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Development of an Online Humility-Boosting Program

A Dissertation submitted in partial satisfaction
of the requirements for the degree of

Doctor of Philosophy

in

Psychology

by

Peter Michael Ruberton

September 2017

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"I just want to thank everyone who made this day necessary."

—Yogi Berra

I am fortunate to, frankly, an unfair degree for number and quality of the people in my life who helped make this day "necessary" for me. But when it comes to expressing my gratitude for those people, I have, frankly, been—for reasons I cannot entirely explain—what might be called a "man of few words." I think I have always assumed (wrongly, I am sure) that the people in my life to whom I owe thanks have known my thanks for them even without me saying them aloud—or maybe I just have too overly-developed a sense of irony to show any sort of *genuine* feelings. (Thanks for that, Dad.) However, I have it on good authority that expressing gratitude is good for the mind and soul, so I will give it a shot here. (Being a man of few words, I will limit direct acknowledgements to my immediate professional colleagues/mentors and family. But to the countless friends, colleagues, relatives, coworkers, bosses, spiritual elders, etc., whom I do not thank by name: Please know that I am grateful for everything you've done for me as well, and I will make a point to express my gratitude to each of you directly whenever the opportunity arises. Like Ron Weasley, I simply have the emotional range of a teaspoon, and I'm burning up enough of that range here as it is.)

To my doctoral advisor, the incomparable Sonja Lyubomirsky: Thank you for seeing things in me that I scarcely saw in myself, and doing everything in your considerable abilities to bring those things (carrots?) to fruition. At the risk of demeaning

all of the other wonderful doctoral advisors in the world, I will probably spend the better part of my career wondering how I drew the best one.

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[1]But not really. Please see above re. overly-developed sense of irony.

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To my parents, Carol and Michael: Thank you for the last 28 years generally. If I tried to name everything for which I am grateful, and indeed indebted, to you, this acknowledgements section would fill more pages than the entire Dissertation.

ABSTRACT OF THE DISSERTATION

Development of an Online Humility-Boosting Program

by

Peter Michael Ruberton

Doctor of Philosophy, Graduate Program in Psychology
University of California, Riverside, September 2017
Dr. Sonja Lyubomirsky, Chairperson

Humility is a quality marked by a secure, accurate self-concept and high focus on others relative to oneself. Although humility is socially valued and has been linked with positive interpersonal outcomes (e.g., generosity), little research to date has examined ways to make people sustainably more humble. However, at least three activities have been found to provide short-term increases in humility: experiencing awe, affirming self-relevant values (i.e., self-affirmation), and expressing gratitude. In two studies, I examined the efficacy of a multi-activity intervention designed to provide lasting boosts to humility. Study 1 tested the multi-activity intervention in a single-session to evaluate whether three humility activities together are more potent than any single activity. Participants completed either 1 or 3 of the possible humility activities or a set of 3 non-humility control activities. Those participants who completed all 3 activities were further assigned to do the activities in a random order, to assess how sequencing impacted the intervention's effects. Although the 3-activity intervention was not more humbling than the control activities on aggregate, the hypothesized sequence of Awe-Affirmation-Gratitude did increase humility relative to controls and the other 3-activity sequences.

Study 2 expanded the short-term multi-activity intervention into a 3-week online humility-boosting program. Participants (initial $N = 1022$) completed either 3 weekly humility-boosting activities (awe, self-affirmation, gratitude), 3 non-humility control activities, or no activities (waitlist condition). Relative to no activities, the humility program produced marginal increases in acceptance of humble beliefs, but did not decrease un-humble self-focused beliefs. However, the humility program was not discernably more impactful than the non-humility control activities, although effort towards the activities was associated with greater humility at a 4-week follow-up only for those participants who completed the humility program. The moderating role of effort tentatively supports the notion that repeatedly practicing humbling activities leads to humble beliefs "as a habit." Also, low initial humility was associated with an increased likelihood of dropping out of the study among humility program and waitlist participants, but not among non-humility control participants. In sum, my findings provide encouraging, albeit preliminary, evidence for the humility benefits of a novel online humility-boosting program.

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"Humility is the solid foundation of all virtues."
—Confucius
"Work at being a humble person."
—Sir John Templeton

As illustrated in Confucius' words, humility has long been a topic of philosophical and social importance. Only recently, however, has it received serious consideration as a subject for scientific investigation. A growing body of research is addressing questions such as the meaning of humility (e.g., Chancellor & Lyubomirsky, 2013; Peterson & Seligman, 2004; Tangney, 2000), how to measure it (e.g., Ashton & Lee, 2008; Davis et al., 2011; Kruse, Chancellor, & Lyubomirsky, 2017b), and what outcomes it predicts (e.g., LaBouff, Rowatt, Johnson, Tsang, & Willerton, 2012). Although humility is most often viewed as a socially-desirable personality trait or character strength (Exline & Geyer, 2004; Peterson & Seligman, 2004), it may also be approached as a transient psychological state (Chancellor & Lyubomirsky, 2013) in efforts to understand what causes it—and thus how to induce people to feel more humble. Along these lines, a preliminary series of interventions to boost momentary feelings of humility have been conducted (Kruse, Chancellor, & Lyubomirsky, 2017a; Kruse, Chancellor, Ruberton, & Lyubomirsky, 2014; Nelson-Coffey et al., 2017). However, to my knowledge, no research has tested an intervention to increase humility over a long-term period. The current studies build on previous research by examining specific ways that people might fulfill the counsel of both ancient and modern wisdom to work at building this important virtue. I thus aim to address perhaps the most important question of all in humility science: How can people become lastingly more humble?

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Describing Humility

Broadly speaking, humility is a psychological state characterized by a balanced, accurate self-concept and high focus on other people rather than focus on the self (see Tangney, 2000). In contrast with alternative perceptions of humility as self-deprecation or weakness (Tangney, 2000), it is generally viewed as a positive personal characteristic (Exline & Geyer, 2004). Humility has been linked to a number of prosocial outcomes. In a series of studies with undergraduates, humble individuals were more likely than less humble ones to help a fellow student, even when the social pressure to help was minimal (LaBouff et al., 2012). Humble people have also been found to be particularly generous with their time and money (Exline & Hill, 2012) and more likely than non-humble people to cooperate in economic games, even when cooperation is costly to them (Hilbig & Zettler, 2009; Hilbig, Zettler, & Heydasch, 2012).

Humility may also have benefits in specific domains such as medicine and business. In a study of patient-physician interactions, humble physicians were rated as more effective at communicating with patients than their less-humble counterparts (Ruberton et al., 2016). Because physician communication is associated with better patient outcomes (Ong, de Haes, Hoos, & Lammes, 1995; Stewart, 1995), physician humility may thus have downstream benefits for patients. Furthermore, humility in a sample of business CEOs was associated with greater empowerment in followers (Ou et al., 2014), whereas narcissism in a sample of business managers was positively associated with rates of white-collar crime (Blickle, Schlegel, Fassbender, & Klein, 2004).

Humility has been described as a character strength or virtue (along with modesty; Peterson & Seligman, 2004), a transient psychological state (Kruse, Chancellor, & Lyubomirsky, 2017a; Kruse, Chancellor, Ruberton, & Lyubomirsky, 2014), and a characteristic pattern of thoughts and behaviors (Ashton & Lee, 2008; Davis, Worthington, & Hook, 2010; Lee & Ashton, 2004). All these perspectives characterize humility in similar ways—namely, as an individual difference that relates to how people interact with others and involves low self-focus and high other-valuation. My research approaches humility primarily as a beneficial, but malleable, social-cognitive state; however, I recognize that some individuals may be more prone to humble states (i.e., are more "trait" humble) than others. A central goal of the present research is therefore to build moment-to-moment experiences of state humility into enduring trait-like humility, essentially helping people to become habitually more humble.

Hallmarks of Humility

My research approaches humility using the framework proposed by Chancellor and Lyubomirsky (2013). Under this framework, humility is characterized by five hallmarks, or observable markers: Each hallmark must be present, but none are individually sufficient, for a person to be humble. These hallmarks thus both define what humility is and differentiate it from what it is not. In particular, the opposite of humility is high self-focus, including excessively positive (e.g., narcissism or arrogance) or negative (e.g., depression or low self-esteem) self-views. Furthermore, under the hallmarks-based definition, humility is distinct from modesty: Humility reflects inward self-*evaluation* about one's worth and abilities, relative to other people, whereas modesty reflects

outward self-*presentation*, often for perceived social benefits (Tangney, 2000). Although humble people are frequently modest, they may sometimes behave immodestly when speaking frankly about their genuine strengths and accomplishments. Additionally, narcissistic individuals may behave outwardly modestly for self-presentational purposes, although they still have an inwardly inflated self-worth. As such, humility is not merely the absence of arrogance nor the presence of modesty. Instead, humility is indicated by the following five hallmarks: (a) a secure and accepting self-identity; (b) freedom from distortion about one's strengths and weaknesses; (c) openness to new information about oneself and the world; (d) high focus on other people relative to oneself; and (e) a belief that other people are equally worthy as oneself.

The first humility hallmark described by Chancellor and Lyubomirsky (2013) is a stable, accurate self-concept. Contrary to some conceptions (see Tangney, 2000, for a discussion), humility does not involve an inferior self-concept or low self-esteem, and humble individuals are aware of their personal strengths. Indeed, low self-esteem is associated with several outcomes that are antithetical to humility, such as excessively negative reactions to failure (Brown & Dutton, 1995) and a depressive attributional style (Tennen & Herzberger, 1987). Additionally, although both humble people and narcissists may have high self-esteem, humility is further marked by a stable self-concept with minimal fluctuations in self-esteem. In contrast, narcissists' levels of self-esteem are highly sensitive to social feedback, and narcissists respond with high anger and anxiety in response to failure (Rhodewalt & Morf, 1998). Thus, while narcissists have a positive but vulnerable self-concept, humble individuals have a positive but secure self-concept.

The second hallmark of humility is an accurate, undistorted view of one's strengths and weaknesses. Self-enhancement biases (such as over-attributing success to one's own ability or overstating the importance of successes) are common even among non-narcissists (e.g., Campbell, Reeder, Sedikides, & Elliot, 2000; see also Sedikides & Gregg, 2008, for a review). In contrast, humble people evaluate their own strengths and weaknesses accurately, without the need to self-enhance (Tangney, 2000).

The third hallmark of humility involves a willingness to incorporate new information into one's view of oneself or of the world, even when that information might threaten one's self-image. For example, humble people may be more willing than others to consider and accept information that runs contrary to their beliefs, rather than dismissing it to preserve their self-view (see Lord, Ross, & Lepper, 1979; see also Cohen, Aronson, & Steele, 2000). Additionally, narcissistic self-enhancement has been found to predict greater in-group favoritism and social categorization (Stangor & Thompson, 2002), suggesting that low humility is associated with a closed-minded view of other people.

The fourth and fifth hallmarks of humility are classified as relational hallmarks (Chancellor & Lyubomirsky, 2013), involving how humble people interact with others. First, humility is marked by high focus on other people as opposed to oneself. Humility is a hypo-egoic state (Leary & Guadagno, 2011); that is, it is low in self-involvement and abstract self-awareness. Because humble people do not focus on their own situation, they are particularly able to attend to the needs of other people, as illustrated by their high willingness to help a peer in need (LaBouff et al., 2012) and generosity (Exline & Hill,

2012). Finally, humble people are egalitarian; that is, they view other people as equally worthy and important as themselves (Tangney, 2000), whereas narcissists frequently view themselves as special or more important than others (Emmons, 1984).

State Humility

In addition to using the hallmarks-based definition of humility, my research treats humility as a malleable psychological state. By contrast, most research to date has approached humility as a relatively stable personality trait (e.g., Ashton & Lee, 2008; Davis et al., 2010). Although individuals do indeed vary in their overall levels of humility, I propose that humility also varies *within* individuals across time in a predictable, controllable manner. This state-based approach allows for the examination of specific psychological and contextual antecedents of humility, and thus ways to increase momentary feelings of humility. To that end, our laboratory has already tested three experimental interventions to boost state humility: practicing self-affirmation (Kruse et al., 2017a), expressing gratitude (Kruse et al., 2014), and experiencing awe (Chancellor, Nelson, Cornick, Blascovich, & Lyubomirsky, 2015). The background and details of each intervention are described in detail below. The success of interventions to date at boosting humility demonstrates that humility is not necessarily a permanent characteristic of an individual; rather, it is also a transient state that can be elicited by specific cognitive activities or situational cues. If people can be made more sensitive to such activities and cues, then they may be able to become more humble across situations. The current research therefore systematically integrates these interventions into a large-scale

humility-boosting program, with the goal of helping participants learn to think and act more humbly in their everyday lives.

Humility Interventions

Self-Affirmation

Self-affirmation is a process by which individuals reflect on self-relevant values when confronted with information that threatens their self-concepts (Cohen & Sherman, 2014; Sherman & Cohen, 2006). A central tenet of self-affirmation theory is that people are motivated to preserve a sense of self-integrity—a belief that they are capable, efficacious, and moral actors in their environments (Sherman & Cohen, 2006; Steele, 1988)—and therefore may respond defensively to information that threatens their self-integrity (Steele, 1988). For example, they may dismiss or discredit information that challenges their closely held beliefs (e.g., arguments against the death penalty presented to a proponent of capital punishment; Lord, Ross, & Lepper, 1979) or attribute their failures to external causes, rather than to themselves (e.g., Miller & Ross, 1975). These defensive biases are typically unconscious and automatic (Sherman & Cohen, 2006) and may serve to reduce dissonance that results from encountering a threat to one's self-view (see Steele & Liu, 1983). Self-affirmation thus serves as a substitute for defensive biases by reinforcing the self-image in other domains unrelated to the threatening information (Sherman & Cohen, 2006; Steele, 1988). By strengthening other aspects of the self, self-affirmation enables individuals to accept threatening information in an open and non-defensive manner.

Self-affirmation has been shown to reduce defensive biases, or other negative reactions to threating information, in a variety of domains. First, self-affirmation increases both acceptance of health information, such as information about the risks of caffeine consumption (Reed & Aspinwall, 1998; see also Sherman, Nelson, & Steele, 2000), and use of positive health behaviors after receiving threatening health information (Sherman et al., 2000). Second, self-affirmation diminishes the detrimental effects of stereotype threat on academic performance (Cohen, Garcia, Apfel, & Master, 2006; Goyer et al., 2017; Martens, Johns, Greenberg, & Schimel, 2006; Sherman et al., 2013), perhaps because self-affirmation reduces the relevance of stereotype threats to the self. Self-affirmation has also been found to buffer against the adverse academic consequences of a low sense of belonging among college students (Layous et al., 2016). Third, self-affirmation decreases rumination about negative self-relevant feedback by minimizing the impact of the feedback on positive affect (Koole, Smeets, Van Knippenberg, & Dijksterhuis, 1999). Fourth, self-affirmation reduces dissonance stemming from holding a contrary position in a group discussion (Matz & Wood, 2005) and lessens ideological closed-mindedness in an identity-relevant context (Cohen et al., 2007). Finally, affirming group-relevant values decreases group-serving attributions in response to successes or failures (Sherman & Kim, 2005; Sherman, Kinias, Major, Kim, & Prenovost, 2007).

Self-affirmation thus has a broad impact on reducing biased reactions to self-threatening situations. Because humility is associated with a secure, accepting identity and an acceptance of negative self-information (Chancellor & Lyubomirsky, 2013; Tangney, 2000), such bias reduction is a critical process by which self-affirmation may

increase humility. Affirming one's central values may allow one to accept one's limitations because it is not necessary to dismiss or ignore the limitations to preserve a sense of self-worth. Additionally, self-affirmation may boost humility by increasing positive other-focus. Crocker, Niiya, and Mischkowski (2008) found that self-affirmation promoted feelings of loving and connectedness, which in turn predicted greater acceptance of self-relevant information about the risks of smoking. Completing a self-affirmation activity also decreased narcissistic aggression in a sample of adolescents for a period of up to 1 week following the affirmation activity (Thomaes, Bushman, de Castro, Cohen, & Denissen, 2009). Self-affirmation thus promotes positive, egalitarian attitudes and behaviors towards other people, which is a key hallmark of humility (Chancellor & Lyubomirsky, 2013). Finally, humility involves relatively low negative affect and depression, and self-affirmation has been found to temper negative affect (Nelson, Fuller, Choi, & Lyubomirsky, 2014).

A series of studies by Kruse and his colleagues (2017a) experimentally examined the relationship between self-affirmation and humility. Across five studies, completing a self-affirmation activity led to greater self-reported and observer-rated humility. However, this effect was only present when the self-affirmation was immediately followed by exposure to self-relevant information (e.g., write about your strengths and weaknesses or write about why someone may be angry with you). That is, self-affirmation alone did not increase humility, but rather enabled a humble response to a self-threatening or self-enhancing cue. This finding is consistent with past research showing that self-affirmation enables non-biased responses to self-relevant information:

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Only when such information is salient is the effect of affirmation felt. Furthermore, exposure to negative self-information alone did not promote humility, and the effects of self-affirmation on humility could not be explained by increased positive affect or self-esteem. That is, affirmed participants did not report greater humility than non-affirmed participants simply because they felt good about themselves in general.

In sum, both theory and empirical evidence suggest that self-affirmation is associated with high humility. Self-affirmation reduces defensive biases towards threatening information, enables greater acceptance of one's limitations, promotes a more positive view of other people, and diminishes negative moods—all key components of the experience of humility. Consistent with this theoretical framework, experimentally manipulated self-affirmation did, indeed, lead to increases in humility in response to self-relevant information (Kruse et al., 2017a). Although further research is needed to explore other mechanisms by which self-affirmation may boost humility, self-affirmation and humility appear to be inexorably linked. Thus, I argue that self-affirming activities should be an integral component of a large-scale humility-boosting program.

Gratitude

Gratitude is a cognitive and affective reaction to externally-caused positive events and circumstances. It has been described as a moral emotion that occurs when individuals recognize that they have benefited from another person's actions (McCullough, Kilpatrick, Emmons, & Larson, 2001), particularly when individuals believe that the benefits they received were altruistically motivated and costly to the benefactor (Wood, Maltby, Stewart, Linley, & Joseph, 2008). Additionally, gratitude may be conceptualized

as a broader appreciation of positive factors in life, rather than merely of a specific positive event (Wood, Froh, & Geraghty, 2010). Similar to humility, gratitude may be treated as a stable trait (i.e., a grateful disposition; McCullough, Emmons, & Tsang, 2002) or a transient, but malleable, emotional state (e.g., Emmons & McCullough, 2003; Fredrickson, 2004).

Gratitude has been linked to greater psychological well-being in both correlational (e.g., McCullough et al., 2002) and experimental (e.g., Lyubomirsky, Dickerhoof, Boehm, & Sheldon, 2011; Froh, Sefick, & Emmons, 2008) studies. Furthermore, gratitude is associated with a variety of inter- and intra-personal outcomes. Emmons and McCullough (2003, Study 1) found that a "counting blessings" gratitude activity led to fewer physical health symptoms and more positive responses to receiving help than either reflecting on life's burdens or a neutral control activity. Fredrickson (2004) posits that these findings suggest an "upward spiral" (see Fredrickson & Joiner, 2002) between gratitude and positive emotions and behaviors; that is, feeling grateful leads people to act more positively towards themselves and others, which in turn promotes additional gratitude. Supporting this perspective, Layous and colleagues (2017) found that writing a letter of gratitude prior to completing a self-improvement intervention led to increased effort towards the intervention. Gratitude has also been linked to increases in helping behaviors. Across three studies, grateful responses to receiving help increased subsequent prosocial behaviors towards the original benefactor and a stranger, even when it was costly to act prosocially (Bartlett & DeSteno, 2006; see also Tsang, 2006). Finally, gratitude is associated with more positive interpersonal relationships (e.g., greater

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feelings of connectedness and relationship satisfaction between romantic partners; Algoe, Gable, & Maisel, 2010).

Gratitude and humility are linked through several overlapping mechanisms. First, gratitude is an other-focused—and, indeed, other-praising (Algoe & Haidt, 2009)— emotion. As such, it inherently requires recognition of the positive influence of other people (or other factors outside of the self) in one's life, which naturally decreases self-focus and thus increases humility (Chancellor & Lyubomirsky, 2013; Tangney, 2000). In a similar vein, experiences that promote gratitude may also bring about feelings of dissonance or uncertainty about one's capabilities (Fritz & Lyubomirsky, in press). For example, self-determination theory proposes that people are motivated to fulfill the basic needs of competence and autonomy (see Ryan & Deci, 2000, 2002); that is, they need to see themselves as capable and independently-motivated actors in their social environment. However, experiences or activities that induce gratitude (e.g., writing a letter of gratitude) implicitly challenge these self-perceptions because the recipient of the benefit was unable to, or simply did not, carry out a particular goal independently. To restore their sense of competence and autonomy, individuals must first recognize that their capabilities are limited; in other words, they must acknowledge that they cannot "go it alone" to achieve their goals.

Consistent with this theory, writing letters of gratitude has been found to be not a wholly positive experience; rather, in several studies, the activity evoked feelings of indebtedness, guilt, and humility, suggesting that it made participants cognizant of their own shortcomings (Layous et al., in press). Furthermore, practicing gratitude may

promote increased effort towards self-improvement goals (Armenta, Fritz, &

Lyubomirsky, in press; Layous et al., 2017), suggesting that gratitude-evoking

experiences raise individuals' awareness of a need to improve themselves. In sum,

experiences that bring about gratitude may also bring a greater recognition of one's

limitations, which is a key facet of humility (Chancellor & Lyubomirsky, 2013).

A recent series of studies by our lab empirically tested the relationship between

humility and gratitude (Kruse et al., 2014). Consistent with the hypothesis that gratitude-

inducing activities can also induce humility, participants who wrote a letter of gratitude

were rated as more humble in response to a "stress test" than those who completed a

neutral activity. This effect was mediated by low self-focus in the letters of gratitude.

Additionally, humility moderated the impact of writing a letter of gratitude on gratitude

itself: Only participants who were initially humble reported feeling more grateful after

writing the letter. Finally, day-to-day gratitude and humility mutually predicted one

another over a 14-day period in a diary study; that is, feeling particularly grateful on a

certain day was associated with feeling particularly humble on the same day and the

following day, and vice-versa. Taken together, these findings suggest the possibility that

gratitude and humility may exist in a mutually-reinforcing upward spiral: Gratitude

boosts humility, which in turn enables one to feel more grateful.

Practicing gratitude is a potentially powerful pathway towards greater humility. It

deflects focus from the self to other people and promotes a broad awareness of one's

limitations, as well as the need for other people. However, the effects of gratitude on

humility may be constrained in individuals who are initially low in humility. Such

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individuals may be less capable of experiencing gratitude (see Kruse et al., 2014), and thus less capable of gaining humility from gratitude, than individuals who are comparatively high in humility. For example, narcissism—an antithesis of humility—involves a sense of inflated self-worth and entitlement (e.g., Campbell & Foster, 2007); as such, narcissistic individuals may refuse to acknowledge the contributions of other people to their successes. Additionally, writing letters of gratitude has been shown to diminish positive affect in people high in depressive symptoms (Sin, Della Porta, & Lyubomirsky, 2011), perhaps because those individuals believe that they have nothing about which they can feel grateful. Therefore, expressing gratitude should not be the first or only intervention used to increase humility in particularly self-focused individuals. Instead, gratitude should serve as a follow-up to self-affirmation: Once participants have secured their sense of self-worth, they may be more capable of recognizing their dependence on other people. The impact of gratitude on humility may therefore be most pronounced when participants have already been induced into a mildly humble state. I empirically test this hypothesis here.

Awe

Awe is an emotional response to grand, powerful, overwhelming, or unexpected environmental stimuli (see Fredrickson, 2013; Keltner & Haidt, 2003), such as nature, beauty, or great accomplishments by other people (Shiota, Keltner, & Mossman, 2007). It is a discrete emotion (Ekman, 1992; Shiota, Campos, & Keltner, 2003) and is regarded as a positive state (Fredrickson, 2004; Griskevicius, Shiota, & Neufeld, 2010; Shiota et al., 2007; cf. Lazarus, 1991) or even a moral emotion (i.e., an emotion triggered by non-self-

relevant stimuli that promotes prosocial behavior; Haidt, 2003; Keltner & Haidt, 2003). Keltner and Haidt (2003) propose that awe is distinguished by two primary components. First, awe evokes a sense of vastness, or a recognition of forces larger (either physically or socially) than the self. Second, awe promotes cognitive accommodation, or the expansion of mental structures to make sense of new or overwhelming experiences.

The relatively few empirical studies to date that have examined the correlates and outcomes of awe support the theoretical framework set forth by Keltner and Haidt (2003). Shiota and colleagues (2007) explored the types of situations that may evoke awe and the cognitive consequences of these situations. First, they found that awe-inducing situations involve rich stimuli (e.g., nature, art, creativity), but not social contexts or personal accomplishments. Additionally, thinking about experiences in nature, but not thinking about personal accomplishments, evoked a sense of smallness, connection with the world, and the presence of something larger than the self. Finally, dispositional proneness to awe was associated with greater tolerance for uncertainty and a more abstract, universal self-concept. These studies are consistent with the view that awe involves both a perception of vastness about the world relative to the self and a high capacity for cognitive flexibility.

Building on these findings, Rudd, Vohs, and Aaker (2011) found that induced awe promoted a more open perception of time. Participants who were presented with awe-eliciting stimuli, relative to participants who received happiness-eliciting or neutral stimuli, perceived time as more plentiful, were more generous with their time, and expressed a preference for experiential rather than material products. In a separate series of studies, induced awe made weak arguments seem less persuasive, while other positive

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emotions, such as amusement, enthusiasm, and contentment, made the arguments seem more persuasive (Griskevicius et al., 2010). Furthermore, this pattern held even when the argument was rendered superficially more convincing by attributing it to an apparent authority on the topic. Awe thus uniquely enabled a more open, critical mindset and minimized the impact of irrelevant heuristic cues.

The empirical research on awe suggests that awe-eliciting experiences should also evoke feelings of humility. Specifically, awe promotes a diminished, detached sense of self (Shiota et al., 2007), and humility involves low self-focus and an accurate view of oneself and one's position in the world (Tangney, 2000). Additionally, awe is associated with increased cognitive openness and a broader, less closed-minded worldview (Griskevicius et al., 2010; Rudd et al., 2011; Shiota et al., 2007), and humility is associated with high openness to new information about oneself and the world (Chancellor & Lyubomirsky, 2013).

A study from our laboratory provided support for the hypothesized awe-humility relationship by using an immersive virtual environment (aka virtual reality) to induce awe (Nelson-Coffey et al., 2017). Participants were exposed to either a high-awe simulation (a spaceship slowly moving away from Earth with narration of a passage from the book *Pale Blue Dot* [Sagan, 1994]) or a neutral simulation (a generic office setting with narration of an encyclopedic description of the dwarf planet Pluto). As expected, participants who viewed the awe simulation subsequently reported greater awe and humility than participants who viewed the neutral simulation. However, the increase in humility was not mediated by increases in awe alone; instead, awe mediated the effects of

the Pale Blue Dot simulation only among participants who also felt connected to others during the simulation. Reported feelings of awe itself therefore may not be sufficient for awe-related experiences to increase humility.

Furthermore, little is known about the conditions under which awe-eliciting stimuli might be most effective at increasing humility. For example, highly self-focused individuals may be reluctant to diminish their self-view and thus resistant to the cognitive effects of awe. Similar to practicing gratitude, awe-related experiences may therefore be most impactful on humility when individuals have already been made to feel somewhat humble. Although further research is needed to understand how and when awe-related experiences elicit humility, it is clear that such experiences are nonetheless a valuable means of boosting humility, particularly in conjunction with other techniques such as self-affirmation and gratitude.

The Present Studies

The primary goal of this research was to develop a multi-week online program to sustainably increase humility. I addressed this overarching question across two studies. First, in Study 1, I examined the effectiveness of a multi-activity humility intervention in a single session. The multi-activity intervention comprises three previously-tested short-term humility interventions to systematically target improvements in each of the five "hallmarks" of humility: Self-affirmation, to promote a secure, accepting self-concept and a resistance to defensive self-protective biases; gratitude, to promote higher focus on other people and a view of other people as equally valuable as oneself; and awe, to promote an open, balanced view of the self in a larger society and world. I hypothesized

that the integrative humility intervention will provide stronger and more durable boosts to humility than any single-activity interventions alone. Furthermore, the order in which the activities are completed may impact their combined effectiveness. Specifically, I hypothesized that, because awe is associated with increased cognitive openness (Keltner & Haidt, 2003), feeling awe before practicing self-affirmation may magnify the impact of the self-affirmation activity. Additionally, writing a letter of gratitude has been found to be more impactful for individuals in a humble state than for less humble individuals (Kruse et al., 2014). Therefore, I expected that the multiple-activity humility intervention would be most effective if the letter of gratitude was completed last, following awe and values affirmation, in that order.

Second, in Study 2, I directly tested my hypothesis that humility can be durably increased via a multi-activity, multi-week program. This humility-boosting program employs the same three activities (self-affirmation, gratitude, and awe) tested together in Study 1. Although each of these activities individually—or collectively, as tested in Study 1—may have short-term effects on humility, I hypothesized that the synthesis of all three activities, practiced over a period of weeks rather than minutes, would provide a powerful means of shaping a more humble mindset over a longer-term period. This approach is consistent with recent behavior-oriented models of personality change (e.g., Magidson, Roberts, Collado-Rodriguez, & Lejuez, 2014); as Funder (2014) succinctly put it: "Change the behaviors, and the trait will follow." Accordingly, the humility-boosting program tested in Study 2 employs specific strategies—self-affirmation, practicing gratitude, and appreciating awe—that should promote and reinforce humble

thoughts and behaviors. Finally, Study 2 also examines potential moderators of the humility-boosting program's effectiveness, such as personality (e.g., the Big Five, narcissism), religiosity, and initial motivation to become more humble.

Study 1

Participants and Procedure

A total of 538 adults were recruited online to complete Study 1. Specifically, 504 participants were recruited from Prolific Academic, a UK-based online survey response recruitment site similar to MTurk, and 34 participants were recruited from an advertisement posted to Dr. Sonja Lyubomirsky's personal Facebook profile. Because the activities were presented only in English, their effectiveness may have been substantially attenuated for participants who primarily spoke a different language; for example, the powerful narration of the Pale Blue Dot awe video would have little impact on a person who does not understand English. I therefore excluded participants recruited from Prolific whose first language (reported by Prolific) was not English (remaining n = 343). I also excluded participants who did not watch any of their assigned awe or control video, yielding a final sample of 328 participants (184 male, 138 female, 6 other or no response; $M_{age} = 31.37$, $SD_{age} = 11.51$).

Participants first completed a set of baseline personality questionnaires as potential moderators and covariates of the effects of the activities; these measures were not considered in the analyses reported in this study. They then completed three of six possible activities. Specifically, participants were randomly assigned to complete either (a) three humility-related activities; (b) one humility activity, randomly assigned, and two

neutral control activities; or (c) three neutral control activities. Participants assigned to complete three humility activities were further randomly assigned to complete the activities in different sequences (6 sequences total; see Table 1); each sequence was treated as a separate experimental condition. Participants assigned to complete one humility activity also completed two control activities corresponding to the humility activities they were not assigned; for example, participants who completed the letter of gratitude activity did the control activities for awe and self-affirmation. The single humility activity was completed last, and the two control activities were presented in a random order. Participants who completed three control activities did the activities in a random order. The sequence of control activities was ignored in both the single-humility and three-control conditions. There were thus 10 possible conditions: 6 conditions with three humility activities, 3 conditions with one humility activity, and 1 condition with three control activities. Sample sizes per condition are reported in Table 2.

Table 1
Activity sequence conditions in Study 1.

Condition	First activity	Second activity	Third activity
1	Awe	Self-affirmation	Gratitude
2	Awe	Gratitude	Self-affirmation
3	Self-affirmation	Awe	Gratitude
4	Self-affirmation	Gratitude	Awe
5	Gratitude	Awe	Self-affirmation
6	Gratitude	Self-affirmation	Awe

To reduce fatigue, participants were told that they could take a brief (3-minute) break after each activity, including the final activity. Participants were encouraged to continue thinking about the activity they had just completed during these breaks. After

finishing their assigned activities, participants completed posttest measures of their humility, mood, gratitude, self-integrity, and self-esteem.

Activities

Complete prompts for all activities are available in Appendix A.

Humility activities.

Awe. Participants watched a video of a spaceship moving away from Earth, paired with images and video clips of outer space and humanity, while listening to narration of an excerpt from the book Pale Blue Dot (Sagan, 1994; see Nelson-Coffey et al., 2017). The awe video can be viewed at https://youtu.be/4PN5JJDh78I. Participants were encouraged to watch the video "in a comfortable setting where you can fully appreciate the video," and were informed that the video included audio narration. The percentage of the video viewed was recorded using the YouTube JavaScript API. After watching the video, participants were instructed to "write a sentence or two about your reaction to the video you just watched—your thoughts and feelings about it."

Self-affirmation. Following typical procedures for self-affirmation (e.g., Cohen et al., 2006), participants first identified the qualities they valued the most and least from a list of 14 possible values (e.g., creativity, relationships with family and friends; adapted from Kruse et al., 2017a). They then wrote about why their most important value was important to them. Participants were instructed to write at least a short paragraph, and could not progress to the next part of the study until 5 minutes had elapsed. Because self-affirmation requires exposure to self-information, particularly negative self-information,

to increase humility, participants wrote about a "quality of yours that others have said is negative or have criticized you for" after completing the self-affirmation writing.

Gratitude. Participants were instructed to think of a kind act (or acts) that someone had done for them for which they were extremely grateful, and to write a letter of gratitude to the person who did the kind act(s). Participants were instructed to write the letter directly to the person they were addressing, and could not progress to the next part of the study until 5 minutes had elapsed. Participants were also told that their letter was private and that they would not need to deliver it to anyone.

Control activities.

Awe control: Informational video. Participants watched an informational video of a scientific description of a day on earth (mimicking the space-theme of the Awe video, but without awe-inducing stimuli.) The non-awe video can be viewed at https://youtu.be/1wGFJd3j3ds. All instructions were identical to those used with the awe video.

Self-affirmation control: Other's affirmation. Participants first identified the qualities they valued the most and least from a list of 14 possible values. They then wrote about why their least important value might be important to someone else, parallel to the personal self-affirmation activity but without self-reflection (see Cohen et al., 2006). All instructions were identical to the self-affirmation activity.

Gratitude control: Daily activities. Participants were instructed to think about what they did over the past 7 days and write those activities in a list format, paralleling a letter of gratitude but without high other-focus. All instructions were identical to those

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used in the gratitude activity, except for instructions specific to writing a letter to another person.

Measures

Humility. Participants completed the Brief State Humility Scale (BSHS; Kruse, Chancellor, & Lyubomirsky, 2017b), a 6-item scale consisting of 3 positively-coded items that a humble person should endorse and 3 negatively-coded items that a humble person should reject. Responses were given on a 7-point Likert scale (1 = *Strongly disagree,* 7 = *Strongly agree*). Reliability of the overall scale was adequate, α = .79.

A confirmatory factor analysis of the BSHS at Day 0 in Study 2 revealed that a one-factor solution did not adequately explain the structure of the items. A subsequent exploratory factor analysis suggested a two-factor solution, with the 3 positively coded items on the first factor (i.e., items that a humble person would affirm; "affirmative humility") and the 3 negatively coded items on the second factor (i.e., items that a humble person would reject; "anti-humility"). Because I am interested in the effects of the interventions on humility holistically, I examined a bifactor model with a higher-order factor using all 6 items ("general humility") and the two lower-order factors suggested by the EFA. A CFA revealed that the bifactor model, with latent factors fixed to be orthogonal, adequately fit the data, TLI = .938, RMSEA = .077 (95% CI = [.048, .110], and was better fitting than a one-factor model, $\chi^2(6) = 85.79$, $p < .001$, BIC 18834 (bifactor) vs. 18879 (one-factor). Due to difficulty in estimating bifactor structural models with latent variables, I present separate results using manifest variables for general humility, as well as for the affirmative humility and anti-humility subscales

(collectively the "humility outcomes"). These factors were inversely correlated with one another, $r = -.62$, $p < .001$, and were strongly correlated with the general humility factor (rs = .88 and -.92 for affirmative and anti-humility, respectively).

Results

I used contrast t-tests to examine my hypothesis that any multi-activity intervention would be more effective than a single-activity intervention, and that any intervention with at least one humility activity would be more effective than an all-control intervention. Hence, I refer to this contrast as "3-1-0" because it compares 3 humility activities to 1 humility activity to 0 humility activities. Given that differences between activity sequences were addressed in separate analyses, for the 3-1-0 contrasts, the 3-humility-activity sequence conditions were combined into a single group to maximize the degrees of freedom available for the t-test; the combined group was assigned a contrast weight of +1. The single-humility-activity conditions were evaluated separately, and each condition was assigned a contrast weight of 0. The all-control condition was assigned a contrast weight of -1. Contrast weights were inverted for the anti-humility subscale, which was hypothesized to be lower in the humility activity conditions than in the all-control condition. All contrasts used one-tailed p-values, as is typical for contrast t-tests (Rosenthal, Rosnow, & Rubin, 1999).

To assess overall differences among the activity sequence conditions, relative to control, I also estimated one-way linear models with all 10 conditions dummy coded separately (all control = 0) and humility grand mean standardized. Means and standard deviations for each humility variable in each condition are reported in Table 2.

Table 2

Means and standard deviations of humility (all scales) by experimental condition, Study 1.

	n	General Humility		Affirmative Humility		Anti-Humility	
		M	*SD*	*M*	*SD*	*M*	*SD*
Awe - Affirmation - Gratitude	31	5.72	0.72	5.76	0.78	2.33	0.89
Awe - Gratitude - Affirmation	38	4.98	1.01	5.04	0.95	3.09	1.31
Gratitude - Affirmation - Awe	24	5.02	0.92	4.85	1.24	2.81	1.21
Gratitude - Awe - Affirmation	29	5.02	1.08	5.13	1.12	3.08	1.22
Affirmation - Awe - Gratitude	30	5.26	1.10	5.36	1.03	2.84	1.34
Affirmation - Gratitude - Awe	34	5.50	0.96	5.54	1.14	2.55	0.94
All multi-humility sequences	186	5.25	1.00	5.29	1.07	2.79	1.18
Control - Control - Awe	37	5.61	0.91	5.83	0.80	2.61	1.32
Control - Control - Gratitude	39	4.97	1.19	4.94	1.18	3.01	1.33
Control - Control - Affirmation	35	5.30	1.11	5.37	1.02	2.76	1.31
Control - Control - Control	30	5.02	0.95	5.16	0.97	3.12	1.17

General humility. Contrary to my hypothesis, the 3-1-0 contrast was not significant for general humility, $t(322) = 1.17$, $p_{one-tailed} = .12$, $r_{contrast} = .065$. However, in the all-conditions linear model, the overall ANOVA was significant, $F(9, 317) = 2.44$, $p = .006$, suggesting that the conditions differed in how humble they became. Specifically, as shown in Table 3, the Awe-only condition and the hypothesized 3-activity sequence of Awe-Affirmation-Gratitude were both significantly higher in general humility than the all-control condition, bs = 0.57 ($p = .018$) and 0.68 ($p = .007$), respectively. The 3-activity sequence of Affirmation-Gratitude-Awe also approached significance relative to control, b = 0.46, $p = .059$.

Table 3

Regression coefficients by condition for general humility, Study 1

	β	*SE*	*t*	*p*
Awe - Affirmation - Gratitude	0.68	0.25	2.70	.007
Awe - Gratitude - Affirmation	-0.04	0.24	-0.16	.876
Gratitude - Affirmation - Awe	0.00	0.27	0.02	.988

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	β	SE	t	p
Gratitude - Awe - Affirmation	0.01	0.25	0.02	.981
Affirmation - Awe - Gratitude	0.23	0.25	0.92	.360
Affirmation - Gratitude - Awe	0.46	0.25	1.89	.059
Control - Control - Awe	0.57	0.24	2.39	.018
Control - Control - Gratitude	-0.05	0.24	-0.21	.836
Control - Control - Affirmation	0.28	0.24	1.15	.252

Note. Condition was dummy coded with all-control as the reference group.
β = standardized regression coefficient. *SE* = standard error.

Affirmative humility. Contrary to my hypothesis, the 3-1-0 contrast was also not significant for affirmative humility, $t(322) = 0.66$, $p_{one-tailed} = .25$, $r_{contrast} = .037$. However, in the all-conditions linear model, the overall ANOVA was again significant, $F(9, 317) = 3.49$, $p < .001$, suggesting that the groups differed in their levels of affirmative humility. Specifically, as shown in Table 4, the Awe-only condition and the hypothesized 3-activity sequence of Awe-Affirmation-Gratitude were both significantly higher in affirmative humility than the all-control condition, bs = 0.63 ($p = .008$) and 0.57 ($p = .021$), respectively.

Table 4
Regression coefficients by condition for affirmative humility, Study 1

	β	SE	t	p
Awe - Affirmation - Gratitude	0.57	0.25	2.31	.021
Awe - Gratitude - Affirmation	-0.11	0.24	-0.45	.656
Gratitude - Affirmation - Awe	-0.29	0.26	-1.10	.274
Gratitude - Awe - Affirmation	-0.03	0.25	-0.11	.913
Affirmation - Awe - Gratitude	0.19	0.25	0.75	.451
Affirmation - Gratitude - Awe	0.36	0.24	1.49	.137
Control - Control - Awe	0.63	0.24	2.67	.008
Control - Control - Gratitude	-0.20	0.23	-0.86	.388
Control - Control - Affirmation	0.20	0.24	0.85	.399

Note. Condition was dummy coded with all-control as the reference group.
β = standardized regression coefficient. *SE* = standard error.

Anti-humility. The 3-1-0 contrast was marginally significant for anti-humility, $t(322) = 1.39$, $p_{\text{one-tailed}} = .083$, $r_{\text{contrast}} = .077$. Because the contrast was not significant at $\alpha = .05$ even using one-tailed p-value, this effect provides inconclusive support, at best, for my hypothesis that three activities would reduce anti-humility more than any single activity. Furthermore, in the all-conditions linear model, the overall ANOVA was not significant, $F(9, 317) = 1.52$, $p = .14$. However, as shown in Table 5, the hypothesized 3-activity sequence of Awe-Affirmation-Gratitude was significantly lower in anti-humility than the all-control condition, $b = -0.64$, $p = .012$. Additionally, the Awe-only condition and the 3-activity sequence of Affirmation-Gratitude-Awe were both marginally lower in anti-humility than control, bs = -0.41 and -0.46, respectively.

Table 5
Regression coefficients by condition for anti-humility, Study 1

	β	SE	t	p
Awe - Affirmation - Gratitude	-0.64	0.25	-2.52	.012
Awe - Gratitude - Affirmation	-0.03	0.24	-0.12	.908
Gratitude - Affirmation - Awe	-0.26	0.27	-0.95	.344
Gratitude - Awe - Affirmation	-0.03	0.26	-0.13	.896
Affirmation - Awe - Gratitude	-0.23	0.26	-0.88	.379
Affirmation - Gratitude - Awe	-0.47	0.25	-1.87	.062
Control - Control - Awe	-0.41	0.24	-1.70	.090
Control - Control - Gratitude	-0.09	0.24	-0.38	.702
Control - Control - Affirmation	-0.29	0.25	-1.19	.237

Note. Condition was dummy coded with all-control as the reference group.
β = standardized regression coefficient. *SE* = standard error.

Sequence analyses: Was the hypothesized activity sequence the most humbling? To test my hypothesis that the sequence of Awe, then Affirmation, then Gratitude would be most effective at increasing humility, I conducted a series of contrast t-tests. These analyses used only participants in the all-humility activity conditions ($N =$

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144). Contrast weights were set at +5 for the Awe-Affirmation-Gratitude sequence and -1 for all others (weights were inverted for anti-humility), and all tests used one-tailed p-values.

General humility. The contrast for the hypothesized effect was significant, $t(138) = 2.34$, $p_{one-tailed} = .010$, $r_{contrast} = .19$. The data therefore supported my hypothesis that general humility would be higher following the Awe-Affirmation-Gratitude sequence than the other sequences.

Affirmative humility. The contrast for the hypothesized effect for affirmative humility was also significant, $t(138) = 2.55$, $p_{one-tailed} = .006$, $r_{contrast} = .21$. This result provides evidence supporting my hypothesis that affirmative humility would be higher following the Awe-Affirmation-Gratitude sequence than the other sequences.

Anti-humility. Finally, the data supported my hypothesis that anti-humility would be lower following the Awe-Affirmation-Gratitude sequence than the other sequences, $t(138) = 1.69$, $p_{one-tailed} = .046$, $r_{contrast} = .14$.

Study 2

Overall, the results of Study 1 indicated that the expected sequence of humility activities was effective at increasing humility overall and was more effective than the other possible sequences, particularly for the affirmative component of the BSHS. However, Study 1 tested the multi-activity intervention over a short (30-60 minute) timeframe, and the effects of the multi-activity sequences were not consistently stronger than the effects of a single-activity intervention. Perhaps the condensed nature of the multi-activity intervention created undue fatigue, such that participants could not fully

appreciate (and therefore be humbled by) the third activity they completed. To address these issues, Study 2 spread the existing humility activities over a relatively extended period of 3 weeks. The multi-week intervention tested in Study 2 used the existing online humility activities—completed in the hypothesized Awe-Affirmation-Gratitude sequence supported by Study 1—as prompts for participants to "carry forward" the lessons of the activities into their day-to-day lives. Study 2 thus expands the multi-activity online intervention from Study 1 into a more lasting—but also potentially less daunting—real-world intervention.

Method

Participants. Participants were 1,022 adults living in the United States recruited online by Qualtrics survey panels, an online survey response recruitment platform ($M_{age} = 50.7$, $SD_{age} = 16.89$; 59.4% female). The target sample size for Day 0 was set at $N = 1000$ so that at least 100 participants per condition would remain in the study at Day 21, given typical follow-up rates for Qualtrics survey panels (approx. 60-70% return per week). The study was advertised as a test of an "Online self-improvement program," and no references to humility were made in consent documents or any other study prompts (except for the humility motivation scale; see below). Based on parental ethnicity, 711 participants were White, 157 were Asian, 69 were of mixed or multiple ethnicities, 47 were Black, 17 were Hispanic, 2 were Middle Eastern, 2 were Native American, and 1 was Asian Pacific or Hawaiian; the remaining 16 participants either did not report, or did not know, their parents' ethnicities, or reported another parental ethnicity not specified. Because the humility activities were intended to be completed as a complete set,

participants who failed to complete any of the Day 0 through Day 21 surveys were

dropped from the study.

Procedure. Participants were randomly assigned at the start of the study to one of

three conditions: the experimental Humility Program condition, the active control Non-

Humility activities condition, and the no-activity Waitlist control condition. Sample sizes

by day and condition are reported in Table 6. The study was conducted online over a 7-

week period in the spring of 2017.

Table 6
Sample sizes by Day and Condition, Study 2

| Day | Condition | | | |
	Humility Program	Non-Humility	Waitlist	Total
0	330	330	362	1022
7	231	236	257	724
14	131	165	157	453
21	109	146	132	387
49	75	80	79	234

The main program of the study consisted of four weekly surveys administered over the

first 21 days (i.e., on Days 0, 7, 14, and 21). During the main program period, participants

in the Humility Program and Non-Humility conditions completed either the experimental

humility activities (awe, self-affirmation, gratitude) or a set of matched control activities

(generic attention redirection, object affirmation, self-organization). Waitlist participants

completed all study measures, but did not do any humility or control activities. An

additional follow-up survey was administered approximately 4 weeks after the main

program concluded (i.e., on or about Day 49). See Figure 1 for an overview of the study

timeline in each condition and Table H for the measures administered at each time point. Consent was obtained at Day 0, and participants were included in the final sample only if they correctly answered three "distraction check" items in the Day 0 survey (e.g., "Please select 3, 'Disagree'"), and indicated at the start of the Day 0 survey that they "commit[ted] to thoughtfully providing your best answers to each question in this study."

Day	Humility Program	Non-Humility	Waitlist
0	Survey Awe activity	Survey Spotlight activity	Survey
2	Reminder email	Reminder email	
5	Reminder email	Reminder email	
7	Survey Values affirmation	Survey Object affirmation	Survey
9	Reminder email	Reminder email	
12	Reminder email	Reminder email	
14	Survey Gratitude activity	Survey Organizing activity	Survey
16	Reminder email	Reminder email	
19	Reminder email	Reminder email	
21	Survey	Survey	Survey
49	Follow-up Survey	Follow-up Survey	Follow-up Survey

Figure 1. Timeline of Study 2 procedures, by condition.

In each survey, all participants first completed the measures reported in Table 7. In the first three surveys (Days 0, 7, and 14), Humility Program and Non-Humility participants also completed their respective online activities at the end of the survey. The activities in the Humility Program condition were identical to the activities in the Humility condition of Study 1. However, to ensure that the non-humility activities were plausibly positive and enjoyable, but did not include any "humbling" artifacts, when practiced over a multi-day period, three new activities were developed for the Non-Humility condition.

Table 7
Measures used in each survey wave, Study 2

Measure	Day 0	Day 7	Day 14	Day 21	Day 49
Brief State Humility Scale	*	*	*	*	*
Affect-Adjective Scale + Awe/Wonder	*	*	*	*	*
Gratitude Questionnaire	*	*	*	*	*
Self-Integrity Scale	*	*	*	*	*
Direct manipulation check questions	*	*	*	*	*
Rosenberg Self-Esteem Scale	*	*	*	*	*
Improvement motivation	*			*	*
Satisfaction with Life Scale	*			*	*
Dispositional awe	*			*	*
Narcissistic Personality Inventory	*			*	*
Religious belief salience & practice	*			*	*
Ten-Item Personality Inventory	*			*	*
Demographics	*				
Activity effort & motivation				*	
Follow-up continued activity practice					*

Specifically, as a comparison to the awe activity, Non-Humility participants completed a condensed version of the "Spotlight" activity, an attention-redirection activity (Shin, Ruberton, & Lyubomirsky, 2017). Participants watched a video with stock

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footage of everyday scenery while listening to narration by Dr. Sonja Lyubomirsky

describing the potential benefits of volitionally redirecting one's attention when needed.

The video can be viewed at https://youtu.be/8TPp6kNONzs. The Spotlight activity

matches the attentional components of the awe activity but removes the specific

instructions to identify awe-inspiring stimuli. As a comparison to self-affirmation, Non-

Humility participants completed an object affirmation (appreciation) activity, in which

they selected two everyday objects from a list and wrote about why one of those objects

was important to them.[2] The other-values writing typically used as a control for self-

affirmation may induce empathy or connectedness towards others, both potentially

humbling experiences, when practiced repeatedly; by contrast, an everyday object

affirmation should not induce empathy or other-connectedness while retaining the

personal relevance of (self) self-affirmation. As a comparison to writing a letter of

gratitude, participants wrote about their organizational techniques and ways that they

might improve them. Like expressing gratitude, an organization task should be a

reasonably positive activity for participants, but the organizational task lacks the

decreased self-focus and increased other-focus of gratitude. The complete prompts for

these initial Non-Humility activities are given in Appendix B1.

After doing the online activities, participants in the two active conditions received

instructions to continue practicing the key "ingredient" of that activity in their day-to-day

lives over the next week, and were told to keep a daily record of their actions and

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[2]All participants reported both their two most important values (from the same list used in Study 1) and the two everyday objects most important to them (reported in Appendix B1) as part of the Day 0 survey.

experiences related to the activity. The exact instructions for these continuing activities are given in Appendix B2. Although participants were asked to keep a diary of their activities, they were told that they would not be asked to report what they wrote down specifically, but instead that they would be asked about their relevant experiences in general at the next survey. To encourage participants to follow through on the weekly activities, two reminder emails were sent each week, one approximately two days after the preceding survey and another approximately two days before the following survey. The text of these emails is reported in Appendix B3. No new activities were presented at Day 21, but participants completed a brief questionnaire about their motivation and effort to complete their assigned activities. Additionally, participants were asked in the Day 49 follow-up survey about how much they continued to practice the activities after Study 2 period.

Participants in the Waitlist condition completed all non-activity-related questionnaires, but did not complete any activities or receive any reminder emails during the study period. Waitlist participants were sent a document detailing the humility activities, including the weekly diary activities and the text of the reminder emails, after the Day 49 survey was completed.

Measures. Means and standard deviations for all variables across time, collapsed across conditions, are shown in Table 8.

Table 8
Means and standard deviations of all study variables, by Day, Study 2.

	Day 0 M (SD)	Day 7 M (SD)	Day 14 M (SD)	Day 21 M (SD)	Day 49 M (SD)
General Humility	67.09 (17.03)	67.91 (16.40)	69.18 (17.45)	69.32 (16.83)	70.85 (17.07)
Affirmative Humility	68.51 (19.32)	69.50 (17.86)	72.00 (17.91)	72.28 (17.66)	73.67 (17.84)
Anti-Humility	34.33 (21.39)	33.67 (20.75)	33.59 (21.28)	33.69 (20.94)	31.96 (20.68)
Positive Affect	4.35 (1.35)	3.94 (1.45)	3.92 (1.52)	4.14 (1.45)	4.27 (1.41)
Negative Affect	2.58 (1.23)	2.06 (1.17)	1.97 (1.20)	2.29 (1.23)	2.33 (1.13)
Gratitude	5.50 (0.99)	5.54 (0.99)	5.57 (0.98)	5.46 (1.05)	5.54 (1.00)
Self-Integrity	5.54 (0.86)	5.60 (0.86)	5.65 (0.88)	5.56 (0.88)	5.59 (0.84)
Awe	2.85 (1.51)	2.57 (1.57)	2.52 (1.63)	2.97 (1.63)	3.10 (1.67)
Self-Esteem	3.05 (0.54)	3.09 (0.54)	3.13 (0.54)	3.07 (0.55)	3.12 (0.53)
Manipulation check: Awe	2.17 (1.10)	2.21 (1.07)	2.26 (1.16)	2.18 (1.12)	2.29 (1.23)
Manipulation check: Value aff.	3.03 (1.27)	3.56 (1.27)	3.54 (1.28)	3.45 (1.33)	3.62 (1.23)
Manipulation check: Gratitude	3.35 (1.18)	3.48 (1.18)	3.44 (1.22)	3.44 (1.21)	3.48 (1.14)
Manipulation check: Attn. redirection	2.58 (1.28)	2.64 (1.28)	2.45 (1.23)	2.44 (1.27)	2.57 (1.29)
Manipulation check: Object aff.	2.85 (1.23)	3.01 (1.24)	3.02 (1.23)	3.00 (1.29)	3.03 (1.30)
Manipulation check: Organization	3.18 (1.13)	3.21 (1.15)	3.12 (1.21)	3.16 (1.21)	3.12 (1.21)
Humility Motivation	4.64 (1.32)			4.55 (1.37)	4.46 (1.46)
Gratitude Motivation	5.15 (1.17)			5.12 (1.20)	5.09 (1.28)
Happiness Motivation	5.37 (1.07)			5.31 (1.08)	5.30 (1.09)
Relationship improvement motivation	5.33 (1.12)			5.25 (1.19)	5.24 (1.23)
General Self-Improvement Motivation	5.72 (0.98)			5.59 (1.04)	5.48 (1.10)
Positive Change Motivation	5.71 (1.03)			5.65 (1.04)	5.59 (1.14)
Dispositional Awe	4.62 (1.00)			4.62 (1.15)	4.60 (1.14)
Life Satisfaction	4.36 (1.46)			4.39 (1.43)	4.38 (1.39)
NPI: Overall Narcissism	11.51 (6.85)			10.44 (6.75)	9.69 (6.72)

NPI: Authoritarianism	3.22 (2.29)	2.89 (2.19)	2.73 (2.22)
NPI: Self-Sufficiency	2.50 (1.47)	2.36 (1.34)	2.24 (1.42)
NPI: Superiority	1.55 (1.41)	1.42 (1.39)	1.28 (1.38)
NPI: Exhibitionism	1.03 (1.42)	0.88 (1.39)	0.84 (1.36)
NPI: Exploitativeness	1.22 (1.17)	1.12 (1.22)	1.10 (1.26)
NPI: Vanity	0.63 (0.93)	0.51 (0.88)	0.45 (0.86)
NPI: Entitlement	1.36 (1.30)	1.25 (1.30)	1.05 (1.15)
Religious Belief Salience	4.35 (2.02)	4.20 (2.07)	4.16 (2.12)
Religious Practice	7.26 (6.64)	6.71 (6.61)	6.54 (6.55)
Extraversion	3.75 (1.52)	3.68 (1.50)	3.69 (1.53)
Agreeableness	5.27 (1.19)	5.41 (1.25)	5.40 (1.24)
Conscientiousness	5.60 (1.18)	5.66 (1.18)	5.78 (1.09)
Neuroticism	3.11 (1.39)	2.98 (1.43)	2.87 (1.41)
Openness	4.88 (1.14)	4.88 (1.22)	4.87 (1.24)
Activity Effort (Humility Program)		5.24 (1.06)	
Activity Effort (Non-Humility)		5.40 (0.94)	

Humility. Humility was assessed with the Brief State Humility Scale (Kruse et al., 2017b), using the same affirmative humility and anti-humility facets as Study 1. To minimize recall effects from week to week, responses were given on a 100-point sliding scale, with labels at 0 (*Strongly disagree*), 50 (*Neutral*), and 100 (*Strongly agree*). Reliability of the general humility factor at Day 0 was mediocre, $\alpha = .73$; reliability of the affirmative humility facet was slightly weaker than that of the general factor, $\alpha = .59$, while reliability of the anti-humility facet was comparable to that of the general factor, $\alpha = .74$. As in Study 1, the two subscales were negatively correlated with one another, $r = -.39$, $p < .001$, and correlated as expected with the general humility factor, rs = .82 and -.85, respectively, although the correlations were somewhat weaker than in Study 1.

Positive and negative affect and awe. Positive and negative affect were assessed using a modified version of the Affect-Adjective Scale (Diener & Emmons, 1984), which measures the extent to which participants felt six positive emotions ("Happy," "Pleased," "Peaceful/serene," "Joyful," "Enjoyment/fun," "Relaxed/calm") and five negative emotions ("Worried/anxious," "Angry," "Frustrated," "Dull/bored," "Depressed/blue," "Unhappy"). Two additional items were included to assess feelings of awe ("Awed," "Wonder/amazement"); these items were not included in either the positive or negative affect composites. Reliability of the positive and negative affect composites at Day 0 was good, αs = .93 and .88, respectively. Reliability of the awe composite was adequate, $\alpha = .73$. Affect was assessed over the previous week at Day 0 and "right now" for the other surveys.

Gratitude. Gratitude was assessed with the 6-item Gratitude Questionnaire (GQ-6; McCullough, Emmons, & Tsang, 2002). Reliability of the composite scale at Day 0 was adequate, $\alpha = .81$.

Self-integrity. To determine the success of the self-affirmation activity at bolstering a stable, competent self-identity, self-integrity was assessed with the 8-item Self-Integrity Scale (Sherman et al., 2009) using a 7-point Likert scale (1 = *Strongly disagree*, 7 = *Strongly agree*). Reliability of the composite scale at Day 0 was good, $\alpha = .89$.

Direct manipulation check questions. Thoughts and behaviors related to the Humility Program and Non-Humility activities each week were assessed with 6 ad-hoc questions, each relating to one of the six (3 Humility, 3 Non-Humility) activities used in the study. The questions relating to the Humility Program activities were: "How often did you experience something that moved you to feel awe?"; "Consider the values that you previously indicated were most important to you ([Top value] and [Second value]). How often did you think about these values?"; and "How often did you express gratitude to someone who helped you?" Participants responded to the questions with regards to their experiences "over the past week." Each item was considered separately as a direct manipulation check for its respective activity.

Self-esteem. Self-esteem was assessed with the 10-item Rosenberg Self-Esteem Scale (Robins, Hendin, & Trzesniewski, 2001; Rosenberg, 1965) using a 4-point Likert scale (1 = *Strongly disagree*, 4 = *Strongly agree*). Reliability of the composite scale at Day 0 was good, $\alpha = .89$.

Improvement motivation. Participants reported their motivation to increase their humility using five items adapted from Breines and Chen's (2012, Experiment 2) scale assessing motivation to make amends following a transgression. Example items from the original scale include "I am committed to not repeating this behavior (or anything like it) again" (adapted to "I am committed to becoming more humble") and "I feel no need to make amends" (adapted to "I feel no need to experience humility more often"; reverse-coded). The same items were also adapted for motivation to improve in happiness, gratitude, and interpersonal relationships. Reliability of the domain-specific improvement motivation scales was adequate, α range .82 (happiness motivation) to .89 (humility motivation). As part of a separate investigation, participants also provided their own open-ended definitions of "humility," "gratitude," and "happiness" with the respective improvement motivation scales.

Additionally, participants completed a 5-item measure of their general self-improvement motivation (from Breines & Chen, 2012, Experiment 4). An exploratory factor analysis of the items revealed two distinct subfactors: personal self-improvement motivation ("I want to learn and improve myself," "I want to find opportunities that will challenge me and help me grow as a person," "I would like to discover new strategies for improving myself"; α = .87) and general positive change motivation ("I feel capable of making positive changes," "I feel confident that I can make positive changes"; α = .90). All improvement motivation items used a 7-point Likert scale (1 = *Strongly disagree*, 7 = *Strongly agree*).

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Life satisfaction. Life satisfaction was assessed with the Satisfaction With Life Scale (Diener et al., 1985) using a 7-point Likert scale (1 = *Strongly disagree*, 7 = *Strongly agree*). Reliability of the composite at Day 0 was good in this sample, α = .92.

Dispositional awe. Dispositional awe was assessed with the awe subscale of the Dispositional Positive Emotions Scale (Shiota, Keltner, & John, 2006; sample items: "I often feel awe," "I have many opportunities to see the beauty of nature.") Reliability of the composite at Day 0 was adequate, α = .80.

Narcissism. Narcissism was assessed with the Narcissistic Personality Inventory (NPI; Raskin & Terry, 1988). The NPI consists of a set of 40 forced-choice response pairs, each of which includes one low narcissism and one high narcissism option (e.g., "When people compliment me I sometimes get embarrassed" vs. "I know that I am good because everybody keeps telling me so"). Scores were the total number of high-narcissism options selected. Reliability of the overall composite at Day 0 was adequate, α = .86. In addition to the general narcissism factor, the NPI measures 7 lower-level "component traits" of narcissism: Authority (8 items; α = 76), Self-Sufficiency (6 items; α = .42), Superiority (5 items; α = .61), Exhibitionism (7 items; α = .67), Exploitativeness (5 items; α = .46), Vanity (3 items; α = .65), and Entitlement (6 items; α = .49).

Religiosity. Religious belief salience was assessed using a 5-item measure (Blaine and Crocker, 1995; sample item: "My religious beliefs are what lie behind my whole approach to life") on a 7-point Likert scale (1 = *Strongly disagree*, 7 = *Strongly agree*). Reliability of the religious belief salience composite at Day 0 was excellent, α = .97. Religious practice was assessed using a 5-item measure evaluating how frequently

participants performed six religious activities (e.g., "Praying or meditating," "Attending religious services") during the prior month (Exline & Geyer, 2004). The religious practice scale used a 6-point scale from 0 (*Not at all*) to 5 (*More than once a day*), and scores were the average of the six items. Reliability of the religious practice composite at Day 0 was good, $\alpha = .90$.

  Personality. Personality was assessed with the Ten-Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003). The TIPI assesses personality along the "big five" traits (extraversion, neuroticism, agreeableness, conscientiousness, openness), with each trait measured by two items, and has demonstrated convergent validity with more comprehensive big-five personality measures (Gosling et al., 2003). The trait scales of the TIPI typically have poor internal reliability because the scale was designed to provide content validity for each trait, rather than high inter-item correlations. However, the scale had good test-retest reliability from Day 0 to Day 21 in this sample, 4 of 5 test-retest rs > .80 (test-retest r for openness = .69).

  Activity effort and motivation. Participants in the Humility Program and Non-Humility conditions completed an ad hoc 6-item measure of their motivation and effort to complete their assigned activities (example items: "I tried to follow the instructions for the activities closely," "I wanted to do the activities for my own sake, rather than just for this study.") All items used a 7-point Likert scale (1 = *Strongly disagree*, 7 = *Strongly agree*). Reliability of the composite was adequate, $\alpha = .82$. Mean effort scores did not differ between the Humility Program ($M = 5.24$) and Non-Humility ($M = 5.40$) conditions, $t(253) = 1.29$, $p = .20$.

Continued activity practice. Participants in the Humility Program and Non-Humility conditions were asked at the end of the Day 49 survey the extent to which they continued practicing the activities from the primary study period. Specifically, for each of their three assigned activities, participants reported how much they continued to do each of the activities after the study, compared to how much they naturally did the activities before starting this study. (For the Humility Program condition, the activities were described as "Focusing on awe-inspiring things," "Thinking about my most important values," and "Expressing additional gratitude towards people who helped me.") Responses were given on a 4-point scale (0 = *Less than before the study*, 1 = *About the same as before the study*, 2 = *A little more often than before the study*, 3 = *Considerably more often than before the study*), and each activity was evaluated separately.

Results: Manipulation Check

To evaluate whether the humility program activities influenced the specific qualities underlying them (feelings of awe, self-integrity, and gratitude), I estimated regressed change models predicting each manipulation outcome at the study day immediately following its respective activity, controlling for the outcome's value at the study day immediately prior. For example, self-integrity (outcome of self-affirmation) was predicted at Day 14, following the self-affirmation activity week, controlling for Day 7 self-integrity. For each activity, I then estimated a second model assessing change in the direct manipulation check question (e.g., "How often did you experience something that moved you to feel awe?"

Manipulation check and outcome variables were standardized within time point, and all available participants at each time point were included. Condition was dummy coded with the Humility Program condition as the all-zero group, making the coefficients for condition direct comparisons between each control condition and the Humility Program condition. Additionally, because each outcome was standardized, the intercept coefficients reflect ordinal changes in the outcomes among participants in the Humility Program condition. For example, in the model predicting Day 7 awe, how many standard deviations above or below average in awe were Humility Program participants at Day 7 if they reported average awe at Day 0?

Awe. In the model predicting feelings of awe and wonder, the intercept coefficient was significant, $\beta = .16$, $p = .002$, 95% CI = [.059, .26], indicating that participants in the Humility Program condition reported greater than average awe at Day 7. Additionally, Humility Program participants reported greater awe at Day 7 than both Non-Humility ($\beta = -.15$, $p = .032$, 95% CI = [-.29, -.013]) and Waitlist ($\beta = -.22$, $p = .001$, 95% CI = [-.36, -.086]) participants. However, no significant effects were found for the direct awe manipulation check question (all ps > .20). The awe activity was therefore partially successful: The activity induced increased feelings of awe, but not necessarily increased awareness of awe experiences.

Self-affirmation (self-integrity). In the model predicting self-integrity, the intercept coefficient was marginally significant, $\beta = .086$, $p = .078$, 95% CI = [-.010, .18], indicating that participants in the Humility Program condition reported slightly greater than average self-integrity at Day 14. Additionally, Humility Program participants

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reported greater self-integrity at Day 14 than both Non-Humility ($\beta = -.13$, $p = .042$, 95% CI = [-.26, -.004]) and Waitlist ($\beta = -.23$, $p = .001$, 95% CI = [-.35, -.094]) participants. However, no significant effects were found for the direct self-affirmation manipulation check question (all ps > .60). The self-affirmation activity was also therefore partially successful: The activity induced increased self-integrity, but not necessarily increased reflection about personal values.

Gratitude. No significant effects were found either for feelings of gratitude (all ps > .50) or for the direct gratitude manipulation check question (all ps > .30). The gratitude activity was therefore unsuccessful at eliciting increased feelings of gratitude or gratitude expression.

Results: Multilevel Models (Days 0 through 21)

Analytic approach. The effects of the humility program relative to the non-humility and waitlist control conditions were assessed using multilevel models. For each humility outcome, I first estimated an unconditional means model and calculated an intraclass correlation to determine whether participants varied meaningfully in humility across all time points. I then estimated an unconditional growth model to assess the baseline variance in how much participants increased in humility over time, with linear time as a level 1 predictor. Finally, I estimated a theoretical model with experimental condition as a level 2 predictor of intercepts and slopes.

Humility outcome variables were grand-mean standardized. Day was centered at Day 21 so that intercept fixed effects reflected differences among conditions at the conclusion of the program. To ease interpretation of growth slopes, study days were

divided by 7 prior to analysis. Day 0 was thus coded as -3, Day 1 was coded as -2, etc.

Condition was dummy coded with the Humility Program condition as the all-zero group; level 2 fixed intercepts thus indicate the trajectories in the Humility program, while level 2 slopes indicate differences between each control condition and the Humility Program condition separately. Random effects of Day were included, and random effects were allowed to correlate.

The complete model for each humility outcome is:

$$\text{Humility}_{ij} = \gamma_{00} + (\gamma_{01} \times \text{Non-Humility}) + (\gamma_{02} \times \text{Waitlist}) + (\gamma_{10} \times \text{Day}) + (\gamma_{11} \times$$

$$\text{Day} \times \text{Non-Humility}) + (\gamma_{12} \times \text{Day} \times \text{Waitlist}) + u_{0j} + (u_{1j} \times \text{Day}) + r_{ij}$$

Where:

Humility_{ij} is the standardized humility score for each participant j at Day i,

γ_{00} is the expected average standardized humility score at Day 21 for participants in the Humility Program condition,

γ_{01} is the standardized difference between Humility Program and Non-Humility participants at Day 21,

γ_{02} is the standardized difference between Humility Program and Waitlist participants at Day 21,

γ_{10} is the change in standardized humility per week for participants in the Humility Program condition,

γ_{11} is standardized difference in change per week between Humility Program and Non-Humility participants,

γ_{12} is standardized difference in change per week between Humility Program and Waitlist participants,

u_{0j} is the deviation from the expected Day 21 humility score for each participant j, with standard deviation τ_{00},

u_{1j} is the deviation from the expected change in humility per week for each participant j, with standard deviation τ_{11}, and

r_{ij} is the residual deviation from the expected humility score at Day i for each participant j, with standard deviation σ.

Significance of the fixed effects was determined using conventional p-values (using the Satterthwaite approximation of degrees of freedom), with confidence intervals computed from likelihood profiles. Significance of the random effects was determined using likelihood profile confidence intervals of their respective standard deviations; a confidence interval that does not contain zero suggests that the standard deviation (variance) of the random effect is statistically significant.

Two sets of models were estimated for each humility outcome. In the first set of models, I used all available observations at each time point, including data from participants who subsequently dropped out of the study. Multilevel models estimate growth trajectories using all available observations for each participant, extrapolating the trajectories to missing observations where needed. These all-case analyses thus represent an intention-to-treat analytic approach: How much did participants assigned to complete the humility program change in humility relative to controls, regardless of whether they completed all parts of the program? Because all participants randomly assigned to a

condition were considered, these models permit causal conclusions about the effectiveness of the humility program. However, participants may have elected to leave the study because they did not experience any psychological benefits, reducing their expected changes in humility over the parts of the study that they did not complete. These models therefore represent a relatively conservative test of the efficacy of the humility program.

In the second set of models, I used only participants with complete data for all of Days 0 through 21. These complete-case analyses thus represent the effects of the program as designed: How much did participants who completed the entire program change in humility, relative to controls? Because participants who completed the entire humility program may have differed from control participants in meaningful ways at baseline, true random assignment cannot be assumed in these models, restricting causal conclusions. However, by evaluating only those participants who completed all of the assigned surveys and activities, complete-case analyses are still informative as a proof-of-concept test of the humility program.

All-case models.

General humility. The intraclass correlation from the unconditional means model was .78, indicating that the majority of variance in general humility was between, rather than within, participants. In the unconditional growth model, linear time explained 5.2% of within-participant variance. The variance of the random slopes was significant, $\tau_{11} =$ .11, 95% CI = [.058, .14], suggesting that participants varied meaningfully in the extent to which they increased in general humility.

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In the complete model, experimental condition explained 1% of intercept (Day 21) variance in general humility and 2.8% of variance in linear change in affirmative humility, relative to the unconditional growth model. Participants in the Humility Program condition did not show a significant linear increase in general humility over the course of the program, $\gamma_{10} = .032$, $p = .10$, 95% CI = [.-007, .072]. However, as shown in Figure 2, Humility Program participants did increase in general humility marginally more than Waitlist participants, $\gamma_{12} = -.047$, $p = .084$, 95% = [-.10, .006], but not Non-Humility participants, $\gamma_{11} = -.028$, $p = .30$, 95% CI = [-.080, .025]. The Humility Program condition therefore did not appreciably boost general humility per se, but it did promote small increases in general humility relative to no activities at all. However, Humility Program participants were not significantly higher on Day 21 general humility than Non-Humility ($\gamma_{01} = -.13$, $p = .17$, 95% CI = [-.32, .058]) or Waitlist ($\gamma_{02} = -.050$, $p = .60$, 95% CI = [-.24, .14]) participants.
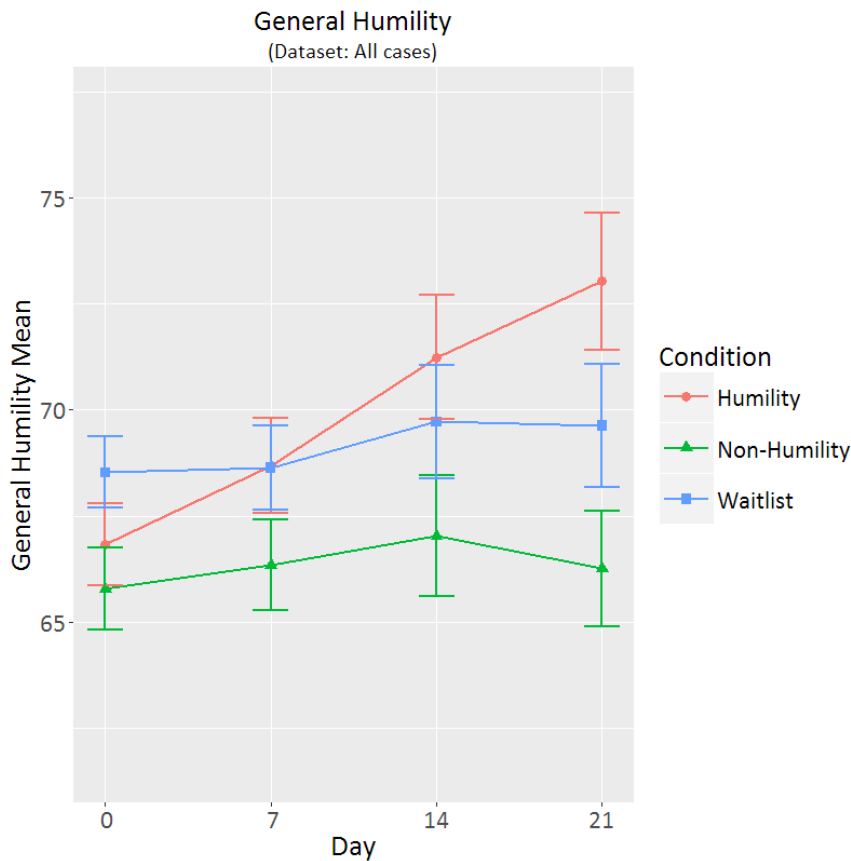
Figure 2. Change in general humility over the course of the study, by condition, using all available participants. Error bars are standard errors.

Affirmative humility. The intraclass correlation from the unconditional means model was .63, indicating that the majority of variance in affirmative humility was between, rather than within, participants. Linear time explained 7.3% of within-participant variance in the unconditional means model. The variance of the random slopes was significant, $\tau_{11} = .17$, 95% CI = [.11, .21], indicating that participants varied meaningfully in the extent to which they increased in affirmative humility over the course of the study.

In the complete model, experimental condition explained 1.3% of intercept (Day 21) variance in affirmative humility and 2.2% of variance in linear change in affirmative humility, relative to the unconditional growth model. Additionally, participants in the Humility Program condition increased significantly in affirmative humility over the course of the program, $\gamma_{10} = .081$, $p = .001$, 95% CI = [.031, .13] (see Figure 3); however, this increase was not significantly greater than the increase among participants in the Non-Humility condition, $\gamma_{11} = -.055$, $p = .10$, 95% CI = [-.12, .01], and only marginally greater than the increase among participants in the Waitlist condition, $\gamma_{12} = -.067$, $p = .053$, 95% CI = [-.13, .001]. The Humility Program condition thus led to marginally stronger boosts in affirmative humility than no activities at all, but this effect was not discernably different from the effect of activities not intended to increase humility, although the effect was in the hypothesized direction. Additionally, Humility Program participants were marginally higher in Day 21 affirmative humility than Non-Humility participants, $\gamma_{01} = -.18$, $p = .075$, 95% CI = [-.37, .018], but not Waitlist participants, $\gamma_{02} = -.092$, $p = .36$, 95% CI = [-.29, .10].
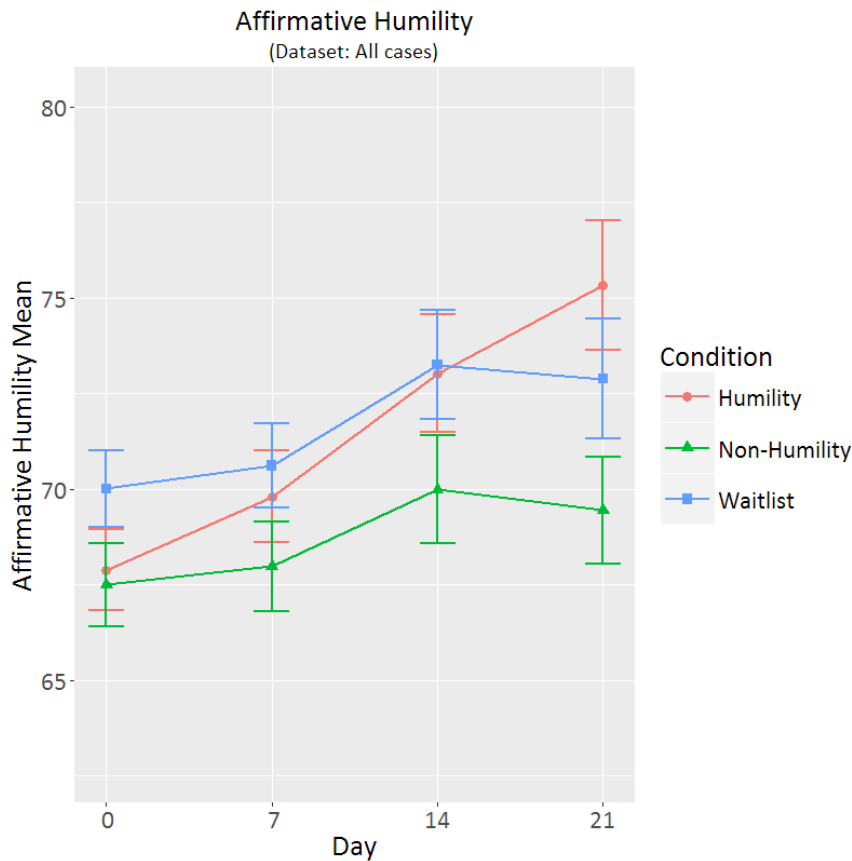
Figure 3. Change in affirmative humility over the course of the study, by condition, using all available participants. Error bars are standard errors.

Anti-Humility. The intraclass correlation from the unconditional means model was .75, indicating that the majority of variance in anti-humility was between, rather than within, participants. In the unconditional growth model, linear time explained 2.8% of within-participant variance. In contrast with the models predicting general and affirmative humility, the variance of the random slopes in the anti-humility model was not significant, $\tau_{11} = .085$, 95% CI = [.000, .13]. Participants therefore did not vary meaningfully in the extent to which they increased in anti-humility. Nevertheless, I examined the model with experimental condition for exploratory purposes.

In the complete model, experimental condition explained 0.62% of intercept (Day 21) variance in anti-humility and 0.62% of variance in linear change in anti-humility, relative to the unconditional growth model. Although Figure 4 shows an apparent negative trend in anti-humility among Humility Program participants, this decrease was not statistically significant, $\gamma_{10} = .001$, $p = .97$, 95% CI = [-.040, .041]. As suggested by the attrition analyses, the negative slope of the Humility Program condition shown in Figure 4 is likely an artifact of differential attrition: Only participants initially low in anti-humility completed the entire humility program, creating a downward trend in *mean* anti-humility over time but not necessarily any meaningful within-person changes. Additionally, the linear change in anti-humility among Humility Program participants was not significantly stronger than the change among Non-Humility ($\gamma_{11} = .009$, $p = .75$, 95% CI = [-.045, .063]) or Waitlist ($\gamma_{12} = .020$, $p = .47$, 95% CI = [-.035, .075]) participants. Additionally, Humility Program participants were not significantly lower in Day 21 anti-humility than Non-Humility ($\gamma_{01} = -.090$, $p = .35$, 95% CI = [-.099, .28]) or Waitlist ($\gamma_{02} = -.010$, $p = .92$, 95% CI = [-.18, .20]) participants. The Humility Program condition thus did not promote any apparent reductions in anti-humility relative to the control conditions.
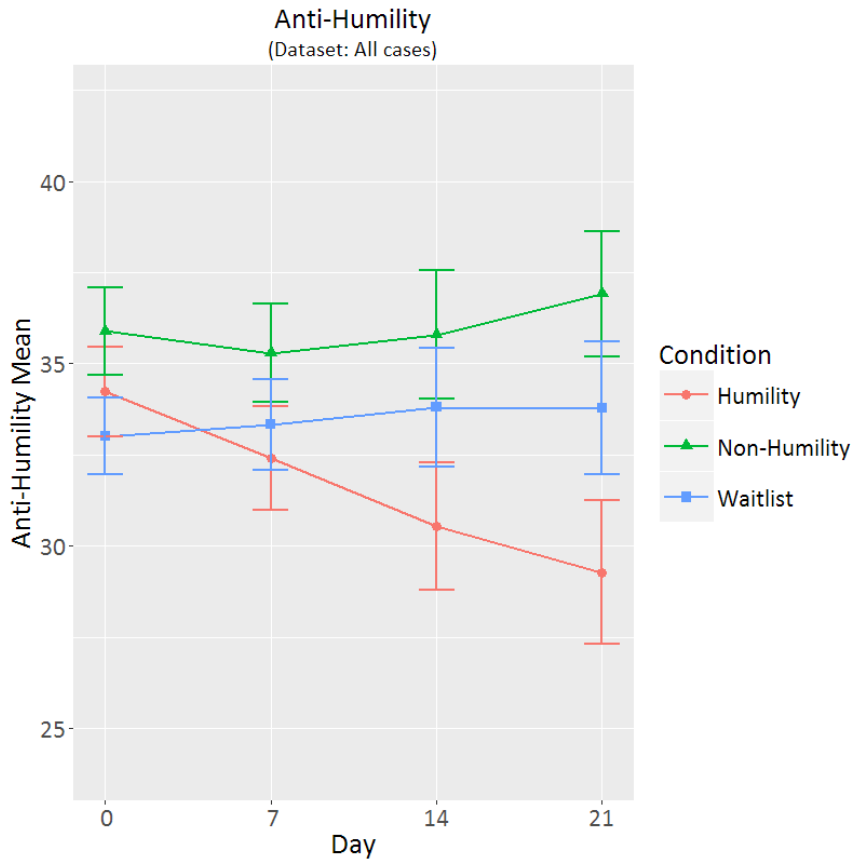
Figure 4. Change in anti-humility over the course of the study, by condition, using all available participants. Error bars are standard errors.

Complete-case models.

General humility. The intraclass correlation from the unconditional means model was .77, indicating that general humility varied mostly between, rather than within, participants. In the unconditional growth model, linear time explained 5.7% of within-participant variance, and the variance of the random slopes was significant, $\tau_{11} = .11$, 95% CI = [.065, .15].

In the complete model, experimental condition explained 2.4% of intercept (Day 21) variance in general humility and 2.8% of variance in linear change in affirmative

humility, relative to the unconditional growth model. Complete-case participants in the Humility Program condition did not show a significant linear increase in general humility over the course of the program, $\gamma_{10} = .029$, $p = .19$, 95% CI = [-.015, .073], nor did they increase in general humility more than Non-Humility participants, $\gamma_{11} = -.024$, $p = .41$, 95% CI = [-.082, .033], or Waitlist participants, $\gamma_{12} = -.047$, $p = .12$, 95% CI = [-.11, .012], although both effects were in the hypothesized direction. The Humility Program condition therefore did not appreciably increase general humility among participants who completed all parts of the study. However, as shown in Figure 5, Humility Program participants were significantly higher in Day 21 general humility than Non-Humility participants, $\gamma_{01} = -.36$, $p = .005$, 95% CI = [-.61, -.11], and marginally higher than Waitlist participants, $\gamma_{02} = -.22$, $p = .086$, 95% CI = [-.48, .032].
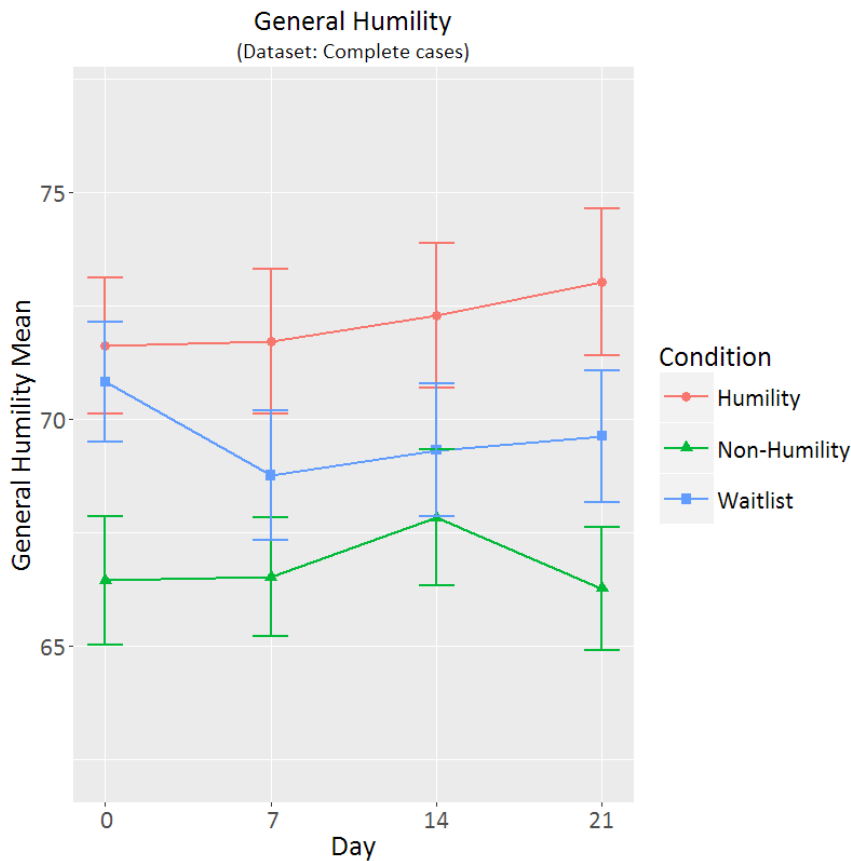
Figure 5. Change in general humility over the course of the study, by condition, using complete-case participants only. Error bars are standard errors.

Affirmative humility. The intraclass correlation from the unconditional means model was .61, indicating that the majority of variance in affirmative humility was between, rather than within, participants. In the unconditional growth model, linear time explained 8.8% of within-participant variance. The variance of the random slopes was significant, $\tau_{11} = .18$, 95% CI = [.13, .22]

In the complete model, experimental condition explained 1.8% of intercept (Day 21) variance in affirmative humility and 2.5% of variance in linear change in affirmative humility, relative to the unconditional growth model. As illustrated in Figure 6, complete-

case participants in the Humility Program condition showed a significant linear increase in affirmative humility over the course of the program, $\gamma_{10} = .063$, $p = .035$, 95% CI = [.004, .12]; however, this increase was not significantly greater than the increase among participants in the Non-Humility condition, $\gamma_{11} = -.039$, $p = .10$, 95% CI = [-.12, .039], and only marginally greater than the increase among participants in the Waitlist condition, $\gamma_{12} = -.073$, $p = .073$, 95% CI = [-.15, .007]. As in the all-case analyses, the Humility Program condition thus led to marginally stronger boosts in affirmative humility than no activities at all among complete-case participants, but this effect was not discernably different from the effect of activities not intended to increase humility. However, Humility Program participants were significantly higher in Day 21 affirmative humility than Non-Humility participants, $\gamma_{01} = -.28$, $p = .021$, 95% CI = [-.52, -.04], but not Waitlist participants, $\gamma_{02} = -.14$, $p = .25$, 95% CI = [-.38, .10].

Figure 6. Change in affirmative humility over the course of the study, by condition, using complete-case participants only. Error bars are standard errors.

Anti-Humility. The intraclass correlation from the unconditional means model was .73, indicating that the majority of variance in anti-humility was between, rather than within, participants. In the unconditional growth model, linear time explained 2.6% of within-participant variance. Contrary to the all-case analyses, participants varied meaningfully in the extent to which they increased (or decreased) in anti-humility, $\tau_{11} =$ .082, 95% CI = [.001, .13], although a secondary confidence interval estimated using bootstrapping (quantile-based) was not significant, bootstrap 95% CI = [-.002, .13].

In the complete model, experimental condition explained 2.3% of intercept (Day 21) variance in anti-humility and 0.57% of variance in linear change in anti-humility, relative to the unconditional growth model. As shown in Figure 7, complete-case Humility Program participants did not show a significant linear change in general humility over the course of the program, $\gamma_{10} = .008$, $p = .72$, 95% CI = [-.037, .053]. Furthermore, the linear change in anti-humility among Humility Program participants was not significantly stronger than the change among Non-Humility ($\gamma_{11} = -.004$, $p = .89$, 95% CI = [-.055, .064]) or Waitlist ($\gamma_{12} = -.015$, $p = .63$, 95% CI = [-.046, .076]) participants. Complete-case Humility Program participants were significantly lower in Day 21 anti-humility than Non-Humility ($\gamma_{01} = .33$, $p = .007$, 95% CI = [.089, .58]) and Waitlist ($\gamma_{02} = .24$, $p = .059$, 95% CI = [-.009, .49]) participants. However, as in the all-case analyses, these differences likely reflect baseline differences in anti-humility that carried over to the Day 21 survey due to differences in attrition. The Humility Program condition thus did not promote any apparent decreases in anti-humility relative to the control conditions.

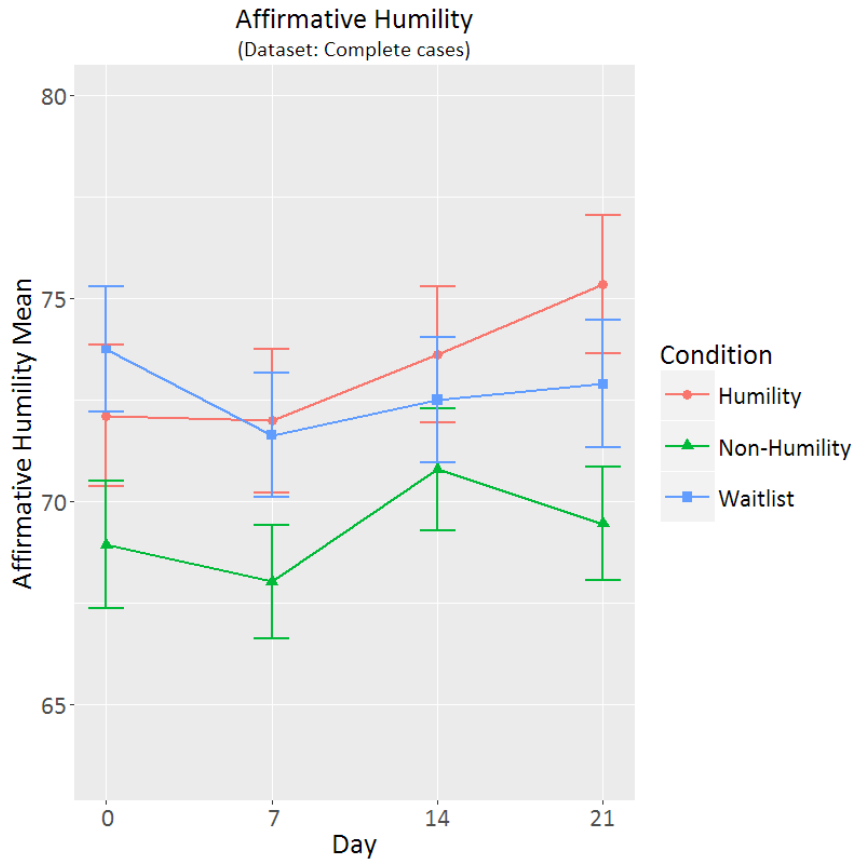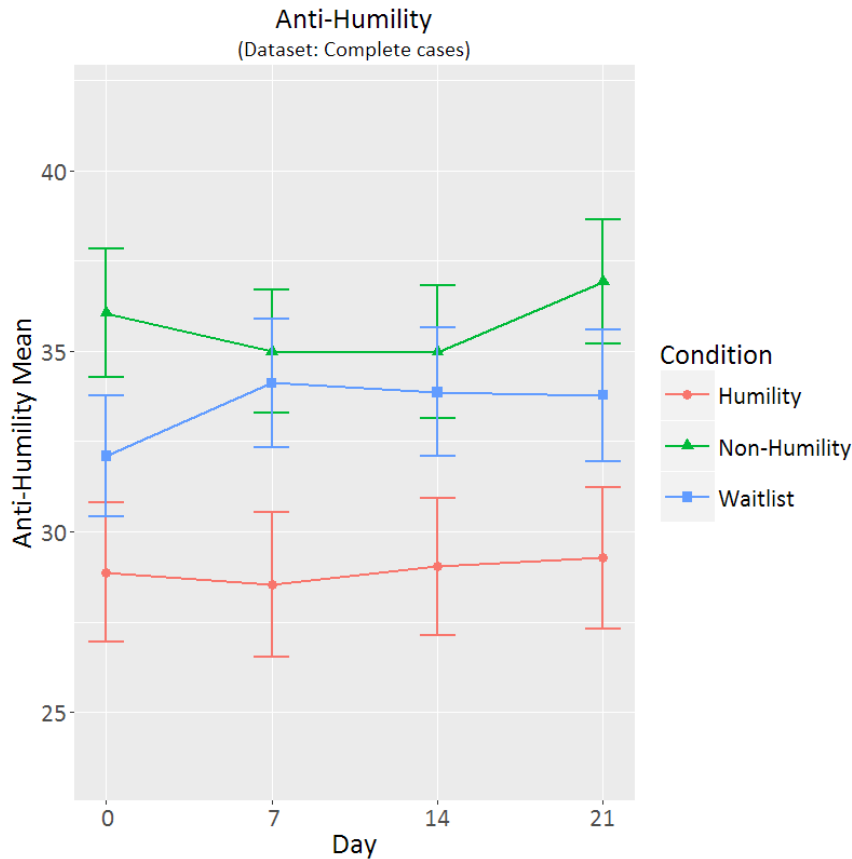*Figure 7.* Change in anti-humility over the course of the study, by condition, using complete-case participants only. Error bars are standard errors.

Results: Moderators

To assess the moderators of the effects of the humility program, I estimated an additional set of multilevel models for each humility outcome. Specifically, I added baseline (Day 0) levels of each variable measured at Day 0 as level 2 predictors (standardized), as well as the interaction between that variable and the two experimental condition variables. A significant interaction between condition and the baseline variable (i.e., a 3-way interaction between condition, the baseline variable, and study day)

indicates that the variable moderated the effect of the Humility Program condition on linear changes in humility.

In the all-case analyses, no significant moderators of the effects of the humility program on linear changes in humility were found. However, across all conditions, linear increases in general humility were moderated by initial religious belief salience, such that highly religious participants increased in humility more than less religious participants, γ = .039, p = .039, 95% CI = [.002, .076]. A similar pattern emerged for affirmative humility, γ = .049, p = .041, 95% CI = 95% CI = .002, .097].

In the complete-case analyses predicting affirmative humility, the effect of the humility program relative to waitlist was significantly moderated by initial narcissistic entitlement, γ = -.087, p = .031, 95% CI = [-.17, -.008]. Specifically, entitlement predicted decreases in affirmative humility for Waitlist participants (simple slope = -.083, p = .004), but was not associated with changes in humility for Humility Program (simple slope = .004, p = .89) or Non-Humility participants (simple slope = -.022, p = .39). In other words, among participants who completed the entire study, both the humility activities and the non-humility activities appeared to "stave off" natural decreases in affirmative humility among entitled participants.

No other significant moderators of the Humility Program condition were found, although initial neuroticism (γ = -.074, p = .058, 95% CI = [-.15, .003]) and dispositional awe (γ = .073, p = .072, 95% CI = [-.007, .15]) both revealed marginally significant moderation effects on affirmative humility relative to the Non-Humility condition. Because these effects were weak and unexpected, with no clear post hoc explanation, I

will not interpret them further, although they do raise potential hypotheses for future research.

Finally, I estimated an additional moderation model using participant-reported effort and motivation to complete the activities among (complete-case) participants in the Humility Program and Non-Humility conditions. Effort towards the activities did not predict increases in humility among Humility Program participants, $\gamma = .010$, $p = .61$, 95% CI = [-.035, .072], and there was no significant difference in the role of effort in change in humility between Humility Program and Non-Humility participants, $\gamma = -.016$, $p = .58$, 95% CI = [-.089, .060]. Self-reported effort towards the activities therefore did not appear to impact the effectiveness of the humility activities at increasing humility.

Results: Other Outcomes

To determine the effects of the humility program on outcomes other than humility, I conducted a set of regressed change models. Each variable measured Day 21, excluding activity effort, was regressed on experimental condition (dummy coded as in the humility analyses), controlling for Day 0 scores. All variables were standardized prior to analyses. Because these variables, except for self-esteem, were assessed only at Days 0, 21, and 49, only complete-case analyses are possible.

The Humility Program did not produce any theoretically-plausible significant effects on the non-humility variables at $\alpha = .05$. A marginally significant effect was found for the Entitlement subscale of the NPI, such that both Non-Humility ($\beta = .18$, $p = .060$, 95% CI = -.007, .37]) and Waitlist ($\beta = .18$, $p = .063$, 95% CI = [-.010, .37]) participants reported increased narcissistic entitlement at Day 21 relative to Humility Program

participants. Given the strong inverse association between humility and narcissism, this marginal effect of the humility program on narcissistic entitlement is relatively unsurprising, although I did not specifically hypothesize it. Additionally, Waitlist participants reported a significantly greater increase in the awe ($\beta = .22$, $p = .035$) and object affirmation ($\beta = .22$, $p = .045$) manipulation checks than Humility Program participants. Because there is no a priori or post hoc reason to expect that the humility activities would decrease awe experiences or object appreciation, these differences are likely chance correlations due to multiple comparisons.

Results: Attrition

To determine whether attrition differed across conditions as a function of baseline humility or other variables of interest, I estimated a set of logistic regression models predicting attritions. Attrition was treated as a binomial outcome: Participants who dropped out of the study before Day 21 were scored as 1, while participants who completed all surveys from Days 0 through 21 (ignoring Day 49) were scored as 0. Attrition was predicted from the interaction between experimental condition (dummy coded with Humility Program as the all-zero group) and each covariate at Day 0, including the humility outcomes, successively. (All covariates were standardized.) Because the Humility Program condition is the zero-coded group, the main effect of the covariates represents the association between the covariate and attrition for participants in the Humility Program condition. A logit coefficient significantly greater than zero indicates that the covariate predicted increased attrition in the Humility Program

condition, while a coefficient significantly less than zero indicates that the covariate predicted less attrition in the Humility Program condition.

Regression coefficients predicting attrition for each Day 0 variable are reported in Table 9. The condition × covariate interaction terms represent the difference between the Humility Program condition and the control conditions in the association between the covariate and attrition. That is, was the covariate significantly more associated with attrition for participants in the control conditions than for participants in the Humility Program condition? Simple slopes analyses tested the association between the covariates and attrition in the Non-Humility and Waitlist control conditions. Although Table 9 reports attrition effects for all variables measured at Day 0, I will only discuss here the results for the humility outcome variables.

Table 9
Regression coefficients and simple slopes predicting attrition, Study 2.

Predictor	$\beta_{Predictor}$	$\beta_{Predictor \times Non\text{-}humility}$	$\beta_{Predictor \times Waitlist}$	Simple Slope: Non-Humility	Simple Slope: Waitlist
General Humility	-0.41***	0.35*	0.17	-0.07	-0.25*
Affirmative Humility	-0.34**	0.21	0.02	-0.13	-0.32**
Anti-Humility	0.36**	-0.37*	-0.28	-0.01	0.08
Positive Affect	-0.06	-0.07	0.07	-0.13	0.01
Negative Affect	0.22	-0.06	-0.08	0.16	0.14
Gratitude	-0.02	0.00	0.05	-0.02	0.03
Self-Integrity	-0.15	0.02	0.17	-0.13	0.02
Awe	0.26*	-0.13	-0.11	0.13	0.15
Self-Esteem	-0.13	-0.05	0.09	-0.18	-0.04
Manipulation check: Awe	0.07	0.31	0.05	0.38**	0.11
Manipulation check: Value aff.	0.19	0.06	-0.09	0.24*	0.10
Manipulation check: Gratitude	0.05	0.14	-0.08	0.19	-0.02
Manipulation check: Attn. redirection	0.16	0.03	-0.07	0.19	0.09
Manipulation check: Object aff.	-0.05	0.21	0.03	0.16	-0.03
Manipulation check: Organization	0.07	-0.19	-0.22	-0.12	-0.15
Humility Motivation	0.13	0.15	0.23	0.27*	0.36**
Gratitude Motivation	0.05	0.18	0.37*	0.23*	0.42***
Happiness Motivation	0.05	0.00	0.32*	0.06	0.38**
Relationship improvement motivation	0.10	0.01	0.21	0.10	0.30**
General Self-Improvement Motivation	0.21	-0.05	0.05	0.16	0.26*
Positive Change Motivation	-0.01	0.06	0.14	0.05	0.13
Dispositional Awe	0.08	-0.03	0.05	0.05	0.14
Life Satisfaction	-0.01	0.04	0.24	0.03	0.23*
NPI: Overall Narcissism	0.28*	-0.20	-0.08	0.08	0.20
NPI: Authoritarianism	0.27*	-0.32	-0.19	-0.06	0.08

NPI: Self-Sufficiency	0.07	0.02	0.04	0.09	0.10
NPI: Superiority	0.32*	-0.26	-0.15	0.06	0.18
NPI: Exhibitionism	0.22	-0.11	-0.10	0.11	0.12
NPI: Exploitativeness	0.13	-0.07	-0.02	0.06	0.11
NPI: Vanity	0.25*	-0.17	0.10	0.07	0.35**
NPI: Entitlement	0.12	-0.01	0.03	0.10	0.15
Religious Belief Salience	0.09	0.25	0.03	0.33**	0.12
Religious Practice	0.09	0.22	-0.06	0.31**	0.03
Extraversion	0.04	-0.11	0.07	-0.06	0.11
Agreeableness	-0.20	0.04	0.27	-0.16	0.07
Conscientiousness	-0.24*	-0.10	0.10	-0.35**	-0.14
Neuroticism	0.13	-0.01	-0.15	0.12	-0.02
Openness	-0.16	-0.14	0.20	-0.30*	0.04

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

$\beta_{\text{Predictor}}$ is the standardized main effect of the predictor (i.e., the simple slope for the Humility Program Condition).

$\beta_{\text{Predictor} \times \text{Non-Humility/Waitlist}}$ are the interactions between the predictor and dummy-coded condition.

As shown in Table 9, baseline general humility and affirmative humility significantly predicted decreased attrition among participants in the Humility Program and Waitlist conditions, but not among participants in the Non-Humility condition, although the difference between the Humility Program and Non-Humility conditions was only significant for general humility. By contrast, anti-humility predicted increased attrition in the Humility Program condition, but not in either control condition, although the difference between the Humility Program and Waitlist conditions was not significant.

Taken together, these findings suggest that participants initially low in humility— specifically, the affirmative component of humility—were more likely to drop out of the study than participants initially high in humility only if they were assigned to the Humility Program or Waitlist conditions. Experimental differences in humility between the Humility Program and Waitlist conditions thus do not appear to be confounded by initial status. However, initial affirmative humility was irrelevant for participants assigned to the Non-Humility condition, indicating that differences between the Humility Program and Non-Humility conditions may be confounded with initial status. Furthermore, anti-humility predicted attrition only in the Humility Program condition, suggesting that any experimental effects on anti-humility may be confounded with initial status.

Results: Day 49 Follow-Up Survey

To assess whether the humility program produced changes in humility beyond the primary study period (i.e., Days 0 through 21, when the humility and non-humility

activities were administered), I examined each humility outcome at Day 49 using regressed change models, predicting humility from experimental condition (dummy coded) while controlling for Day 0 humility. No significant main effects of the Humility Program, relative to either control condition, emerged for any of the humility outcomes, all ps > .20.

However, the carry-over effects of the activities on humility among Humility Program and Non-Humility participants were significantly moderated by effort towards the activities (reported at Day 21), $\beta_{Interaction}$ = -.22, $t(150)$ = 2.00, p = .048, 95% CI = [-.45, -.002]. Specifically, effort was associated with greater Day 49 general humility, above and beyond initial humility, for participants in the Humility Program condition, β = .30, $t(150)$ = 3.61, $p < .001$, 95% CI = [.14, .47], but not for participants in the Non-Humility condition, simple slope β = .076, $t(150)$ = 0.98, p = .33, 95% CI = [-.078, .23]. Similar patterns emerged for affirmative humility ($\beta_{Humility\ Program}$ = .33, $p < .001$, 95% CI = .14, .52]; $\beta_{Non-Humility}$ = .17, p = .065, 95% CI = [-.011, .35]; however, the interaction was not significant, $\beta_{Interaction}$ = -.16, p = .21, 95% CI = [-.42, .093]) and anti-humility ($\beta_{Humility\ Program}$ = -.24, p = .002, 95% CI = [-.40, -.093]; $\beta_{Non-Humility}$ = -.013, p = .82, 95% CI = [-.16, .13]; $\beta_{Interaction}$ = .23, p = .030, 95% CI = [.023, .43]). Therefore, the role of effort in increasing humility was not merely an artifact of humble people (or, more precisely, people who became more humble) naturally tending to put forth effort towards the activities they were asked to do: Effort towards the non-humility control activities did not predict boosts in humility at the Day 49 survey. These findings suggest that the humility program activities were uniquely effective at increasing humility at follow-up

among those participants who put effort into performing the activities. Furthermore, effort towards the humility activities in the primary study period was associated with greater continued practice of the activities in the follow-up period, rs = .28, .32, and .36 for awe, self-affirmation, and gratitude, respectively (all ps < .02).

Notably, across all conditions, participants who completed the Day 49 survey were significantly higher than non-respondents in initial general humility, $t(1020) = 3.13$, $p = .002$, $d = 0.20$. Additionally, among all participants, initial humility was associated with lower attrition at Day 49, regardless of experimental condition, $\beta = .33$, $p = .014$, for general humility. (The effects for affirmative and anti-humility were comparable in strength to the effect of general humility, βs = .30 and -.26, respectively, although the effect for anti-humility was only marginally significant, $p = .051$.) However, initial humility was not associated with attrition from Day 21 to Day 49 among complete-case participants, general humility, $\beta_{\text{Humility Program}} = -.08$, $p = .69$; $\beta_{\text{interaction}} = .29$ and .16 for Non-Humility and Waitlist, respectively (both ps > .28). In other words, participants who returned for the Day 49 survey were more humble at the beginning of the survey than those who dropped out before Day 21, but were not more humble than those who dropped out after Day 21.

General Discussion

My findings provide encouraging, albeit preliminary and often equivocal, evidence for the humility benefits of a novel online humility-boosting program. Study 1 revealed that multiple activities can produce a powerful short-term effect on humility, but—partially supporting my hypotheses—only when those activities are completed in

the most psychologically-influential order: first an awe-inspiring experience, to promote feelings of smallness and openness; then affirmation of self-relevant values, to secure one's self-identity and enable non-defensive responses to threatening information (such as the Pale Blue Dot awe video); and finally expressing gratitude, to reduce self-focus and increase other-valuation. Study 2 then demonstrated that such activities, completed in the same psychologically-impactful sequence, may promote increases in humility over a period of weeks or, if practiced regularly, even months.

As illustrated by both the all-case and complete-case analyses, Study 2 humility program produced marginally greater increases in humility—particularly of the acceptance of humble beliefs (i.e., affirmative humility)—than no activities at all over the course of the program. The convergence of the all-case and complete-case analyses suggests that participants who began the humility program but subsequently dropped out followed similar trajectories, over the parts they completed, as those participants who completed the entire program. Although attrition was meaningfully related to initial humility—and participants may have dropped out for other theoretically or practically meaningful reasons (e.g., they found the effects of the activities uncomfortable, or the activities did not hold their interest)—these parallel results nonetheless indicate that incomplete participants might have experienced similar effects on humility as complete participants had all participants done all of the activities.

Furthermore, the high amounts of nonrandom attrition restrict causal interpretations of the complete-case data, but not necessarily the all-case data: If attrition was negatively associated with upward trajectories in humility, then the inclusion of

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incomplete participants in the all-case models should have diluted the effects of the humility program to nonsignificance. In fact, the effects in the all-case models were generally comparable in magnitude with the effects in the complete-case models. The humility program therefore appears to have a genuinely causal role, albeit a small one, in changes in humility. The small effects may reflect difficulties in producing large-scale personality changes over a relatively short period—traits related to humility, such as agreeableness, tend to be relatively stable, albeit not completely immutable (e.g., Specht, Egloff, & Schmukle, 2011)—and future studies should examine a similar humility program extended over a longer time span (e.g., months instead of weeks).

The effects of the humility activities were not discernably stronger than the effects of non-humility-related control activities, suggesting that the unique elements of the humility activities (awe, self-affirmation, and gratitude) are not necessarily required for a humility-boosting intervention. Because participants were not informed in advance of the purpose of the activities (except that they were "self-improvement" activities, a cover story given to participants in all conditions), and because the Brief State Humility Scale typically resists social desirability biases (i.e., reporting increases in the BSHS because the study was about "self-improvement"; Kruse et al., 2017b), the impact of the program on humility is unlikely to be due primarily to expectancy or placebo effects, although such illusory effects cannot be conclusively ruled out by my results. Rather, the lack of difference between the humility and non-humility activities likely reflects an artifact of the non-humility activities. Although intended to be enjoyable, but not humbling, the "non"-humility activities may have inadvertently produced greater-than-intended changes

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in humility. For example, the object-affirmation activity might have induced feelings of gratitude and appreciation (or even awe, as illustrated by the participant who "stopped what I was doing to spend a few minutes looking at the sky and appreciating its beauty"), and in turn induced a more humble mindset among the Non-Humility control participants.

Alternatively, as indicated by the attrition analyses, the non-humility activities appeared particularly appealing to people who were relatively low in humility at the start of the study. Because these individuals lacked humility from the beginning, they may have stood to gain humility from any positively-focused intervention, or were simply more prone to regression to the mean, inflating the effects of the non-humility activities relative to the humility program.

Importantly, however, the humility program did provide a small "carry-over" effect on humility at the Day 49 follow-up survey, relative to the non-humility activities, but only for those participants who reported that they put effort into the activities during the primary study period. Such an effect is consistent with previous research showing that the effort a person puts into a positive activity intervention (e.g., to increase well-being) moderates the effectiveness of the intervention (see Layous & Lyubomirsky, 2014, for a review). The moderating role of effort also tentatively supports the notion that repeatedly practicing humbling activities leads to humility "as a habit," and—consistent with theories of volitional personality change (e.g., Magidson et al., 2014)—shows that such habitual changes can translate into persistent increases in humility. Although preliminary, this finding, along with the effects of the humility activities during the program itself,

provides proof-of-concept support for the hypothesis that promoting habitually humble thoughts and behaviors is a viable means of sustainably increasing humility.

Attrition

The most consequential limitation of Study 2 was the non-random attrition across the experimental conditions. The high dropout rate (over 60%) creates almost inevitable confounds between experimental conditions, because participants in the activity conditions likely dropped out if they found the activities unenjoyable or even unpleasant. To the extent that the humility activities were particularly enjoyable (or aversive) to certain types of people, any "effects" that they showed at the end of the study will at least partially be a result of participants' prior personality and motivation. Multilevel analyses using all available participants help overcome this barrier to causal inference by estimating complete trajectories for incomplete participants. However, these quasi-imputed trajectories cannot reveal the true effects of all three humility activities *together*, as they were intended to be completed, for individuals who did only some of the activities. As previously noted, the incomplete trajectories did not substantially dilute the effects of the humility activities over time, but the question of how incomplete participants would have responded to the activities they omitted—for example, would they have continued to increase in humility?—remains unanswered.

Of particular note, attrition was negatively associated with initial humility (both affirmative and anti-humility). Humble people were more likely to remain in the study than less humble people if they were assigned to either the Humility Program or Waitlist conditions. This correlation is consistent with the notion that humility is a prosocial,

other-focused characteristic: Because humble people are sensitive to the needs of others, they should seek to advance the goals of the research—and researcher—by completing all requested tasks regardless of their own enjoyment of the study. Curiously, however, no such association between humility and attrition was found in the Non-Humility condition. Perhaps less humble people were particularly attuned to the positively-valenced control activities, such that they did not need the motivation of helping the research(er) to remain in the study. Future studies should examine how humble people and non-humble people alike respond not just to humility-boosting activities but also to non-humbling control activities.

Measurement Issues

My studies were limited by difficulties in cleanly assessing humility, but they also provide new insights into how humility—a notoriously difficult quality to assess using self-reports (Davis et al., 2010)—should be defined and measured. The Brief State Humility Scale, which served as the primary outcome measure in both studies, demonstrated an unexpectedly complex measurement structure in this research. Specifically, the various statements that a humble person might affirm or reject did not map cleanly onto the intended single factor (see Kruse et al., 2017b). Instead, the statements that a humble person should accept appeared to be partially driven by a different underlying cause from the statements that a humble person should refute. Any subsequent attempts to measure humility using self-reports must therefore consider whether the measure reflects agreement with humble beliefs or rejection of egotistical beliefs.

The distinction between "affirmative" and "anti" humility necessitated the division of the BSHS into two factors (in addition to an overarching general factor) to parse the precise aspects of humility that were affected by the intervention. Surprisingly, the activities had clearly discrepant effects on the two aspects of humility: Only the affirmative aspect changed in response to the humility program. The inconsistent findings for affirmative and anti-humility have important implications both for the humility program tested here and for humility research in general. First, they suggest that humility interventions are uniquely impactful at promoting acceptance of humble beliefs (e.g., "I am not better or worse than the average person"), but do not necessarily promote rejection of egotistical beliefs (e.g., "I deserve more respect than other people.") (Similarly, the humility activities had little impact on narcissism, except perhaps for entitlement beliefs, even though narcissism is, almost by definition, opposite to humility.)

Second, these contrary effects create a paradox for humility research, because people who come to acknowledge their own averageness should also recognize their *lack* of superiority over others. My findings contradict this hypothesis. Instead, I find that these antipodal changes need not co-occur as the results of a single intervention, suggesting that specifically humble thoughts and attitudes are driven by psychologically different processes from self-focused or arrogant thoughts and attitudes. Future research should parse these discrepant processes to shed light on the true psychological meaning and structure of humility, as compared with self-centered qualities such as narcissism. For example, the agency model of narcissism (Campbell & Foster, 2007) proposes that narcissists seek positive self-esteem not out of self-enhancement, but rather because such

esteem "feels good." Although the humility activities successfully produced modest increases in self-awareness and "averageness" beliefs, perhaps people nonetheless wished to *feel* like they were more worthy of respect and admiration than others. The processes underlying humility—and that differentiate "humility" from its opposites—thus present an exciting direction for future humility research.

Future Directions

When and why are humility interventions most effective? Study 2 examined several potential moderators of the effect, but aside from a follow-up effect of effort towards the activities, no noteworthy moderators emerged. (Completing either set of positive activities prevented decreases in humility among entitled narcissists, but the effect was not unique to the humility activities. Additionally, increases in humility were more pronounced among religious individuals, an effect consistent with humility's importance as a religious virtue [e.g., Exline & Geyer, 2004], but the association did not differ across experimental conditions.) Furthermore, because of the small, and uncertain, main effects of the humility program, I did not examine any mediators of the effects of the program on humility. Although prior research has examined the mechanisms of each of the humility activities separately—promoting other-connectedness and self-reflection (awe; Nelson-Coffey et al., 2017), enabling non-defensive responses to threatening information (self-affirmation; Kruse et al., 2017a), or decreasing focus on oneself (gratitude; Kruse et al., 2014)—no research has yet examined how these mechanisms might interact to produce larger or more durable changes in humility.

Additionally, my humility program used a narrow subset of possible humility-boosting activities. Although the three activities employed broadly encompassed different elements of humility (e.g., open-mindedness, other-focus), they may not carry the intended effects for all people, reducing the impact of the overall program. The program also approached humility indirectly, through activities that were not explicitly related to humility. This approach minimizes social desirability biases and placebo effects that might influence humility-related thoughts and behaviors, but also may introduce "side effects" that cloud or attenuate the activities' effects on humility. For example, awe experiences might induce feelings of fear (Gordon et al., 2016), which narrow attention instead of promoting cognitive openness. Future research should contrast my indirect approach with more direct humility interventions, such as the workbook-based intervention used by Lavelock and colleagues (2014).

Finally, Study 2 used only a single sequence (out of six possible sequences) for the humility activities. Because the activities were intended to be done as a (complete) set, presenting them in only one sequence reduced the effective number of experimental conditions and thereby maximized power to detect an effect of the intervention as a whole. However, this compact design also prevented analysis of the second and third activities (self-affirmation and gratitude expression) separately, because the unique effects of those activities were confounded by the activity(ies) that preceded them. Therefore, my study provides some evidence for the effectiveness of the humility program in its entirety but cannot cleanly indicate which specific parts of the program were particularly useful or ineffective.

Furthermore, the single-sequence design was employed on the assumption that the awe-affirmation-gratitude sequence would maximize the impact of the three activities. However, the linearity of the effects of the humility program, relative to waitlist, suggests that each activity contributed an approximately equal amount to increases in humility. If my assumption about the impact of the chosen sequence is true, then the linear effects suggest that the affirmation and gratitude activities would have been relatively *in*effective at boosting humility in any other sequence. That is, if the effects of those activities on humility were merely linear using the "optimal" sequence, then their effects would have been less than linear (and essentially null) using one of the "suboptimal" sequences. Alternatively, my assumption about the role of activity sequencing may have been unwarranted, in which case the program would have increased humility regardless of the ordering of the activities. Although Study 1 tentatively supported the optimal-sequence assumption, the brief timeframe of that study may not generalize completely to a multi-week intervention. Future research should address the single-sequence limitation of this research by adapting the sequencing design used in Study 1 to the multi-week program tested in Study 2. By enabling tests of each activity separately, such a study would also help reveal whether the humility program could be improved by replacing one or more of the activities used in my research.

Concluding Words

The many intra- and interpersonal benefits of humility—from stabilizing a person's own self-esteem to encouraging generosity and prosociality—make it a valuable quality for researchers to understand and promote. Although considerably more research

is needed to understand the optimal ways to sustainably increase humility, and how and why such increases can be achieved, my findings suggest that such changes might be attainable using a straightforward intervention-based approach. The online humility program thus represents an important step in the long path towards a more humble society.

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# Appendix A: Study 1 Humility and Control Activities

Awe and Informational (Control) Videos

Instructions: Please watch the following short video. We suggest that you watch it in a comfortable setting where you can fully appreciate the video. (Note: The video includes audio narration—make sure that your computer's sound is turned on. You may wish to use headphones to hear the audio more clearly. Click on the title at the top of the video to open the video in a new tab.)

Awe video:

Control video:
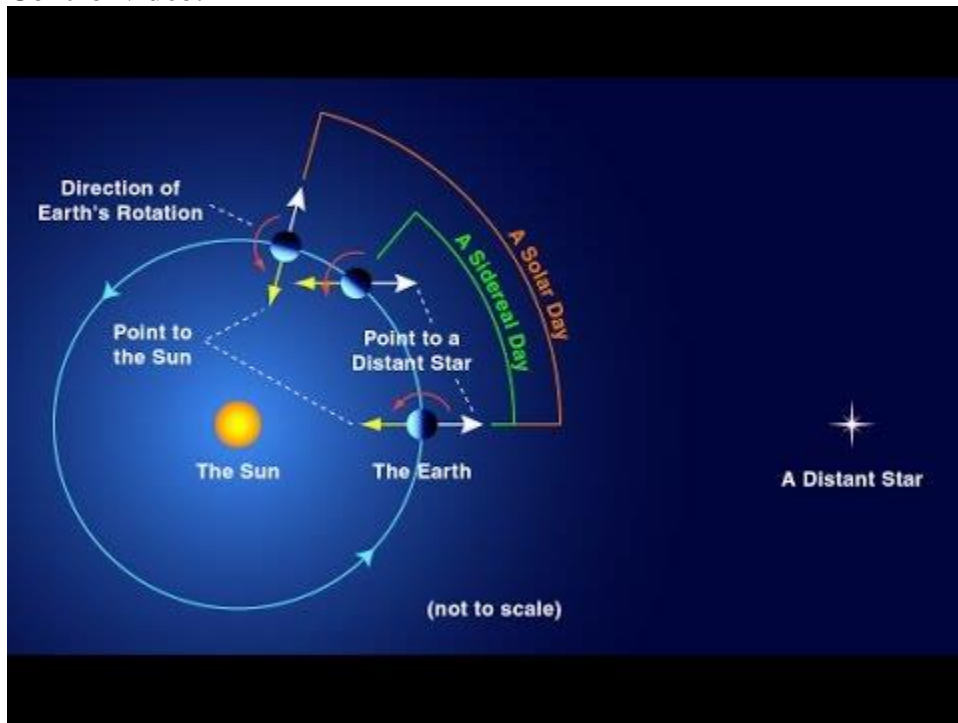
Post-video instructions: Now write a sentence or two about your reaction to the video you just watched—your thoughts and feelings about it. [open-ended text box]

Affirmation: List of Values

Instructions: Please select the thing you value MOST [LEAST] from the drop down list.

Government or politics
Being kind and respectful to others
Spiritual or religious values
Creativity
Career
Music or art
Honesty
Relationships with family and friend
Belonging to a social group (such as your community, ethnic group, or a school club)
Being independent
Leadership skills
Athletic ability
Sense of humor
Learning and gaining knowledge

Self-Affirmation Instructions
You selected as one of your most important values: [most important value]. For the next 5 minutes, please write about why this value is important to you. Write at least a short paragraph. You may write for more than 5 minutes if you wish, but you will not be able to advance to the next screen until 5 minutes have passed.

Please do not include any identifying details (such as your name). There is no need to worry about perfect grammar or spelling. Please also remember that anything you write will remain strictly confidential. Should an experimenter read this entry in the future, it will be identifiable only by a subject number and not by a name.

Other's Values Affirmation (Control) Instructions
You selected as one of your least important values: [least important value]. For the next 5 minutes, please write about why this value might be important to someone else. Write at least a short paragraph. You may write for more than 5 minutes if you wish, but you will not be able to advance to the next screen until 5 minutes have passed.

Post-Activity Writing (Both Conditions)
Think about a quality of yours that others have said is negative or have criticized you for. What is the quality? Please write about when they criticized you. Write at least 4-5 sentences. (Do not write a 1-2 sentence answer.) Please do not include any identifying details.

Letter of Gratitude Instructions

Please take a moment to think back over the past several years of your life and remember an instance when someone did a kind act (or acts) for you for which you are extremely grateful. Think of the people – parents, children, spouses/partners, relatives, friends, neighbors, teachers, employers, and so on – who have been especially generous and thoughtful towards you. For example, you may feel grateful for a friend who was there for you when you needed them, or helped give you a new perspective on things when you were upset.

Now, for the next 5 minutes, write a letter to one of these individuals. You may write for more than 5 minutes if you wish, but you will not be able to advance to the next screen until 5 minutes have passed. Use the instructions below to help guide you through this process:

1. Use whatever letter format you like, but remember to write as though you are directly addressing the individual you are grateful to. If it is helpful to head the letter "Dear so-and-so," or end with "Sincerely, XXX," feel free to do so.

2. Do not worry about perfect grammar and spelling.

3. Describe in specific terms the kind act this person bestowed upon you and how the kind act affected your life.

4. Describe what you are doing now and how you often remember their efforts.

5. Remember: Anything you write will remain strictly confidential. Although you are welcome to show or give this letter to anyone you please, for the purposes of this study, the letter you write is a private document in which you can express your gratitude freely without intent to deliver it to anyone. Should an experimenter read this entry in the future, it will be identifiable only by a subject number and not by a name.

Daily Activities (Control) Instructions

Please take a moment to think about what you did over the past 7 days. That is, create a mental outline of what you did during that time. Now, for the next 5 minutes, please write these activities out in a list format. You may write for more than 5 minutes if you wish, but you will not be able to advance to the next screen until 5 minutes have passed. Use the instructions below to help guide you through this process:

1. Use whatever writing style you please, but be as detail oriented as possible.

2. Try to leave out emotions, feelings, or opinions pertaining to your plans.

3. Focus on exactly what you did.

4. Do not worry about perfect grammar and spelling.

5. Remember: Anything you write will remain strictly confidential. Should an experimenter read this entry in the future, it will be identifiable only by a subject number and not by a name.

Appendix B1: Study 2 Non-Humility Activities
Note: Study 2 used the same humility activities as Study 1.

Spotlight Activity Video
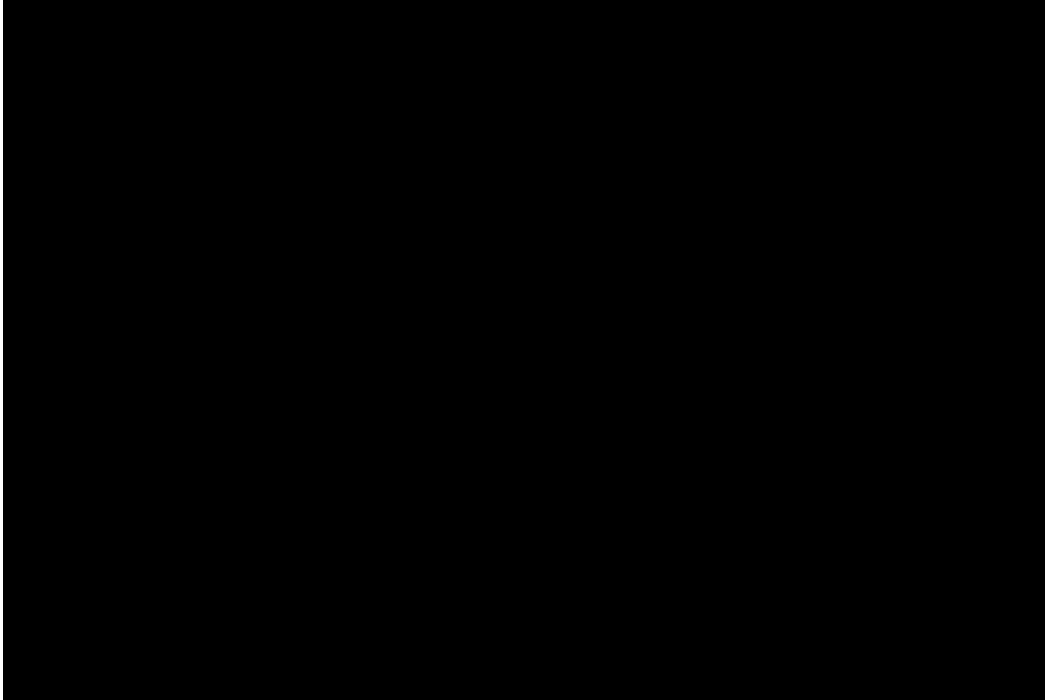
Object-Affirmation Instructions
Object selection instructions: Please select the TWO objects that are MOST important to you from the drop-down list.

Door	Watch
Towel	Mailbox
Toaster	Chair
Stapler	Shower curtain
Wallet/Purse	Window frame
Lightbulb	Socks
Carpet	Toothbrush

Writing activity instructions: Last week, you selected as one of the most important objects in your life: [most important object]. For the next 5 minutes, please write about why this object is useful to you. Focus on the ways that you use the object, rather than any sentimental value it might have. Write at least a short paragraph. You may write for more than 5 minutes if you wish, but you will not be able to advance to the next screen until 5 minutes have passed.

Organizational Task Instructions

Please take a moment to think about the ways that you organize your space and ways that you might improve your organization. For the next 5 minutes, write about your organizational techniques. How do those techniques improve your life? In what ways could you improve your organizational skills? You may write for more than 5 minutes if you wish, but you will not be able to advance to the next screen until 5 minutes have passed. Use the instructions below to help guide you through this process:

1. Use whatever writing style you please, but be as detail oriented as possible.

2. Try to leave out emotions or feelings pertaining to your actions.

3. Focus on exactly what you do (or want to do) to organize your space.

4. Do not worry about perfect grammar and spelling.

5. Remember: Anything you write will remain strictly confidential. Should an experimenter read this entry in the future, it will be identifiable only by a subject number and not by a name.

Appendix B2: Study 2 Continued Activity Instructions

Humility Program Condition
Awe instructions: "Often we feel awe in response to vast, beautiful landscapes and natural wonders such as tall mountains, expansive vistas, or large waterfalls. We can also feel awe in response to people who cause large-scale change such as Nelson Mandela and his role in ending apartheid in South Africa. Other times, we might feel awe towards an idea that is amazing and wondrous—such as the mysteries of space. Over the next week, make an effort to focus on the things in your life, however big or small, that move you to feel awe. What do these experiences tell you about your own life?

Think about this question as you go about your day this week and, at the end of each day, write down a few sentences about the experience that brought you the most awe that day, as well as any other awe-inspiring things in your life. You won't have to share what you write down, but we will ask you about the things you experience that move you to awe in the next survey, one week from today."

Self-affirmation instructions: "Over the next week, take time each day to identify and understand the values that are most important to you and, at the end of each day, write down a few sentences about how your values affect how you respond to things that happen in your life. You won't have to share what you write down, but we will ask you about how your values influence you in the next survey, one week from today. We also encourage you to continue focusing on awe-inspiring things in your life and, if you wish, writing about those things at the end of each day as well."

Gratitude instructions: "Whenever appropriate, try to take the time to say thank you—and mean it sincerely. How have other people contributed to your happiness and successes or otherwise helped to make your life better? At the end of each day this week, write down a few sentences about the ways in which other people helped you that day. You won't have to share what you write down, but we will ask you about how other people have helped you, and the ways in which you expressed gratitude to them, in the next survey, one week from today. We also encourage you to continue thinking about your important values and focusing on awe-inspiring things in your life and, if you wish, writing about those things at the end of each day as well."

Non-Humility Condition
Spotlight instructions: "Over the next week, every time you don't want to continue feeling what you're feeling, thinking what you're thinking, or doing what you're doing, ask yourself, "What is my attention primarily focused on right now?" Answer that question for yourself and then make a determination: "Should I redirect my attention or is this something that I have to do?"

If you do decide that you need to redirect your attention, you'll need to choose which strategy to use. There are probably a hundred ways to do it—for example, you can try to

appreciate the positives, meditate for 8 minutes, distract by phoning a friend, or watch a funny video, etc. In other words, feel free to choose whichever strategy you think will work best for you and for whatever situation that you're in.

Think about this question as you go about your day and, at the end of each day, write down a few sentences about a situation where you did (or did not) choose to redirect your attention. You won't have to share what you write down, but we will ask you about the times when you chose to redirect (or not redirect) your attention in the next survey, one week from today."

Object affirmation (appreciation) instructions: "There are many everyday objects in our lives that we often take for granted. Over the next week, take time each day to identify and appreciate the everyday things in your life and, at the end of each day, write down a few sentences about how those objects affect your life. You won't have to share what you write down, but we will ask you about how your everyday objects influence you in the next survey, one week from today. We also encourage you to continue redirecting your attention when you see fit and, if you wish, writing about those things at the end of each day as well."

Organization instructions: "We all tend to get a little disorganized as the year progresses. However, we are often so busy that we do not have time to focus on how we can become more organized. Each day this week, focus on organizing something you use daily, such as your backpack, desk, or bedroom. Spend at least a few minutes intentionally organizing your space. For example, you can put loose papers in your binder, clean out your closet, or tidy your desk. At the end of each day, write down what you did to organize your space. You won't have to share what you write down, but we will ask you about your organizational changes in the next survey, one week from today. We also encourage you to continue thinking about important everyday objects and redirecting your attention when needed and, if you wish, writing about those things at the end of each day as well."

Humility Program Condition

<u>Day 2</u>

"Two things awe me most: The starry sky above me and the moral law within me."– German philosopher Immanuel Kant

Remember to keep looking for the things that awe YOU most and write down a few sentences about those things at the end of each day this week.

Best,

The PAW Lab, UC Riverside

<u>Day 5</u>

"The most beautiful thing we can experience is the mysterious. It is the source of all true art and all science. He to whom this emotion is a stranger, who can no longer pause to wonder and stand rapt in awe, is as good as dead: his eyes are closed." – Albert Einstein

Remember to stand rapt in awe of the mysteries and wonders in your world.

Best,

The PAW Lab, UC Riverside

<u>Day 9</u>

"Tell me what you pay attention to and I will tell you who you are." – Spanish philosopher José Ortega y Gasset

Remember to write a few sentences about how your key values, such as [most important value], are important in your life each day this week.

Best,

The PAW Lab, UC Riverside

<u>Day 12</u>

"It's not hard to make decisions when you know what your values are." – Roy Disney

Keep reflecting on the ways that your values, such as [2nd most important value], help YOU to make decisions.

Best,

The PAW Lab, UC Riverside

<u>Day 16</u>

"We must find time to stop and thank the people who make a difference in our lives." – John F. Kennedy

Try to follow President Kennedy's advice to take the time to thank the people who have made your life better. Remember to write about those people each day this week.

Best,

The PAW Lab, UC Riverside

Day 19

"Cultivate the habit of being grateful for every good thing that comes to you, and to give thanks continuously. And because all things have contributed to your advancement, you should include all things in your gratitude." – Ralph Waldo Emerson

Never lose sight of the things and people you have in your life, however large or small, that have contributed to your advancement.

Best,

The PAW Lab, UC Riverside

Non-Humility Condition

Day 2

"My experience is what I agree to attend to. Only those items which I notice shape my mind." – Psychologist William James

Remember to monitor the experiences that YOU attend to and keep track of the times that you decide to shift what you notice.

Best,

The PAW Lab, UC Riverside

Day 5

"Attention is vitality. It makes you eager. Stay eager." – Susan Sontag

Keep shifting your attention to the things that make you eager this week.

Best,

The PAW Lab, UC Riverside

Day 9

"We cannot do anything with an object that has no name." – Philosopher Maurice Blanchot

Remember to give a name to the everyday objects in your life and write about how those objects affect you this week.

Best,

The PAW Lab, UC Riverside

Day 12

"Any object, intensely regarded, may be a gate of access to the incorruptible eon of the gods." – James Joyce

Remember to intensely regard the objects in your life that you don't always notice this week.

Best,

The PAW Lab, UC Riverside

Day 16

"For every minute spent organizing, an hour is earned." – Benjamin Franklin

Remember to spend a few minutes each day this week organizing your space and keeping track of what you did.

Best,

The PAW Lab, UC Riverside

Day 19

"Organizing is what you do before you do something, so that when you do it, it is not all mixed up." – A. A. Milne

Keep organizing your space this week so that you don't get all mixed up when you use it.

Best,

The PAW Lab, UC Riverside