential implications suggested by gratitude theorizing remain largely unexplored. Specifically, as I noted, from a broad perspective theorists posit that gratitude could function as a general system for identifying and reacting to any benefit in life, not just those that originate from people, or those that are received in an explicit, one-time exchange. Nevertheless, although prior research has been invaluable in understanding gratitude, the majority of this work has almost exclusively focused on examining feelings of gratitude for one-time benefits that are provided by a human source (e.g. Wood et al., 2008; Polker & Kuebli, 2014). This has led several theorists and researchers alike to call for increased investigation of benefits/resources that emerge from non-human sources (Emmons & McCullough, 2004; Konstan, 2016; Lambert et al, 2009; Watkins, 2014; Wood, et al., 2010). While work on interpersonal gratitude certainly offers some generalized process clues, programmatic research is needed to better understand how people respond to and appreciate benefits that emerge from non-human sources. The present study attempts to address this gap by examining impersonal benefits that do not explicitly originate from a human source, and which are typically and consistently used over time.

The findings from Study 1 offer preliminary evidence that perceived benefit value is associated with feeling gratitude for a benefit that is provided by a non-human source. However, this effect only emerged among those who seemed to have the most "room to improve" in terms of gratitude. Specifically, when participants read information about the needs that water fulfills, gratitude for water increased for both those low in trait gratitude and pro-environmental attitudes; groups that otherwise displayed less gratitude for water when provided only with information unrelated to water. Moreover, mediational tests demonstrated that those in the water value condition (vs. other conditions) rated water as both more valuable and need-fulfilling. In turn, these variables mediated effects on gratitude for water, such that more value/needfulness related to increased gratitude. Although Study 1 did not produce a significant correlation between well-being and gratitude, wellbeing was correlated with the related concepts of water value and needfulness.

In Study 2 I examined a novel predictor of impersonal gratitude—namely, the uncertainty/certainty with which a seemingly endless benefit, like water and air are perceived to be consistently available. The results, controlling for trait gratitude, showed that people exhibited more gratefulness for water when reminded of its uncertainty (vs. control). Likewise, when

controlling for religiosity, belief that water is less certain relates to more gratitude for water. Furthermore, beliefs about the certainty of water resources moderated the relationship between water value and gratitude for water. Specifically, when water access is relatively more certain, people judge water as more valuable, and as perceived value increases, people's feelings of gratitude also increases. However, when water is more uncertain, the relationship between the water value and gratitude for water falls to non-significance. The results from Study 2 also showed that the relative certainty of water affected the perceived value of water as a function of people's environmental attitudes. In the uncertain water condition, those who were more pro-environmental judged water resources to be less valuable compared to those who read information that was unrelated to water. For those less pro-environmental, the effect crossed, such that those in the low certainty condition rated water as more valuable than those in the neutral box condition. Finally, as expected Study 2 showed that gratitude for water was correlated with subjective well-being,

The results from Study 3 expand and replicate those from Study 2. Consistent with hypotheses, those who read that water resources are more uncertain (vs. certain) displayed more gratitude for water. Importantly, Study 3's results also suggest that feelings of gratitude for water that emerged in the uncertain condition were associated with increased interest and behavior to protect water resources via volunteering and conservation behaviors. Conversely, those in the water certainty condition were less interested in conservation efforts. These latter findings suggest that impersonal gratitude may partly function to identify important benefits/resources that are at risk and encourage behavior to protect such resources. Mediational tests were consistent with this interpretation, showing that condition (water certainty vs. uncertainty) predicted certainty beliefs, which predicted gratitude, which in turn, correlated with interest in volunteering. That is, those in the uncertain (vs. certain) water condition felt more grateful for water, and were more interested in volunteering to protect natural water resources. Finally, Study 3 replicated the finding from Study 2 that state gratitude positively correlates with subjective well-being.

With Study 4, I examined a potential process involving habituation that may in part help explain the link between benefit certainty and gratitude. I reasoned that when people perceive water resources as more certain and stable, they are likely to use water in a more habitual manner (i.e., more automatically with minimal thought), and to feel less grateful for water. The results were consistent with expectations, indicating that people exhibited less gratitude the more they used water habitually and that habituation was, in part, a function of water certainty beliefs. That

is, when people were more certain about water access, they also reported more thoughtlessly using water, and they felt less grateful for water. Furthermore, additional measures of habituation (e.g., routine use of water, overall habitual use of water) were negatively related to gratitude, among those who were more politically and socially liberal (vs. conservative). Specifically, the routine and habitual use of water was related to less gratitude for those who were low in religiosity, low in political conservativism, or high in environmental attitudes. Again, Study 4 also demonstrated that gratitude for water was positively related to subjective well-being.

Although across the studies the findings were generally consistent with expectations, there were several unexpected results. Specifically, for the main effect of narrative conditions, the results from Study 1 showed that although those in the water value condition expressed more gratitude than those in the neutral condition (i.e., about boxes), they were not more grateful than those in the water process or water definition condition. It is plausible that reading about just the water cycle process itself (absent direct value information) might increase the degree to which one values water because such a complex process may seem important/valuable, and as such may increase the perceived value of water in much the same manner that the value condition increased perceptions of water's value. Similarly, even just a reminder of water via the definition condition seems to prompt increased value perceptions, as well as increased gratitude for water. Thus, it seems that even just incidental prompts about water may elicit expressions of value and gratitude, which partly explains the lack of conditional differences across the three conditions that mentioned water. We see some support for this reasoning from the pilot study, which involved no prompts and resulted in only a miniscule fraction of people spontaneously listing gratitude for water. By comparison, Study 1 involved conditional prompts, and the results suggest a ceiling effect in which many participants across the three water conditions expressed the maximum gratitude for water when explicitly asked.

Also, unexpectedly, the findings from Study 2 showed that gratitude was only greater in the water uncertainty condition compared to the neutral box condition. However, in Study 3, using the same narrative conditions as Study 2, I found that gratitude for water was greater in the uncertainty versus the certainty condition. Although clearly speculative, the inconsistency in the narrative conditional differences across Study 2 and 3 might be partly attributed to the age differences across the respective samples (college vs. adult age). In today's culture, younger people might be more aware/sensitive to the notion that water resources are potentially uncertain. By

comparison, an older sample with greater life experience may harbor skepticism or even reactivity to the information about water's potential uncertainty.

I also anticipated that a number of individual differences might moderate the impact of the narrative conditions on gratitude, although these expectations were exploratory and I did not make specific hypotheses. Specifically, trait gratitude (Studies 1 and 2), environmental attitudes (Studies 1, 3, and 4), religion (Studies 2 and 4), and liberalism/conservatism (Study 4) emerged as moderating variables. As noted, these individual differences are potentially relevant to the appreciation of natural water resources, because they relate to attitudes about natural resources utility, climate change beliefs, or even the disposition to generally feel grateful for any given benefit (Wood et al., 2008; Hayward et al, 2016; Milfont & Duckitt, 2010).

Generally, these moderation findings are consistent with prior work showing that trait gratitude and pre-existing beliefs/attitudes are likely to influence state gratitude (Wood et al., 2008; Algoe & Zhaoyang, 2016). When gratitude value or certainty was manipulated (i.e., Studies 1 and 2) the findings revealed larger effects for participants who were predisposed to experience less gratitude, including those low in trait gratitude and those with more anti-environmental attitudes. When certainty was measured (i.e., Study 4), the effect of certainty on water gratitude was the largest among participants who were dispositionally inclined to hold a favorable perception of natural resources, including those with a more liberal perspective and those with pro-environmental attitudes. I posit that these narrative manipulations may be more effective for those with the most room to improve in terms of experiencing gratitude. It is relatively unsurprising that the effects of an intervention designed to increase gratitude are most apparent among those who start at a lower baseline. Conversely, for those who are generally predisposed to feel grateful for any particular benefit/resource the narrative conditions may have less impact on their felt gratitude, simply because these individuals already consider water to be a valued resource for which they already feel quite grateful for, as the ceiling effect from Study 1 would suggest. Finding a stronger relationship between certainty, habituation, and water gratitude for those who are more environmentally oriented seems consistent with this interpretation.

Theoretical Implications

The present work contributes to and expands gratitude theory and research by providing initial evidence that feelings of gratitude can serve broader adaptive purposes than is currently

theorized. Some theorists suggest that gratitude is exclusively an interpersonal emotion, necessarily requiring a human benefactor to feel grateful toward (e.g. McCullough, Kilpatrick, Emmons, & Larson, 2001; Trivers, 1971). Influenced by this perspective, much of the existing empirical work on gratitude focuses primarily on gratitude that is felt for a one-time benefit that is received from other people. Such work examining the unique properties of interpersonal gratitude is certainly valuable, however, other theorists argue that impersonal gratitude encompasses emotional and cognitive elements that help people adaptively identify and promote resources/benefits in life more generally (Fredrickson, 2004; Watkins 2014). The present findings are consistent with these latter theorists, suggesting a broader theoretical perspective in which gratitude not only helps people identify and bond with social benefactors, but it also serves as a generalized psychological system that prompts people to recognize and positively respond to most any form of benefit/source.

Furthermore, the present findings indicate that some of the factors that are related to interpersonal feelings of gratitude are also applicable even when there is no human benefactor. Specifically, I found that moderators of interpersonal gratitude including benefit value and certain individual differences (e.g., trait gratitude) similarly influence feelings of impersonal gratitude (i.e., benefits that emerge from non-human sources). Additionally, the present study demonstrates that gratitude not only promotes social bonding with human sources, but gratitude also encourages a host of benefit-promotion oriented behaviors (e.g., volunteering to protect environmental sources). That impersonal gratitude helps people to identify and promote general life benefits may open areas of examination for other research areas. For example, feelings of gratitude were sensitive to the perceived needfulness and uncertainty of a benefit, and gratitude increased motivation to protect general life-oriented benefits. As such, examining gratitude in contexts that involve goal pursuit, risk management, subjective well-being, and evolutionary psychology may prove to be beneficial.

The present study also extends our understanding by examining gratitude for benefits that are enjoyed consistently over time, whereas prior work generally focused on feelings of gratitude for a specific benefit that is typically received at one time from an outside source. For example, Wood and colleagues (2008) investigated a hypothetical loan to help pay an unexpectedly large bill. In this case, the benefit is received once and after the benefit is used, the benefit is complete. Other benefits in life are often used repeatedly, frequently, even daily, and thus, may be subject to

unique concerns. That is, feelings of gratitude arise for benefits that have been available and used for one's entire life. The factors that affect longer-term resources may be unique in that they do not readily apply to one time favors or gifts. For instance, long-term benefits might be present now, but lost in the future, and the recipient may not know if or when access to the benefit might cease. As such, novel psychological characteristics including beliefs about the certainty of continued access or habituation to those resources becomes relevant to feeling gratitude. Specifically, when an ongoing resource is perceived as relatively certain, people may be inclined to take that resource for granted, habituating to its presence and failing to appreciate it. Conversely, reminders that ongoing benefits are generally uncertain and could be lost lead to increased feelings of impersonal gratitude.

Although speculative, the current work provides a tentative link between gratitude and environmental psychology, suggesting plausible and practical implications that can be applied to natural resources. Specifically, the findings demonstrate that people can be prompted to experience gratitude for natural resources (e.g., water) and that such feelings can subtly impact conservation intentions. I posit that this represents a novel way to foster preservation behavior aimed at protecting natural resources. In other words, akin to other interventions to promote gratitude (Davis et al., 2016), the current gratitude intervention may partly help to promote natural resource appreciation and protective behaviors. Likewise, ample work demonstrates that interpersonal gratitude practices, interventions, and trainings promote overall happiness (Alkozei et al., 2018); much in the same manner, the current work identifies and extends that relationship to impersonal gratitude and links such feelings to increased subjective wellbeing. To the best of my knowledge, the current research is one of the first programs of studies to examine impersonal gratitude for benefits that emerge from non-human sources; this work contributes to the gratitude literature, extending theory, research, and practical application.

Limitations and Future Work

While this work provides an initial exploration of impersonal gratitude and the relationship between benefit certainty and gratitude, additional research will be necessary. For the sake of methodological clarity, the present study focused on a single long-term benefit: water. The effect might be different for other types of long-term resources, even potentially socially provided public goods, including for instance, the internet and public health investments. It will be valuable to

extend the current work by examining whether the effects generalize to appreciation for other types of non-human or long-term benefits/resources.

The present research suggests that the perceived certainty of continued access to a benefit should influence feelings of gratitude for most any long-term benefit/resource. Although the findings suggest that impersonal and interpersonal gratitude may share some processes, there are theoretical and conceptual differences, and it is possible that the underlying processes associated with each may function differently. Future work would profit from contrasting and examining how certainty, for example, impacts gratitude for long-term impersonal resources (e.g., water) compared to long-term interpersonal resources (ongoing support of a close other). Moreover, the present work is limited to exploring cross-sectional instances of gratitude. Given that the resource that I focused on (i.e., water) is used over long periods of time, it would be profitable to examine the processes using longitudinal research. Such research would be well suited to capture habituation or the perceived certainty of a resource over time, rather than relying on retrospective assessments of one's water use.

Although the findings demonstrate that impersonal gratitude is linked to behaviors that protect and promote the gratitude object, I examined only a relatively narrow range of low cost behaviors, which were explicitly suggested to the participant. The results cannot speak to people's willingness to spontaneously engage in such resource-protection behaviors or even more costly efforts to protect such resources. Future work would do well to examine a broad range of long-term benefits/resources and a host of different protection oriented actions and behaviors.

Finally, it should be noted that the data for Study 2, 3, and 4 were collected between March and May of 2020, during the onset of the Covid-19 pandemic and state mandated shutdowns of schools and businesses in the US. Considering the massive social changes and psychological impact that accompanied the pandemic it is possible that the results of those studies were influenced by the pandemic. For instance, all those studies concern beliefs about the continued availability of essential resources (water). For most people living in developed nations like America, access to such resources is rarely in question. However, during the initial shutdowns, common goods like meat, paper products, canned food, and rice were unavailable in stores for extended periods while people stockpiled. Experiencing shortages of common essentials that one can usually take for granted may have affected thoughts about the certainty and appreciation of

other essential resources like water. As such, the present results should be considered in the context they were collected in.

Conclusion

Among the goods in life, those that are directly provided by others in an explicit show of giving represent one of the most salient forms of benefits that people can receive. As the current work demonstrates though, it is also valuable to examine impersonal gratitude for the benefits that people obtain from non-human sources. Nearly everyone can appreciate common everyday benefits including clean air, water, food, health, and shelter. Because such resources are fundamental to life, societies can only flourish under circumstances where these resources are freely available or secured with robust protection systems. In today's world, most people (but not all) have enjoyed consistent access to these fundamental resources, and many people in all likelihood have become habituated to the ongoing presence of such benefits/resources. For the most part, people may perceive that such benefits/resources will always be available, and in turn, might consider the continued use of these resources to be a near certainty. However, certainly climate change, economic turmoil, and pandemics can threaten the ease with which these resources are continually available. Assuming that a resource is certain, habituating to its presence, and taking it for granted would seem to engender a risky complacency. Failing to experience gratitude for the natural goods in one's life might lead people to be less willing to protect and preserve such resources. Examining the processes and individual differences that foster impersonal gratitude improves our theoretical understanding and aids in the development of effective gratitude interventions that promote the sensible use of resources, which in turn should increase people's subjective well-being.

LIST OF REFERENCES

Adler, M. G., & Fagley, N. S. (2005). Appreciation: Individual differences in finding value and meaning as a unique predictor of subjective well-being. *Journal of Personality, 73*, 79-114.

Ajzen, I. (2002). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior 1. *Journal of Applied Social Psychology, 32*, 665-683.

Algoe, S. B. (2012). Find, remind, and bind: The functions of gratitude in everyday relationships. *Social and Personality Psychology Compass, 6*, 455-469.

Algoe, S. B., Fredrickson, B. L., & Gable, S. L. (2013). The social functions of the emotion of gratitude via expression. *Emotion, 13*(4), 605-605.

Algoe, S. B., Gable, S. L., & Maisel, N. C. (2010). It's the little things: Everyday gratitude as a booster shot for romantic relationships. *Personal Relationships, 17*, 217-233.

Algoe, S. B., & Haidt, J. (2009). Witnessing excellence in action: The 'other-praising' emotions of elevation, gratitude, and admiration. *The Journal of Positive Psychology, 4*, 105-127.

Algoe, S. B., Haidt, J., & Gable, S. L. (2008). Beyond reciprocity: Gratitude and relationships in everyday life. *Emotion, 8*(3), 425-429.

Algoe, S. B., Kurtz, L. E., & Hilaire, N. M. (2016). Putting the "you" in "thank you" examining other-praising behavior as the active relational ingredient in expressed gratitude. *Social Psychological and Personality Science, 7*, 658-666.

Algoe, S. B., & Stanton, A. L. (2012). Gratitude when it is needed most: Social functions of gratitude in women with metastatic breast cancer. *Emotion, 12*(1), 163-168.

Algoe, S. B., & Zhaoyang, R. (2016). Positive psychology in context: Effects of expressing gratitude in ongoing relationships depend on perceptions of enactor responsiveness. T*he Journal of Positive Psychology, 11*, 399-415.

Alkozei, A., Smith, R., & Killgore, W. D. (2018). Gratitude and subjective wellbeing: A proposal of two causal frameworks. *Journal of Happiness Studies, 19*(5), 1519-1542.

Amaro, L. M. (2017). Dyadic effects of gratitude on burden, conflict, and contribution in the family caregiver and sibling relationship. *Journal of Applied Communication Research, 45*, 61-78.

Bagozzi, R. P., & Pieters, R. (1998). Goal-directed emotions. *Cognition & Emotion, 12*, 1-26.

Bar-Tal, D., Bar-Zohar, Y., Greenberg, M. S., & Hermon, M. (1977). Reciprocity behavior in the relationship between donor and recipient and between harm-doer and victim. *Sociometry, 40*(3), 293-298.

Bartlett, M. Y., & DeSteno, D. (2006). Gratitude and prosocial behavior: Helping when it costs you. *Psychological Science, 17*, 319-325.

Clark, W. A., & Finley, J. C. (2007). Determinants of water conservation intention in Blagoevgrad, Bulgaria. *Society and Natural Resources, 20*, 613-627.

Clark, H. B., Northrop, J. T., & Barkshire, C. T. (1988). The effects of contingent thank-you notes on case managers' visiting residential clients. *Education and Treatment of Children, 11*(1), 45-51.

Cohen, D. J., Eckhardt, C. I., & Schagat, K. D. (1998). Attention allocation and habituation to anger-related stimuli during a visual search task. *Aggressive Behavior: Official Journal of the International Society for Research on Aggression, 24*(6), 399-409.

Comte-Sponville, A. (2002). A small treatise on the great virtues: The uses of philosophy in everyday life. Hampshire, United Kingdom: Picador.

Crano, W. D., & Sivacek, J. (1982). Social reinforcement, self-attribution, and the foot-in-the-door phenomenon. *Social Cognition, 1*, 110-125.

Davis, D. E., Choe, E., Meyers, J., Wade, N., Varjas, K., Gifford, A., Quinn, A., Hook, J. Sn., Van Tongeren, D. R., Griffin, B. J., & Worthington, E. L. (2016). Thankful for the little things: A meta-analysis of gratitude interventions. *Journal of Counseling Psychology, 63*(1), 20-31.

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment, 49*, 71-75.

Diener, E., Lucas, R. E., & Scollon, C. N. (2009). Beyond the hedonic treadmill: Revising the adaptation theory of well-being. In E. Diener (Ed.), *The science of well-being: The collected works of Ed Diener* (pp. 103-118). Dordrecht, The Netherlands: Springer.

Dietz, T., Stern, P. C., & Guagnano, G. A. (1998). Social structural and social psychological bases of environmental concern. *Environment and Behavior, 30*(4), 450-471.

Dijksterhuis, A., & Smith, P. K. (2002). Affective habituation: Subliminal exposure to extreme stimuli decreases their extremity. *Emotion, 2*(3), 203-214.

Emmons, R. A. (2004). Gratitude. In M. E. P. Seligman & C. Peterson (Eds.), *Character strengths and virtues: A handbook and classification* (pp. 553-568). New York, NY: Oxford University Press.

Emmons, R. A., & Crumpler, C. A. (2000). Gratitude as a human strength: Appraising the evidence. *Journal of Social and Clinical Psychology, 19*, 56-69.

Emmons, R. A., & McCullough, M. E. (Eds.). (2004). *The psychology of gratitude*. New York, NY: Oxford University Press.

Emmons, R. A., & McCullough, M. E. (2003). Counting blessings versus burdens: An experimental investigation of gratitude and subjective well-being in daily life. *Journal of Personality and Social Psychology*, *84*(2), 377-389.

Emmons, R. A., McCullough, M. E., & Tsang, J. A. (2003). The assessment of gratitude. In S. J. Lopez & C. R. Snyder (Eds.), *Positive psychological assessment: A handbook of models and measures* (pp. 327-341). Washington, DC: American Psychological Association.

Emmons, R. A., & Mishra, A. (2011). Why gratitude enhances well-being: What we know, what we need to know. In K. M. Sheldon, T. B. Kashdan, & M. F. Steger (Eds.), *Series in positive psychology: Designing positive psychology: Taking stock and moving forward* (pp. 248-262). New York, NY: Oxford University Press.

Emmons, R. A., & Shelton, C. M. (2002). Gratitude and the science of positive psychology. *Handbook of Positive Psychology, 18*, 459-471.

Fagley, N. S. (2012). Appreciation uniquely predicts life satisfaction above demographics, the Big 5 personality factors, and gratitude. *Personality and Individual Differences, 53*, 59-63.

Fessler, D. M., Pisor, A. C., & Holbrook, C. (2017). Political orientation predicts credulity regarding putative hazards. *Psychological Science, 28*(5), 651-660.

Fitzgerald, P. (1998). Gratitude and justice. *Ethics, 109*(1), 119-153.

Förster, J., Liberman, N., & Higgins, E. T. (2005). Accessibility from active and fulfilled goals. *Journal of Experimental Social Psychology, 41*, 220-239.

Fredrickson, B. L. (2004). The broaden–and–build theory of positive emotions. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences, 359*, 1367-1377.

Frias, A., Watkins, P. C., Webber, A. C., & Froh, J. J. (2011). Death and gratitude: Death reflection enhances gratitude. *The Journal of Positive Psychology, 6*, 154-162.

Frijda, N. H. (1988). The laws of emotion. *American Psychologist, 43*(5), 349-358.

Frijda, N. H. (2007). *The laws of emotion*. Mahwah, NJ: Lawrence Erlbaum Associates.

Goldberg, L. R. (1999). The international personality item pool (IPIP).

Goldman, M., Seever, M., & Seever, M. (1982). Social labeling and the foot-in-the-door effect. *The Journal of Social Psychology, 117*, 19-23.

Gordon, A. K., Musher-Eizenman, D. R., Holub, S. C., & Dalrymple, J. (2004). What are children thankful for? An archival analysis of gratitude before and after the attacks of September 11. *Journal of Applied Developmental Psychology, 25*, 541-553.

Graham, S. (1988). Children's developing understanding of the motivational role of affect: An attributional analysis. *Cognitive Development, 3*, 71-88.

Graham, S., & Barker, G. P. (1990). The down side of help: An attributional-developmental analysis of helping behavior as a low-ability cue. *Journal of Educational Psychology, 82*(1), 7-14.

Grant, A. M., & Gino, F. (2010). A little thanks goes a long way: Explaining why gratitude expressions motivate prosocial behavior. *Journal of Personality and Social Psychology, 98*(6), 946-955.

Gravetter, F. J., & Wallnau, L. B. (2012). *Forzano LAB. Research methods for the behavioral sciences* (4th ed.). Belmont, CA: Wadsworth.

Harpham, E. J. (2004). Gratitude in the history of ideas. In R. A. Emmons & M. E. McCullough (Eds.), *The psychology of gratitude* (pp. 19-36). New York, NY: Oxford University Press.

Hayward, R. D., Krause, N., Ironson, G., Hill, P. C., & Emmons, R. (2016). Health and well-being among the non-religious: Atheists, agnostics, and no preference compared with religious group members. *Journal of Religion and Health, 55*, 1024-1037.

Henderson, T. L., Roberto, K. A., & Kamo, Y. (2010). Older adults' responses to Hurricane Katrina: Daily hassles and coping strategies. *Journal of Applied Gerontology, 29*, 48-69.

Hill, P. L., Allemand, M., & Roberts, B. W. (2013). Examining the pathways between gratitude and self-rated physical health across adulthood. *Personality and Individual Differences, 54*, 92-96.

Irvine, W. B. (2008). *A guide to the good life: The ancient art of Stoic joy*. New York, NY: Oxford University Press.

Kang, E., & Lakshmanan, A. (2017). Role of executive attention in consumer learning with background music. *Journal of Consumer Psychology, 27*, 35-48.

Kelberer, L. J., Kraines, M. A., & Wells, T. T. (2018). Optimism, hope, and attention for emotional stimuli. *Personality and Individual Differences, 124*, 84-90.

Kilbourne, W., & Pickett, G. (2008). How materialism affects environmental beliefs, concern, and environmentally responsible behavior. *Journal of Business Research, 61*, 885-893.

Killen, A., & Macaskill, A. (2015). Using a gratitude intervention to enhance well-being in older adults. *Journal of Happiness Studies, 16*, 947-964

Koenig, H. G., & Büssing, A. (2010). The Duke University Religion Index (DUREL): A five-item measure for use in epidemological studies. *Religions, 1*, 78-85.

Konstan, D. (2016). The freedom to feel grateful: The view from classical Antiquity. In D. Carr (Ed.), *Perspectives on gratitude: An interdisciplinary approach* (pp. 55-68). Loondong, England: Routledge.

Koo, M., Algoe, S. B., Wilson, T. D., & Gilbert, D. T. (2008). It's a wonderful life: Mentally subtracting positive events improves people's affective states, contrary to their affective forecasts. *Journal of Personality and Social Psychology, 95*(5), 1217-1224.

Lambert, N. M., Clark, M. S., Durtschi, J., Fincham, F. D., & Graham, S. M. (2010). Benefits of expressing gratitude: Expressing gratitude to a partner changes one's view of the relationship. *Psychological Science, 21*, 574-580.

Lambert, N. M., & Fincham, F. D. (2011). Expressing gratitude to a partner leads to more relationship maintenance behavior. *Emotion, 11*(1), 52-60.

Lambert, N. M., Fincham, F. D., Stillman, T. F., & Dean, L. R. (2009). More gratitude, less materialism: The mediating role of life satisfaction. *The Journal of Positive Psychology, 4*, 32-42.

Lambert, N. M., Graham, S. M., & Fincham, F. D. (2009). A prototype analysis of gratitude: Varieties of gratitude experiences. *Personality and Social Psychology Bulletin, 35*, 1193-1207.

Lin, C. C. (2015). Gratitude and depression in young adults: The mediating role of self-esteem and well-being. *Personality and Individual Differences, 87*, 30-34.

Lynn, M. (1991). Scarcity effects on value: A quantitative review of the commodity theory literature. *Psychology & Marketing, 8*, 43-57.

Lyubomirsky, S., Dickerhoof, R., Boehm, J. K., & Sheldon, K. M. (2011). Becoming happier takes both a will and a proper way: An experimental longitudinal intervention to boost well-being. Emotion, 11(2), 391-402.

Mastrandrea, M. D., Field, C. B., Stocker, T. F., Edenhofer, O., Ebi, K. L., Frame, D. J., Held, H., Kriegler, E., Mach, K. J., Matschoss, P. R., Plattner, G-K., Yohe, G. W., & Zwiers, F. W. (2010). *Guidance note for lead authors of the IPCC fifth assessment report on consistent treatment of uncertainties*. Intergovernmental Panel on Climate Change (IPCC).

McCullough M., E. (2013). *The Gratitude Questionnaire (GQ-6).* Measurement Instrument Database for the Social Science. Retrieved from www.midss.ie

McCullough, M. E., Emmons, R. A., & Tsang, J. A. (2002). The grateful disposition: A conceptual and empirical topography. *Journal of Personality and Social Psychology, 82*(1), 112-127.

McCullough, M. E., Kilpatrick, S. D., Emmons, R. A., & Larson, D. B. (2001). Is gratitude a moral affect? *Psychological Bulletin, 127*(2), 249-266.

McCullough, M. E., Kimeldorf, M. B., & Cohen, A. D. (2008). An adaptation for altruism: The social causes, social effects, and social evolution of gratitude. *Current Directions in Psychological Science, 17*, 281-285.

Milfont, T. L., & Duckitt, J. (2010). The environmental attitudes inventory: A valid and reliable measure to assess the structure of environmental attitudes. *Journal of Environmental Psychology, 30*, 80-94.

Moore, D. W. (1996). *Americans most thankful for family and health: Youth also thankful for career/job*. Princeton, NJ: Gallop Organization.

Panagopoulos, C. (2011). Thank you for voting: Gratitude expression and voter mobilization. *The Journal of Politics, 73*(3), 707-717.

Paulhus, D. L., & Van Selst, M. (1990). The spheres of control scale: Ten years of research. *Personality and Individual Differences, 11*, 1029-1036.

Poelker, K. E., & Kuebli, J. E. (2014). Does the thought count? Gratitude understanding in elementary school students. *The Journal of Genetic Psychology, 175*, 431-448.

Rankin, C. H., Abrams, T., Barry, R. J., Bhatnagar, S., Clayton, D. F., Colombo, J., Coppola, G., Geyer, M. A., Glanzman, D. L., Marsland, S., McSweeney, F. K., Wilson, D. A., Wu, C.-F., & Thompson. R. F. (2009). Habituation revisited: An updated and revised description of the behavioral characteristics of habituation. *Neurobiology of Learning and Memory, 92*(2), 135-138.

Rind, B., & Bordia, P. (1995). Effect of server's "thank you" and personalization on restaurant tipping 1. *Journal of Applied Social Psychology, 25*, 745-751.

Rosmarin, D. H., Pirutinsky, S., Cohen, A. B., Galler, Y., & Krumrei, E. J. (2011). Grateful to God or just plain grateful? A comparison of religious and general gratitude. *The Journal of Positive Psychology, 6*(5), 389-396.

Steindl-Rast, D. (2004). Gratitude as thankfulness and as gratefulness. In R. A. Emmons & M. E. McCullough (Eds.), *The psychology of gratitude* (pp. 282-290). New York, NY: Oxford University Press.

Sacco, S. J., Park, C. L., Suresh, D. P., & Bliss, D. (2014). Living with heart failure: Psychosocial resources, meaning, gratitude and well-being. *Heart & Lung: The Journal of Acute and Critical Care, 43*, 213-218.

Schell, A. M., Wynn, J. K., Dawson, M. E., Sinaii, N., & Niebala, C. B. (2000). Automatic and controlled attentional processes in startle eyeblink modification: Effects of habituation of the prepulse. *Psychophysiology, 37*, 409-417.

Segerstrom, S. C. (2001). Optimism and attentional bias for negative and positive stimuli. *Personality and Social Psychology Bulletin, 27*(10), 1334-1343.

Teigen, K. H. (1997). Luck, envy and gratitude: It could have been different. *Scandinavian Journal of Psychology, 38*, 313-323.

Teigen, K. H., & Jensen, T. K. (2010). Unlucky victims or lucky survivors? Spontaneous counterfactual thinking by families exposed to the tsunami disaster. *European Psychologist, 16*(1), 48-57.

Tesser, A., Gatewood, R., & Driver, M. (1968). Some determinants of gratitude. *Journal of Personality and Social Psychology, 9*(3), 233-236.

Trivers, R. L. (1971). The evolution of reciprocal altruism. *The Quarterly Review of Biology, 46*, 35-57.

Tsang, J. A. (2006). Gratitude and prosocial behavior: An experimental test of gratitude. *Cognition & Emotion, 20*, 138-148.

Tsang, J. A. (2007). Gratitude for small and large favors: A behavioral test. *The Journal of Positive Psychology, 2*, 157-167.

Tsang, J. A., & Martin, S. R. (2017). Four experiments on the relational dynamics and prosocial consequences of gratitude. *The Journal of Positive Psychology, 14*(3), 1-18.

Twigg, J. (2013). Risk perception, public education and disaster risk management. In H. Joffe, T. Rossetto, & J. Adams (Eds.), *Cities at risk: Living with perils in the 21st century* (pp. 171-182). Dordrecht, The Netherlands: Springer.

Walker, J., Kumar, A., & Gilovich, T. (2016). Cultivating gratitude and giving through experiential consumption. *Emotion, 16*(8), 1126-1136.

Watkins, P. C. (2014). *Gratitude and the good life: Toward a psychology of appreciation*. Springer Science & Business Media.

Watkins, P. C., Gibler, A., Mathews, M., & Kolts, R. (2005, August). *Aesthetic experience enhances gratitude*. Presentation at the annual convention of the American Psychological Association, Washington, DC.

Watkins, P. C., Grimm, D. L., & Kolts, R. (2004). Counting your blessings: Positive memories among grateful persons. *Current Psychology, 23*, 52-67.

Watkins, P. C., Woodward, K., Stone, T., & Kolts, R. D. (2003). Gratitude and happiness: The development of a measure of gratitude and its relationship with subjective well-being. *Social Behavior and Personality, 31*, 431-452.

Watson, D., & Clark, L. A. (1994). *The PANAS-X: Manual for the Positive and Negative Affect Schedule-Expanded Form*. Ames, IA: The University of Iowa.

Waytz, A., Cacioppo, J., & Epley, N. (2010). Who sees human? The stability and importance of individual differences in anthropomorphism. *Perspectives on Psychological Science, 5*, 219-232.

Weiner, B., Russell, D., & Lerman, D. (1979). The cognition–emotion process in achievement-related contexts. *Journal of Personality and Social psychology, 37*(7), 1211-1220.

Williams, L. A., & Bartlett, M. Y. (2014). Warm thanks: Gratitude expression facilitates social affiliation in new relationships via perceived warmth. *Emotion, 15*(1), 1-5.

Wirtz, D., Gordon, C. L., & Stalls, J. (2014). Gratitude and spirituality: A review of theory and research. In C. Kim-Prieto (Ed.), *Religion and spirituality across cultures* (pp. 287-301). Dordrecht, The Netherlands: Springer.

Wood, A. M., Brown, G. D., & Maltby, J. (2011). Thanks, but I'm used to better: A relative rank model of gratitude. *Emotion, 11*(1), 175-180.

Wood, A. M., Froh, J. J., & Geraghty, A. W. (2010). Gratitude and well-being: A review and theoretical integration. *Clinical Psychology Review, 30*, 890-905

Wood, A. M., Joseph, S., & Linley, P. A. (2007). Coping style as a psychological resource of grateful people. *Journal of Social and Clinical Psychology, 26*, 1076-1093.

Wood, A. M., Maltby, J., Stewart, N., Linley, P. A., & Joseph, S. (2008). A social-cognitive model of trait and state levels of gratitude. *Emotion, 8*(2), 281-290.

APPENDIX A

Gratitude Adjective Questionnaire

Indicate how much you agree with each statement using the following scale (used in Study 1)

1 – Strongly Disagree

2 – Disagree

3 – Somewhat Disagree

4 – Neither Disagree Nor agree

5 – Somewhat Agree

6 – Agree

7 – Strongly Agree

Alternate anchors used in studies 2, 3, & 4
1 = not at all
2
3
4 = very
5
6
7 = the most _____ (grateful) I have ever felt

Key Water Gratitude Items

1) Right now in this moment I feel grateful for water (or distractor item)

2) Right now in this moment I feel appreciative of water (or distractor item)

3) Right now in this moment I feel thankful for water (or distractor item)

Distractor Target Items

… My friends

… My family

… My education

… Cardboard boxes

… Food to eat

… The clothes I wear

… Life itself

… The place I sleep at night

… Smart phones

APPENDIX B

Duke University Religion Index

How often do you attend church or other religious meetings?

1 - Never

2 - Once a year or less

3 - A few times a year

4 - A few times a month

5 - Once a week

6 - More than once/week

How often do you spend time in private religious activities, such as prayer, meditation or

Bible study?

1 - Rarely or never

2 - A few times a month

3 - Once a week

4 - Two or more times/week

5 - Daily

6 - More than once a day

The following section contains 5 statements about religious belief or experience. Please mark the

extent to which each statement is true or not true for you, using the following scale

1 - Definitely *not* true

2 - Tends *not* to be true

3 - Unsure

4 - Tends to be true

5 - Definitely true of me

1. In my life, I experience the presence of the Divine (*i.e.*, God)

2. My religious beliefs are what really lie behind my whole approach to life

3. I try hard to carry my religion over into all other dealings in life

4. I consider myself to be spiritual

5. I consider myself to be religious

For studies in which abbreviated scales are used (Study 2 and Study 4) only the last two items about spirituality and religiosity were used. All other studies utilize the full scale.

APPENDIX C

International Personality Item Pool Liberalism scale

Indicate how much you agree with each statement using the following scale

1 – Strongly Disagree

2 – Disagree

3 – Somewhat Disagree

4 – Neither Disagree Nor agree

5 – Somewhat Agree

6 – Agree

7 – Strongly Agree

1. I tend to vote for liberal political candidates.

2. I believe that there is no absolute right or wrong.

3. I believe that criminals should receive help rather than punishment.

4. I believe in one true religion.

5. I tend to vote for conservative political candidates.

6. I believe that too much tax money goes to support artists.

7. I believe laws should be strictly enforced.

8. I believe that we coddle criminals too much.

9. I believe that we should be tough on crime.

10. I like to stand during the national anthem.

Choose the option that best describes your political orientation on the following scale

1 – Very Conservative

2

3 – Somewhat Conservative

4

5 – Neither Conservative Nor Liberal

6

7 – Somewhat Liberal

8

9 – Very Liberal

For studies in which abbreviated scales are used (Study 2 and Study 4) only the last item about

liberalism/conservativism was used. All other studies utilize the full scale.

APPENDIX D

Eco-centric Concern scale of the Environmental Attitude Questionnaire

Indicate how much you agree with each statement using the following scale

1 – Strongly Disagree

2 – Disagree

3 – Somewhat Disagree

4 – Neither Disagree Nor agree

5 – Somewhat Agree

6 – Agree

7 – Strongly Agree

1. The idea that nature is valuable for its own sake is naive and wrong.

2. It makes me sad to see natural environments destroyed.

3. Nature is valuable for its own sake.

4. One of the worst things about overpopulation is that many natural areas are getting destroyed.

5. I do not believe protecting the environment is an important issue.

6. Despite our special abilities humans are still subject to the laws of nature.

7. It makes me sad to see forests cleared for agriculture.

8. It does NOT make me sad to see natural environments destroyed.

9. I do not believe nature is valuable for its own sake.

10. I don't get upset at the idea of forests being cleared for agriculture.

APPENDIX E

Gratitude Questionnaire 6

Indicate how much you agree with each statement using the following scale

1 – Strongly Disagree

2 – Disagree

3 – Somewhat Disagree

4 – Neither Disagree Nor agree

5 – Somewhat Agree

6 – Agree

7 – Strongly Agree

1. I have so much in life to be thankful for

2. If I had to list everything that I felt grateful for, it would be a very long list

3. When I look at the world, I don't see much to be grateful for

4. I am grateful to a wide variety of people

5. As I get older, I find myself more able to appreciate the people events and situations that have been part of my life

6. Long amounts of time can go by before I feel grateful to something or someone

APPENDIX F

Spheres of Control Scale

Indicate how much you agree with each statement using the following scale

1 – Strongly Disagree

2 – Disagree

3 – Somewhat Disagree

4 – Neither Disagree Nor agree

5 – Somewhat Agree

6 – Agree

7 – Strongly Agree

1. I can usually achieve what I want if I work hard for it

2. Once I make plans, I am almost certain to make them work

3. I prefer games involving some luck over games requiring pure skill

4. I can learn almost anything if I set my mind to it

5. My major accomplishments are entirely due to my hard work and ability

6. I usually do not set goals because I have a hard time following through on them

7. Almost anything is possible for me if I really want it

8. Most of what happens in my career is beyond my control

9. I find it pointless to keep working on something that's too difficult for me

APPENDIX G

Individual Differences in Anthropomorphism Questionnaire

Next, we will ask you to rate the extent to which you believe various stimuli possess certain capacities. On a 0-10 scale (where 0 = "Not at All" and 10 = "Very much"), please rate the extent to which the stimulus possesses the capacity given.

We will ask you about the extent to which the stimulus has a mind of its own, has free will, has intentions, has consciousness, can experience emotions, is good-looking, is durable, is lethargic, is active, and is useful.

By "has a mind of its own" we mean able to do what it wants.

By "has free will" we mean able to choose and control its own actions.

By "has intentions" we mean has preferences and plans.

By "can experience emotion" we mean it has feelings.

By "has consciousness" we mean able to be aware of itself and its thoughts and feelings.

By "good-looking" we mean attractive.

By "lethargic" we mean moving slowly.

By "active" we mean moving frequently and quickly.

By "useful" we mean able to be used for something.

1. To what extent is the desert lethargic?
2. To what extent is the average computer active?
3. **To what extent does technology—devices and machines for manufacturing, entertainment, and productive processes (e.g. cars, computers, television sets)—have intentions.**
4. **To what extent does the average fish have free will.**[3]
5. To what extent is the average cloud good-looking.
6. To what extent are pets useful?

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[3] Bolded items represent the key items of the measure. Other items are filler

7. **To what extent does the average mountain have free will?**

8. To what extent is the average amphibian lethargic?

9**. To what extent does a television set experience emotions?**

10. To what extent is the average robot good-looking?

11. **To what extent does the average robot have consciousness.**

12. **To what extent do cows have intentions?**

13. **To what extent does a car have free will?**

14. **To what extent does the ocean have consciousness?**

15. To what extent is the average camera lethargic?

16. To what extent is a river useful?

17. **To what extent does the average computer have a mind of its own.**

18. To what extent is a tree active?

19. To what extent is the average kitchen appliance useful?

20. **To what extent does a cheetah experience emotions?**

21. **To what extent does the environment experience emotions?**

22. **To what extent does the average insect have a mind of its own?**

23. **To what extent does a tree have a mind of its own?**

24. To what extent is technology—devices and machines for manufacturing, entertainment, and productive processes (e.g. cars, computers, television sets)—durable?

25. To what extent is the average cat active.

26. **To what extent does the wind have intentions?**

27. To what extent is the forest durable?

28. To what extent is a tortoise durable?

29. **To what extent does the average reptile have consciousness?**

30. To what extent is the average dog good-looking?

APPENDIX H

PANAS –X selected subscales

Indicate how much you feel the following using the following scale

 1- Very slightly or not at all

 2- A little

 3- Moderately

 4- Quite a Bit

 5- Extremely

1. Right now I feel active

2. Right now I feel alert

3. Right now I feel attentive

4. Right now I feel enthusiastic

5. Right now I feel excited

6. Right now I feel inspired

7. Right now I feel interested

8. Right now I feel proud

9. Right now I feel strong

10. Right now I feel determined

11. Right now I feel cheerful

12. Right now I feel happy

13. Right now I feel joyful

14. Right now I feel delighted

15. Right now I feel lively

16. Right now I feel energetic

APPENDIX I

Demographic Questions

1. Select the gender that best describes you

    a. Male

    b. Female

    c. Other (specify) _____

    d. Prefer not to answer

2. Please indicate your age in years

    a. (open response)

3. Please indicate the racial identity that best describes you, choose all that apply

    a. Asian

    b. Black/African American

    c. Latino/Hispanic

    d. Native American Inuit

    e. Pacific Islander

    f. White/Caucasian

    g. Other (specify) _____

    h. Prefer not to answer

APPENDIX J

Certainty of water benefits questionnaire.

For each statement, indicate your certainty that the event described will happen and the percent likelihood that the event described will happen in the timeframe provided.

1- exceptionally unlikely	1 - 0 - 1 % probability
2 - very unlikely	2 - 0 - 10% probability
3 - unlikely	3 - 0-33% probability
4 - about as likely as not	4 - 33-66% probability
5 - likely	5 - 66-100% probability
6 - very likely	6 - 90-100% probability
7- virtually certain	7 - 99-100% probability

1. You will have access to fresh water, when you need it, **for the rest of your life**

2. You will have access to fresh water, when you need it, **for the next year**

3. You will temporarily lose access to fresh water due to drought or water shortages at any point in **the rest of your life.**

4. You will temporarily lose access to fresh water due to drought or water shortages at any point in **the next year.**

5. You will temporarily lose access to fresh water due to water contaminants at any point in **the rest of your life.**

6. You will temporarily lose access to fresh water due to water contaminants at any point in **the next year.**

7. You will temporarily lose access to fresh water due to plumbing or water utility issues at any point in **the rest of your life.**

8. You will temporarily lose access to fresh water due to plumbing or water utility issues at any point in **the next year.**

9. Fresh clean water will be abundant and easy to come by for humans on earth for **the rest of time.**

10. Fresh clean water will be abundant and easy to come by for humans on earth for **the rest of next year.**

APPENDIX K

Recall Stimuli

Review the following words. You will study these words for 5 minutes. Afterward you will be asked to recall as many of these words as you can.

Water-Related Stimuli	Neutral Stimuli
Flow	Pen
Wash	Chair
Ice	Phone
Pour	Hat
Rinse	Dog
Stream	Tree
Tide	Apple
Drink	Table
Wave	Paper
Cup	Write
Rain	Throw
River	Sleep
Ocean	Play
Snow	Car
Shower	School
Wade	Dance
Dive	Walk
Swim	People
Sea	Orange
Spout	Friday

APPENDIX L

Self Report Habit Index – Habitual Use of Water

Indicate how much you agree with each statement using the following scale

1 – Strongly Disagree

2 – Disagree

3 – Somewhat Disagree

4 – Neither Disagree Nor agree

5 – Somewhat Agree

6 – Agree

7 – Strongly Agree

Using water for cooking, cleaning, or hygiene is something that…

1. I do automatically.

2. I start doing without realizing

3. That makes me feel weird if I do not do it.

4. I do without thinking.

5. That belongs to my (daily, weekly, monthly) routine.

6. I have no need to think about doing.

APPENDIX M

Subjective Well-Being Questionnaire

Indicate how much you agree with each statement using the following scale

1 – Strongly Disagree

2 – Disagree

3 – Somewhat Disagree

4 – Neither Disagree Nor agree

5 – Somewhat Agree

6 – Agree

7 – Strongly Agree

1. In most ways my life is close to my ideal.

2. The conditions of my life are excellent.

3. I am satisfied with my life.

4. So far I have gotten the important things I want in life.

5. If I could live my life over, I would change almost nothing.

APPENDIX N

Water Conservation Behavioral Intention

Indicate how likely you are to adopt the following behavior in the next year

1 – Very Unlikely

2 – Unlikely

3 – Neutral

4 – Likely

5 – Very Likely

1. Take shorter showers or use less bath water

2. Replace dripping faucets or repair plumbing leaks in your home or report such problems if you live in an apartment

3. Sweep terraces and steps instead of washing them with water

4. Replace existing shower heads and toilets with modern fixtures specifically designed to use less water

5. Not flushing the toilet after every use

6. Using the washing machine/dishwasher more efficiently (only running it with a full load)

7. Turning off the tap while brushing teeth.

APPENDIX O

Water Conservation Organization Pamphlet