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Four studies measured or manipulated beliefs in free will to illuminate how such beliefs are linked to other aspects of personality. Study 1 showed that stronger belief in free will was correlated with more gratitude, greater life satisfaction, lower levels of perceived life stress, a greater sense of self-efficacy, greater perceived meaning in life, higher commitment in relationships, and more willingness to forgive relationship partners. Study 2 showed that the belief in free will was a stronger predictor of life satisfaction, meaning in life, gratitude, and self-efficacy than either locus of control or implicit person theory. Study 3 showed that experimentally manipulating disbelief in free will caused a reduction in the perceived meaningfulness of life. Study 4 found that inducing a stronger belief in free will caused people to set more meaningful goals for themselves. The possible concern that believers in free will simply claim all manner of positive traits was contradicted by predicted null findings with regard to sense of humor, empathy, and self-rated attractiveness. Taken together, the present studies show that the belief in free will is a strong predictor of several positive traits and outcomes.

Keywords: Free Will; Meaning in Life; Positive Psychology

1. Introduction

Philosophers and other authorities have disputed the existence of free will for centuries. It is not surprising that laypersons likewise entertain diverse opinions on the subject. Although some may regard such differences of opinion as little more than fodder for abstract, albeit entertaining, debate at dinner parties, recent work has indicated that these beliefs have practical consequences. Vohs and Schooler (2008)

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found that students who had been induced not to believe in free will became increasingly likely to cheat on a test and steal money. Baumeister, Masicampo, and DeWall (2009) extended these findings to show that disbelief in free will increased aggression and reduced interpersonal helpfulness. Stillman et al. (2010) showed that even among relatively uneducated persons (such as a community sample of day laborers), disbelief in free will predicted job performance. Compared to others, workers with less belief in free will were rated as poorer workers by their supervisors, had less benign influence on co-workers, and were less reliable and consistent about showing up for work.

In light of the evidence that laypersons' beliefs about free will predict a variety of socially important behavior patterns, it is desirable to understand more about those beliefs (quite independent of grand questions about the reality of free will and thus of the accuracy of those beliefs). The present investigation used survey and experimental methods to identify what other beliefs and traits are linked to variations in laypersons' beliefs in free will. In particular, we tested hypotheses linking beliefs about free will to traits and beliefs involving agency, happiness, meaningfulness, and general positivity. We extend these basic links into other issues including gratitude, forgiveness, goal-setting, self-efficacy, and stress.

1.1. Agency

In psychological theory, the notion of free will is linked to assumptions about human agency, including decisions, self-control, morality, and initiative (Double, 1991; Mele, 1999; Nahmias, Morris, Nadelhoffer, & Turner, 2005). Although there are different theories about free will, one theme invoked by most conceptualizations is that the agent has the capacity to act in different ways in the same situation (e.g., Kane, 2002). Baumeister (2008) has proposed that the psychological reality behind the popular notion of free will is a form of action control that evolved to enable humans to participate in culture, so self-control, rational choice, and moral responsibility are central. Folk intuitions about free will also reflect the importance of choice and control. When Monroe and Malle (2010) asked participants to "explain in a few lines what you think it means to have free will," the themes that appeared most frequently across responses were being able to make choices, acting according to one's own desires, accepting responsibility for one's actions, and evading or defying constraints.

Belief in free will should therefore correlate with positive beliefs about human control and agency. Our first hypothesis was that high belief in free will would be correlated with various beliefs in control, including self-efficacy and, possibly, mindfulness (i.e., being highly aware of one's choices and actions). Insofar as a distinctive feature of human agency is intentional pursuit of distal goals, we examined how free will beliefs predicted long-range goal-setting. Belief in one's own free will might create a greater sense that one can control events, so that stressful life events come to seem more controllable, thereby producing reduced perception of stress in life. Meanwhile, belief in others' free will could contribute to feeling greater gratitude for the favors they do, because belief in free will highlights the fact that they did not

have to do those favors (and so one appreciates all the more that they chose to do them).

Some recent studies have suggested that belief in free will increases punitiveness (Shariff et al., 2014). If free will evolved for participation in culture, and culture depends on people following rules, then belief in free will could well predict holding people responsible and punishing them for their violations of cultural rules. In the present studies, however, we extended this by examining forgiveness in close relationships. The same logic might apply, insofar as belief in free will leads one to condemn intimate partners for their transgressions. However, when a close relationship is at stake, a person's primary concern may be maintaining the relationship for the future and repairing damage caused by the partner's misdeeds. Toward that end, it may be helpful to release the partner from condemnation, particularly if one believes that the partner is capable of acting differently in the future. These sentiments might produce the opposite finding, in which free will belief supports willingness to forgive relationship partners.

1.2. Happiness and Meaning

We investigated possible links between free will beliefs and happiness. Dennett (1984) observes that free will is only worth having insofar as it facilitates achieving desirable outcomes. Belief in free will may therefore be linked to confidence that one can act so as to reach one's goals and improve one's life. If so, then happiness (either in terms of positive emotion or general life satisfaction, or both) could well be positively correlated with free will beliefs. Laypersons tend to conflate the idea of not having free will with determinism and even fatalism, that is, the sense that the individual is powerless to change his or her fate (Nahmias et al., 2005). Such an outlook seems depressogenic and could also stem from experiences of helplessness (Miller & Seligman, 1975), all of which could predict that disbelief in free will would correlate with low happiness. This reasoning would be further supported if high levels of life stress predicted low belief in free will.

Taken to an extreme, the belief that people lack all free will suggests a view of human life in which people are automatons who simply perform actions as dictated by powerful forces, including environmental influence and genetic predispositions. Choice, in the sense of genuinely being able to pick among multiple options, would be an illusion. Such a deterministic view may be at odds with how most people understand the meaningfulness in their lives, and indeed the denial of free will rejects a central thrust of existential philosophy, which is that people create the meaning in their lives by the choices that they make. Research has shown that individuals' sense of control over their lives is directly related to their perception that their lives have meaning. Newcomb and Harlow (1986) found that participants who agreed with statements such as "I feel that I am not in control of my life" and "I feel that whether I am successful is just a matter of luck and chance, rather than my own doing" also tended to view their lives as lacking meaning. Ryff (1989) found that participants who scored higher on measures of environmental mastery and perceived autonomy also

scored higher on a measure of perceived meaning in life. If the belief in free will supports a sense of personal agency, then it should be expected that belief in free will would be associated with the perception of meaning in life.

1.3. Positivity Bias

Based on the possibility that participants might regard belief in free will as simply a positive thing and that responses might simply reflect an overall positivity bias, we tested several possible correlations to positive traits that should in theory not have much link to free will, namely sense of humor, empathy, and physical attractiveness.

1.4. Free Will as a Distinct Construct

The central theoretical basis of the present work was that the belief in free will would be related to and exert influence on traits and outcomes which benefit from a sense of personal agency. The belief in free will, however, is not the only extant variable that purports to measure agency. Indeed, locus of control has served as a theoretical framework for investigating human agency long before the relatively recent emergence among psychologists of interest in free will belief (Rotter, 1966). More recently, research on implicit theories has begun to explore the impact of believing that traits are either fixed or immutable (Dweck, Chiu, & Hong, 1995). Both of these theories could be viewed as redundant with a belief in free will. Therefore, the present research sought to disentangle the predictive power of free will belief from these two constructs.

1.5. The Present Research

We tested the hypothesis that the belief in free will would be related to a variety of agentic traits and outcomes. Study 1 tested the bivariate relationship between free will belief and a variety of positive traits and outcomes. Study 2 tested the hypothesis that the belief in free will would predict unique variance in several positive outcome variables while controlling for locus of control and implicit theories. Study 3 tested the hypothesis that individuals induced to believe in free will would view life as more meaningful than would individuals induced to disbelieve in free will. Finally, study 4 tested the hypothesis that individuals induced to believe in free will would set more meaningful goals than would individuals who were induced to disbelieve in free will.

2. Studies

2.1. Study 1

Study 1 reports the findings of a series of correlational studies conducted to determine whether belief in free will was significantly associated with a variety of positive traits and outcomes that we hypothesized should be bolstered by the belief in free will. Specifically, this first series of studies tested the hypothesis that the belief in free will would be associated with the following variables: self-efficacy, life stress (negatively),

mindfulness, perceived meaning in life, subjective well-being, and gratitude. Since these studies employed similar methods—correlational designs assessing the belief in free will and one or more variables of interest—we present this set here as study 1.

2.1.1. Method
2.1.1.1. Participants
Study 1a. Forty-four participants (mean age = 34.55, 59.5% female) were recruited using Amazon's Mechanical Turk website. Participants received $0.10 for participating.

Study 1b. Twenty-four participants (mean age = 33.54, 58.3% female) were recruited using Amazon's Mechanical Turk program. Participants received $0.10 for participation.

Study 1c. Participants were 175 undergraduates (mean age = 19, 71% female) who participated to receive extra credit in their psychology course.

Study 1d. Participants were 120 undergraduates (median age = 18; 50.8% female) who reported on their romantic relationship.

Study 1e. Twenty-five participants (mean age = 35.12; 76.9% female) were recruited using Amazon's Mechanical Turk program. All participants received $0.10 in exchange for participation.

Study 1f. Sixty-nine undergraduates (mean age = 20.06, 79.4% female) participated for partial course credit.

Study 1g. Seventy-five participants (mean age = 33.51, 64.7% female) were recruited using Amazon's Mechanical Turk website. Participants received $0.20 in exchange for participation.

Study 1h. Forty-seven participants (mean age = 38.79, 18.6% female) were recruited using Amazon's Mechanical Turk website. Participants received $0.10 for participating.

2.1.1.2. Procedure
Assessing Free Will Belief. In each study, free will belief was measured using one of the following three scales: the Free Will and Determinism Scale (FAD; Paulhus & Carey, 2009), the Free Will and Determinism Scale, Plus (FAD-plus; Paulhus & Carey, 2011), or the Free Will Determinism Scale (FWD; Rakos, Steyer, Skala, & Slane, 2008). Most studies assessed free belief using the FAD-plus. Two studies predated the publication of this scale; one employed the FAD and another used the FWD.

FAD-Plus. The FAD-plus is a 27-item Likert scale with four factors: free will ($\alpha = .70$), scientific determinism ($\alpha = .69$), fatalistic determinism ($\alpha = .82$), and unpredictability ($\alpha = .72$). The scale includes items such as "People have complete control over the decisions they make," "I believe that the future has already been determined by fate," "People's biological makeup determines their talents and personality," and "Chance events seem to be the major cause of human history." Participants respond on a five-point scale anchored at "Strongly Disagree" and "Strongly Agree."

FAD. The FAD, an older version of the FAD-plus, contains 25 of the 27 items found in its updated counterpart. The original FAD omits the following items: "People's

futures cannot be predicted" and "Luck plays a big role in peoples' lives." The original FAD showed the following alpha reliabilities: free will, .69; scientific determinism, .69; fatalistic determinism, .82; and unpredictability, .63.

FWD. The FWD is a 22-item Likert-type scale with two factors: general will, which assesses participants' beliefs regarding the existence of free will in general, and personal will, which assesses beliefs regarding free will as it relates to oneself. The scale has an overall reliability of .72, with reliabilities of .59 for the general will subscale and point .65 for the personal will subscale.

The following outlines our assessment of the outcome variables:

General Self-Efficacy (GES; Chen, Gulley, & Eden, 2001). The GES contains items such as "I can always manage to solve difficult problems if I try hard enough" and "When I am confronted with a problem, I can usually find several solutions." Participants respond on a four-point Likert scale anchored at 1 (not at all true) and 4 (exactly true).

Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983). The PSS includes 10 items asking about the participants' lives over the past month, such as "In the last month, how often have you felt nervous and 'stressed'?" Participants respond using a five-point Likert scale anchored at 0 (never) and 4 (very often).

Mindfulness (MAAS; Brown & Ryan, 2003). The MAAS consists of 15 items which participants rate using a six-point Likert scale anchored at 1 ("almost always") and 6 ("almost never"). Sample items include "I could be experiencing some emotion and not be conscious of it until sometime later" and "It seems I am running on automatic without much awareness of what I'm doing."

Subjective Happiness Scale (SHS; Lyubomirsky & Lepper, 1999). The SHS consists of four items. The first item asks participants to rate their general level of happiness. The second item asks participants to indicate whether they believe themselves to be more or less happy than their peers. The last two items ask participants to indicate whether they are the sort of people who tend to be happy regardless of what happens to them, or the sort of people who tend to be unhappy regardless of what happens to them. Participants respond to all four questions using a seven-point Likert-type scale.

Relationship Satisfaction. Relationship satisfaction was measured using a four-item measure of relationship satisfaction developed by Funk and Rogge (2007), which included items such as "How rewarding is your relationship with your partner?"

Forgiveness. Forgiveness was assessed using six items that respondents rated following the statement "When my partner wrongs or hurts me . . ." on a six-point scale ranging from "strongly disagree" to "strongly agree." Three items assessed avoidance ("I tend to give him/her the cold shoulder," "I don't want to have anything to do with her/him," "I tend to withdraw from my partner") and three items assessed retaliation ("I find a way to make her/him regret it," "I tend to do something to even the score," "I retaliate or do something to get my own back"). The six items were scored so that higher scores reflected more forgiveness.

Commitment. Commitment was assessed using a short form of the dedication subscale of Stanley and Markman's (1992) commitment measure. It comprised four

items (e.g., "My relationship with my partner is more important to me than almost anything else in my life").

Kunzendorf no Meaning Scale (KNMS; Simon, Arndt, Greenberg, Pyszczynski, & Solomon, 1998). The KNMS measures the extent to which participants view life as being meaningless, and includes items such as "Life has no meaning or purpose" and "Any perceived meaning in life is illusory." Participants respond using a four-point Likert scale anchored at 1 (strongly disagree) and 4 (strongly agree).

Meaning in Life Questionnaire (MLQ-10; Steger, Frazier, Oishi, & Kaler, 2006). The MLQ-10 is a 10-item Liker-type scale designed to assess perceived meaning in life. Sample items include "I understand my life's meaning" and "I have a good sense of what makes my life meaningful." Participants respond to all items using a seven-point scale anchored at "Absolutely Untrue" and "Absolutely True."

Gratitude Questionnaire-6 (GQ6; McCullough, Emmons, & Tsang, 2002). The GQ6 is a six-item questionnaire assessing gratitude. Sample items include "I have so much in life to be thankful for" and "I am grateful to a wide variety of people." Participants responded using a seven-item Likert-type scale anchored at "Strongly Disagree" and "Strongly Agree."

Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985). The SWLS is a five-item scale assessing satisfaction with life. Scale items include "In most ways, my life is close to ideal" and "If I could life my life over, I would change almost nothing." Participants respond using a seven-point Likert-type scale anchored at "Strongly Disagree" and "Strongly Agree."

Interpersonal Reactivity Index (IRI; Davis, 1983). The IRI is a 28-item scale designed to assess empathy. Sample items include "I often have tender, concerned feelings for people less fortunate than me" and "I sometimes try to understand my friends better by imagining how things look from their perspective." Participants respond using a five-point Likert-type scale anchored at "Does not describe me well" and "Describes me very well."

Situational Humor Response Questionnaire (SHRQ; Martin & Lefcourt, 1984). The SHRQ is a 21-item questionnaire designed to assess sense of humor. Participants are presented with a variety of hypothetical scenarios, such as "If you were awakened from a deep sleep in the middle of the night by the ringing of the telephone, and it was an old friend who was just passing through town and decided to call and say hello …" After each scenario, participants are asked to choose one of five hypothetical responses (e.g., "I wouldn't have been particularly amused" or "I would have been able to laugh and say something funny to my friend").

Attractiveness. Attractiveness was assessed using a four-item questionnaire. The four items were: "I would say that I have an attractive face," "I would say that I have an attractive body," "I think other people find me attractive," and "Compared to most people my age, I'd say that I'm above average in attractiveness."

2.1.2. Results
Results of study 1 are presented in Tables 1 and 2. Table 1 presents the relationships between free will beliefs and positive outcomes, including satisfaction with life and

perceived meaning in life. Although we hypothesized that belief in free would contribute to these outcomes, it is entirely possible that any observed relationship is due to a third variable or that belief in free will is affected by the observed variable as opposed to exerting an effect (e.g., greater belief in free will may decrease perceptions of stress in life, or perceiving one's life as less stressful may facilitate the belief in free will).

Table 2 presents results of our test of the hypothesis that free will beliefs simply reflect overall positivity, that is, a tendency to rate oneself favorably on all manner of things. Given the wide array of positive outcomes with which free will is shown to positively correlate in the present studies (e.g., life satisfaction, gratitude, and relationship commitment), we wished to provide some evidence that correlations were not merely the results of an overarching positivity bias on the part of individuals who believe in free will. Although we posit theoretical reasons for the relationship between free will and our observed variables, it could be argued that those who believe in free will are blind optimists who are only too happy to ascribe any and all positive traits and outcomes to themselves. As such, we predicted that at least three uniformly positive traits—physical attractiveness, empathy, and sense of humor—would be unrelated to the belief in free will. Our findings, presented in Table 2, bore out these hypotheses.

2.1.3. Discussion

Across nine simple studies, belief in free will was shown to be associated with a greater sense of self-efficacy, lower levels of perceived life stress, greater mindfulness, more satisfying relationships, greater happiness and satisfaction with life, and a greater sense of meaning in life. Several positive traits—namely empathy, sense of humor, and self-rated physical attractiveness—were not related to the belief in free will.

Having established correlations between free will belief and several variables of interest, we next turned to replicating several key findings. Study 2 therefore pitted the belief in free will against two related but distinct constructs. Study 3 sought to clarify the nature of the relationship between free will belief and perceived meaning in life by manipulating free will belief and then measuring perceived meaning in life. Finally, study 4 provided an additional test of the causal effect of free will belief on meaning by manipulating the belief in free will and assessing the meaningfulness of participants' goals.

2.2. Study 2

Study 1 established that free will belief was positively associated with several positive outcomes, including happiness, gratitude, perceived meaning in life, and self-efficacy. The primary theoretical framework driving our hypotheses related to these variables was that the greater sense of agency and personal freedom engendered by the belief in free will should lead individuals to feel more efficacious, to feel that their actions (and those of others) were more meaningful, and ultimately to possess a greater sense of overall well-being and happiness. Given this theoretical orientation, it is important to establish whether belief in free will is a useful predictor of these outcomes once the

Table 1. Relationship between free will belief and outcomes.

	Self-Efficacy (Study 1a)		Life Stress (Study 1b)		Mindfulness (Study 1c)[a]		Relationship Satisfaction (Study 1d)		Forgiveness (Study 1d)		Commitment (Study 1d)		Subjective Happiness (Study 1e)		Meaning (Study 1f)[b]		Meaning (Study 1g)		Gratitude (Study 1h)		Life Satisfaction (Study 1h)	
	R	DF	R	DF	R	DF	R	DF	R	DF	R	DF	R	DF	R	DF	R	DF	R	DF	R	DF
Free Will Belief	0.35*	42	0.45*	22	−0.26*	173	0.21*	118	0.27**	118	0.24*	23	0.56**	23	0.31**	67	0.32**	73	0.32**	45	0.59**	45

*p < .05. ** p < .01. R = Pearson correlation coefficient. DF = Degrees of freedom.

[a]Free will belief assessed using FWD composite; both subscales also correlated significantly with mindfulness.

[b]Free will belief assessed using FAD.

Table 2. Predicted null results.

	Attractiveness (Study 1g)	Empathy (Study 1h)	Sense of Humor (Study 1g)
Free Will Belief (Pearson's R)	−0.06	−0.18	−0.06

effects of other agency-related variables have been taken into account. It could be, after all, that the belief in free will does not represent a distinct construct, but rather is redundant with other measures in the realm of personal choice and agency. Although past research has established the discriminant validity of the FAD-plus (Paulhus & Carey, 2011), it would be useful to ensure that belief in free will remains a significant predictor of target outcomes when controlling for related variables. Toward this end, study 2 included assessments of internal locus of control and incremental person theory as competing predictors. Locus of control refers to an individual's tendency to view outcomes as either resulting from luck, chance, fate, or other external sources (dubbed an external locus of control), or as resulting from his or her own behavior and traits (an internal locus of control) (Rotter, 1966). Because this construct emphasizes an individual's perceived level of control over his or her outcomes, it could be suggested that an internal locus of control is correlated with a relatively high belief in free will. Hence we sought to ascertain whether belief in free will would still predict target variables after controlling for locus of control.

Implicit theories are beliefs regarding whether a given trait or concept is relatively fixed and immutable (termed an "entity theory") or is malleable and subject to change (an "incremental theory") (Dweck et al., 1995). Implicit theories are typically discussed in a domain-specific manner, with constructs such as intelligence (Blackwell, Trzesniewski, & Dweck, 2007), personality (Chiu, Hong, & Dweck, 1997), and morality (Chiu, Dweck, Tong, & Fu, 1997) among the topics to which implicit theories have been applied. Yet individuals can also be thought of as having implicit theories relating more broadly to the traits and actions of people across a range of situations. The implicit theory of a person as a whole refers to that person's sense that his or her traits and those of others are either relatively unchangeable or are subject to change. Hence, again, it was necessary to ask whether free will beliefs would predict other attitudes after controlling for implicit theories.

Although it can be argued that implicit theories and locus of control are redundant with the belief in free will, we argue that free will belief represents a distinct construct and should, therefore, explain independent variance in outcome variables. Whereas locus of control can be thought of as an individual's belief that or he or she actually *does* control his or her outcomes and decisions, the belief in free will may be thought of as capturing an individual's sense that control of his or her own fate and decisions is *possible*. It would be entirely consistent, for example, for a worker who felt trapped in a dead-end job to feel that although he himself did not exercise much control over his day-to-day life, this fact was due to his own circumstances rather than the metaphysical impossibility of exercising free will. Similarly, an individual could hold an entity theory of the person as a whole (reflecting a belief that individual traits are fixed and immutable) while still believing that individuals, though influenced by their traits and personalities, are ultimately free to deviate from their normal predispositions.

Study 2 therefore had two aims. First, study 2 was designed to provide replication of some of the key findings of study 1. Second, study 2 sought to establish the predictive power of the belief in free will relative to—and independently of—locus of control and implicit person theory.

2.2.1. Method

2.2.1.1. Participants

Seventy-eight participants (mean age = 34.87; 59% female) were recruited using Amazon's Mechanical Turk program. All participants received $0.15 in exchange for participation.

2.2.1.2. Procedure

Participants completed the FAD-plus, the Internal Control Index (ICI; Duttweiler, 1984), the implicit person theory measure (Dweck et al., 1995), the Meaning in Life Questionnaire (MLQ-10; Steger et al., 2006), the Satisfaction with Life Scale (SWLS; Diener et al., 1985), the General Self-Efficacy Scale (GES; Chen et al., 2001), and the Gratitude Questionnaire-6 (GQ6; McCullough et al., 2002). Items were randomized within each questionnaire, and the order of presentation of questionnaires was randomized among participants.

Internal Control Index. The ICI includes 28 items assessing participants' level of internal control. Sample items include "I like jobs where I can make decisions and be responsible for my own work" and "What other people think has a great influence on my behavior" (reverse scored). Participants respond using a five-point Likert-type scale anchored at "Rarely" and "Usually." All items were coded such that higher scores correspond to a greater belief that events are internally controllable.

Implicit Person Theory Measure. The implicit person theory measure is a three item measure assessing participants' implicit theories regarding the person as a whole. The items are "The kind of person someone is is something very basic about them and it can't be changed," "People can do things differently, but the important parts of who they are can't really be changed," and "Everyone is a certain kind of person and there is not much that can be done to really change that." Participants respond using a six-item Likert-type scale anchored at "Strongly Disagree" and "Strongly Agree."

2.2.2. Results

Bivariate correlations between all three predictor variables (belief in free will, implicit person theory, and internal control) were calculated prior to a regression analysis. There was a small-to-moderate positive correlation between belief in free will and locus of control, $r(78) = .28$, $p = .02$, such that participants who believed more strongly in free will also tended to have a more internal locus of control. Neither belief in free will, $r(78) = -0.03$, $p = .82$, nor internal control, $r(78) = .21$, $p = .07$, was significantly correlated with implicit person theory, though the latter did approach significance.

Bivariate correlations were also computed between each of the four subscales of the FAD-plus (free will, scientific determinism, unpredictability, and fatalism) and the criterion variables (meaning in life, gratitude, self-efficacy, and life satisfaction). Apart from correlations between each criterion variable and the free will belief subscale, the only significant correlation that emerged was a negative correlation between fatalism and gratitude, $r(78) = -.26$, $p = .02$. Thus, the free will subscale did indeed predict the criterion variables much more reliably and effectively than the other subscales of the FAD-plus.

Four multiple regressions were conducted predicting satisfaction with life, gratitude, self-efficacy, and perceived meaning in life. Each model included free will belief, internal locus of control, and implicit person theory as predictors. The overall regression models predicting life satisfaction, $F(77) = 6.30$, $p < .01$, gratitude, $F(77) = 18.53$, $p < .01$, self-efficacy, $F(77) = 17.76$, $p < .01$, and meaning in life, $F(77) = 8.18$, $p < .01$, were each significant. Within each model, free will belief emerged as the strongest individual predictor of the dependent variable. Internal control was not a significant predictor of self-efficacy, nor of meaning in life, but it did explain a significant amount of independent variance in life satisfaction and self-efficacy. Incremental person theory predicted a significant amount of variance in self-efficacy, gratitude, and perceived meaning in life, but it did not explain a significant amount of variance in satisfaction with life. Results of regression analyses are presented in Table 3.

2.2.3. Discussion

Study 2 accomplished two things. First, it replicated several of the key findings of study 1, notably the positive correlations between free will beliefs and life satisfaction, gratitude, self-efficacy, and perceived meaningfulness of life. Although replication by definition does not break new ground, recent disputes in the field about replicability have increased the importance of providing replications, and replicating correlations among questionnaire measures has long been considered a highly important (though often neglected) bulwark against ostensible findings merely due to chance.

Second, the novel contribution of study 2 was to differentiate beliefs in free will from conceptually related phenomena, namely locus of control and implicit theories about human malleability. The three were at best weakly intercorrelated. Although there was a significant positive correlation between free will beliefs and internal locus of control, there was a substantial amount of unshared variance. More importantly, the three variables predicted the target variables differentially. Belief in free will had stronger correlations with life satisfaction, gratitude, self-efficacy, and meaningfulness of life than did implicit theories and locus of control. The contribution of free will beliefs remained significant and indeed quite substantial after controlling for the other variables. Thus, these effects of belief in free will were independent of locus of control and implicit theories. We conclude that locus of control and implicit theories do not account for the effects observed regarding free will beliefs.

2.3. Study 3

Studies 1 and 2 established that believing in free will is associated with a greater sense of self-efficacy, greater mindfulness, and lower stress in life. This pattern of results is consistent with our broad hypothesis that the belief in free will supports a greater sense of agency. Furthermore, study 2 established that the belief in free will predicted a significant amount of variance in life satisfaction, gratitude, meaning in life, and self-efficacy, over and above the variance accounted for by locus of control and implicit person theory. As with any correlational results, however, the observed correlation between free will belief and the perception that life has meaning did not establish the

Table 3. Summary of multiple regression analyses for variables predicting satisfaction with life, gratitude, self-efficacy, and perceived meaning in life (N = 77).

Variable	Satisfaction with Life				Gratitude				Self-Efficacy				Perceived Meaning in Life			
	B	SE B	β	partial r	B	SE B	β	partial r	B	SE B	β	partial r	B	SE B	β	partial r
Free Will Belief	0.81	0.26	0.33**	0.30	1.18	0.20	0.54**	0.56	0.51	0.11	0.43**	0.48	0.53	0.19	0.29**	0.30
Internal Control	0.58	0.40	0.16	0.23	0.26	0.30	0.08	0.10	0.48	0.16	0.28**	0.32	0.59	0.29	0.22*	0.23
Incremental Person Theory	0.24	0.15	0.17	0.28	0.41	0.11	0.33**	0.40	0.17	0.06	0.26**	0.31	0.26	0.26	0.26*	0.28
R^2		0.20				0.43				0.42				0.25		
F		6.3				18.53				17.78				8.18		

causal nature of this relationship. Although there are theoretical reasons to believe that individuals who feel a greater sense of agency in life interpret their choices and actions as being more meaningful, it could be that individuals who view life as more meaningful are simply more likely to interpret their actions as having resulted from free will. Therefore, in study 3 we experimentally manipulated participants' belief in free will and then measured their perceived meaning in life. If belief in free will does indeed contribute to the sense that life is meaningful, then individuals who are induced to disbelieve in free will should view life as being less meaningful than do participants induced to believe more strongly in free will. Study 3 therefore tested the hypothesis that inducing disbelief in free will would cause people to view life as relatively less meaningful compared to individuals induced to believe in free will.

The idea of experimentally manipulating beliefs in free will was introduced by Vohs and Schooler (2008). No one assumes that a brief experimental manipulation can move all research participants to extremes of accepting or rejecting the possibility of free action. The goal is simply to create two groups that on average differ in the degree to which they believe that most human beings are able to exert some degree of free will. Random assignment should generally even out all other differences, so the host of correlating variables we illuminated in study 1 would not be potential confounds of any findings (except insofar as they too are altered by experimental manipulations of belief in free will). In this manner, experimental manipulations are valuable complements to the careful measurement of beliefs.

In the present study, beliefs about free will were manipulated by exposing participants to statements that either averred or denied the reality of free will. Participants were instructed to re-state these sentences in their own words. This manipulation causes the participant's mind to think in a manner that either embraces or rejects the notion of free will. The sentences rejecting free will also involved asserting determinism. Although expert opinion often finds free will and determinism compatible, laypersons find these subtle arguments elusive and tend to assume that determinism rules out free will. The manipulation thus has prima facie validity for laypersons even though it lacks the sophisticated, nuanced understandings that philosophers have attained.

2.3.1. Method
2.3.1.1. Participants
Participants were 27 students (mean age $= 19.07$; 78.6% female) who participated in exchange for partial course credit.

2.3.1.2. Procedure
Participants were told they would be completing a study investigating reading comprehension and judgment. The procedure was based on methods for manipulating belief in free will adapted from Vohs and Schooler (2008). Participants were first presented with the ostensible reading comprehension task. This task presented participants with a Velten-style manipulation designed to induce belief or disbelief in free will (Velten, 1968). Participants were told their task would be to read 10 sentences and to rewrite the sentences in their own words while maintaining the

meaning of the original sentence. All sentences were presented on a computer screen using Empiroft's MediaLab software. Sentences appeared for 30 seconds before a response box was provided to ensure that participants could not simply click through the sentence without having read it. After 30 seconds a response box appeared asking participants to rewrite the sentence in their own words. By random assignment, participants were placed into either the free will or determinism condition. In the free will condition, the sentences asserted the existence of free will. Participants in the free will condition were presented with sentences such as "I have free will to control my actions and, ultimately, to control my destiny in life," "I demonstrate my free will every day when I make decisions," and "I have feelings of regret when I make bad decisions because I know that ultimately I am responsible for my actions." Participants in the determinism condition read sentences that disputed or denied the existence of free will, such as "Ultimately, we are biological computers—designed by evolution, built through genetics, and programmed by the environment," "Like everything else in the universe, all human actions follow from prior events and ultimately can be understood in terms of the movement of molecules," and "All behavior is determined by brain activity, which in turn is determined by a combination of environmental and genetic factors." After the free will manipulation, all participants completed the KNMS and the FAD-plus.

2.3.2. Results
As a manipulation check, an ANOVA was conducted to compare scores on the determinism sub-scale of FAD-plus. Participants in the determinism condition (M = 2.52, SD = .59) scored significantly higher on the determinism subscale of the FAD-plus than did participants in the free will condition (M = 3.06, SD = .43), $F(1,26) = 7.23$, $p = .01$, $d = 1.05$. Thus, the manipulation was successful.

An additional ANOVA was conducted to compare scores on the KNMS between the free will and determinism conditions. Participants in the determinism condition (M = 1.7, SD = .68) perceived life to be significantly less meaningful than did participants in the free will condition (M = 1.28, SD = .23), $F(1, 26) = 5.247$, $p = .03$.[1] The effect size was large (Cohen, 1988), $d = 0.82$.

2.3.3. Discussion
Study 3 showed that having participants think about and express the nonexistence of free will reduced the extent to which they saw life as meaningful. Participants who read and rewrote sentences challenging the existence of free will endorsed determinism to a greater degree than participants in the pro-free-will condition. More importantly, they agreed more strongly with statements depicting life as meaningless than did participants who read and rewrote sentences asserting the existence of free will. These results support the hypothesis that the belief in free will contributes causally to the perception that life is meaningful.

2.4. Study 4

Study 3 established that participants induced to disbelieve in free will viewed life as less meaningful than did participants induced to believe in free will, and study 1 showed that beliefs in free will correlated with other agentic beliefs. Study 4 built on these findings by investigating setting goals as an important facet of agency. To the extent that a sense of agency is bolstered by believing in free will, believing more strongly in free will should lead individuals to set more meaningful long-term goals. Study 4 tested this hypothesis experimentally by assigning participants to complete a Velten-style free will manipulation in which they contemplated and internalized sentences that endorsed belief in free will, opposed belief in free will, or, in a neutral control condition, were unrelated to belief in free will (Baumeister, Masicampo, & DeWall, 2009; Vohs & Schooler, 2008). Participants then completed a thought-listing task in which they were asked to briefly describe three things they would like to do and when. Our primary prediction was that participants in the free will condition (i.e., those whose belief in free will was bolstered by the experimental manipulation) would describe more distal, goal-directed, and meaningful desires than participants in the determinism condition.

We also included a no-manipulation control condition. Because most people tend to believe in free will (Baumeister, Masicampo, & DeWall, 2009), we predicted that this neutral control condition would yield results similar to the pro-free-will manipulation.

2.4.1. Method

2.4.1.1. Participants
117 participants (69.2% female) participated in exchange for course credit.

2.4.1.2. Procedure
Participants came to the lab individually and completed the free will manipulation (adapted from Vohs & Schooler, 2008). This manipulation consisted in a modified Velten-style procedure (Velten, 1968), which has been used successfully in past research to temporarily affect the strength of belief in free will (Baumeister, Masicampo, & DeWall, 2009; Vohs & Schooler, 2008). Participants were instructed to read a series of 15 sentences that were designed to reinforce belief in free will, to contradict belief in free will, or to be unrelated to free will. Participants received a booklet that contained one sentence per page and were given one minute to internalize each sentence. The experimenter informed the participant when to turn the page.

Participants were randomly assigned among the free will, determinism, and control conditions. The sentences provided to participants in the free will and determinism conditions were identical to those used in study 3. Sentences provided to participants in the control condition were taken directly from the original Velten (1968) control condition and included sentences such as "The Los Angeles metropolitan area is known for its complex system of highways" and "Monarch butterflies fly slowly but have been sighted hundreds of miles at sea."

Participants then completed the Brief Mood Introspection Scale (BMIS; Mayer & Gaschke, 1988) to provide a measure of mood and arousal. Next, participants completed the thought-listing task in which they were asked to briefly describe three things they would like to do. After completing the descriptions, participants were then asked when they would like to complete each item. The phrasing of the instructions was left intentionally ambiguous and did not specify whether participants should list momentary desires or more distal goals.

Coding Strategy. Participants' descriptions of what they would like to do and when they would like to do it were typed, and all information identifying the condition participants completed was removed. An independent judge then coded the descriptions on two dimensions determined a priori to be relevant indicators of meaningful goal-setting. On one dimension, the judge rated the presence or absence of particular features on a dichotomous scale. The other rating was made on a seven-point Likert scale. To compute reliabilities, a second independent judge recoded the descriptions. Agreement between raters showed high reliability. On the dichotomous coding dimension, kappa ranged from .81 to .86 with a mean of .83. The intraclass correlation coefficient for the continuous dimension ranged from .85 to .88 with a mean of .87. Given the high reliability, we used the first coder's ratings for further analyses. Because each participant provided descriptions of three different goals, the judge's rating for each of the three descriptions was then averaged within each coding dimension, so each participant received one score on each dimension, representing the average for the three goals. The averaged ratings for each coding dimension were significantly correlated.

Participants' descriptions of what they would like to do were coded for the presence or absence of goal-directed content. Specifically, the participants' descriptions were coded as goal-directed if the description detailed a goal broadly related to self-development (e.g., learning a new skill, pursuing an occupation) or relationship enhancement (e.g., deepening friendships). Examples of goal-directed descriptions were "I would like to one day work in the medical field as a doctor of some sort" and "I would like to play the oboe in an orchestra recording for a successful movie." Examples of non-goal-related descriptions were "I would like eat candy" and "I would like to go back to bed".

In addition to coding the goal content, we also coded for the level of meaning conveyed in participants' descriptions. Judges coded the meaningfulness of the participants' responses along a seven-point continuum ranging from (1) not at all meaningful (e.g., eat lunch) to (7) extremely meaningful (e.g., train as a physician in order to provide care to AIDS orphans in Africa).

2.4.2. Results

Goal content. The primary prediction was that participants in the free will condition would report more distal, goal-directed, and meaningful goals than participants in the disbelief in free will condition. Consistent with the primary hypothesis, ANOVA revealed a significant main effect for condition, $F(2, 114) = 5.77$, $p < .01$, $\eta^2 = .09$. Planned comparisons revealed that

participants in the free will condition described more goal-directed content than participants in the disbelief in free will condition, $F(1, 114) = 5.86$, $p = .02$, $\eta^2 = 05$. Participants in the free will condition also expressed more goal-directed content than control participants, $F(1, 114) = 10.65$, $p < .01$, $\eta^2 = .09$, whereas participants induced to disbelieve in free will did not differ from participants in the control condition, $p = .4$, $\eta^2 < .01$. Thus, bolstering belief in free will caused people to set more goals than either neutral controls or participants who were induced to disbelieve free will.

Meaningfulness. ANOVA revealed a significant main effect for condition on the meaningfulness of goals articulated by participants, as rated by coders, $F(2, 114) = 5.56$, $p < .01$, $\eta^2 = .09$. Consistent with the primary hypothesis, planned comparisons revealed that participants in the pro-free-will condition provided more meaningful responses than participants in the disbelief in free will condition, $F(1, 114) = 5.76$, $p = .02$, $\eta^2 = .05$. Additionally, we again found that pro-free-will participants provided more meaningful responses than control participants, $F(1, 114) = 10.21$, $p < .01$, $\eta^2 = .08$. There was no difference in the meaningfulness of responses from participants induced to disbelieve in free will and participants in the control condition, $p = .42$, $\eta^2 < .01$. This departs from the general pattern in the literature, in which the anti-free-will condition differs from the neutral control group but the pro-free-will condition does not (e.g., Baumeister et al., 2009; Vohs & Schooler, 2008). That pattern presumably reflects the baseline fact that most participants (hence most in the control condition) believe in free will to some extent. The fact that bolstering belief in free will increased the setting of meaningful goals thus has particular interest and suggests that, at least in layperson conceptions, free will is particularly associated with organizing one's life so as to move toward a meaningful future.

Additionally, we tested whether mood or arousal differed by experimental condition to verify that effects were not caused by changes in mood or arousal. No differences among conditions were observed for arousal ($p = .27$, $\eta^2 = .02$). There was, however, a significant effect for mood, $F(2,114) = 4.04$, $p = .02$, $\eta^2 = .07$, such that participants induced to believe more strongly in free will reported more positive mood than did participants in the determinism or control conditions. To rule out the possibility that mood differences accounted for our findings, we reran all analyses controlling for mood. All results reported above remained significant.

2.4.3. Discussion

Study 4 provided support for the hypothesis that belief in free contributes to setting personally relevant, meaningful goals. Participants induced to believe in free will set goals that were significantly more meaningful and significantly more personally relevant, and encompassed a longer time frame going further into the future, than did those participants induced to disbelieve in free will or those participants who read control sentences.

3. General Discussion

The central hypothesis for this work was that belief in free will would be associated with a variety of agency-related traits. We also sought to elucidate the nomological net of traits and beliefs linked to individual variations in belief in free will.

The correlational findings in study 1 indicated that individuals with stronger belief in free will were happier and more satisfied with life, reported less stress in life, found their lives to be more meaningful, were more mindful, scored higher on self-efficacy, expressed more gratitude toward others, and were more satisfied with their close relationships, as compared to people with weaker belief in free will. Study 2 demonstrated again that stronger belief in free will predicted higher self-efficacy, more perceived meaning in life, greater life satisfaction, and higher dispositional tendencies toward feeling and showing gratitude. It also showed that belief in free will predicted these outcome variables better than did either locus of control or implicit theories and did so independently of them (despite some shared variance).

Studies 3 and 4 moved beyond mapping out correlations to using experimental designs to establish the causal impact of beliefs in free will. Study 3 demonstrated that the belief in free will had a causal relationship to perceptions of meaning in life. That is, people found their lives more meaningful after being induced to believe than to disbelieve in free will. This finding supports the hypothesis that the belief that one controls one's own decisions and actions promotes a sense of meaning and purpose in life. Study 4 found that belief in free will had a causal effect on goal setting. Participants induced to believe less strongly in free will also set goals that were less meaningful and more temporally proximal than did participants whose belief in free will had not been weakened. These results support the view that belief in free will is integrated with the human propensity to link the present to the distant future, to choose goals that organize present actions based on desired and self-chosen future outcomes, and to link actions together across relatively long time frames.

We were also able to reject the simple explanation based on a broad positivity bias, namely that free will is simply considered a good thing that is correlated with all manner of other things that the person considers good. Belief in free will had no correlation with self-rated attractiveness, empathy toward others, or sense of humor.

Our findings indicate how belief in free will is related to other aspects of personality. First, belief in free will is correlated with an overall positive attitude toward life and toward taking action to improve life. People who believe in free will appear to be happy and satisfied with their lives. Possibly, experiencing personal misfortunes and other negative outcomes may reduce the sense of being able to control one's fate. The lower stress that accompanied free will belief may indicate that people who suffer from aversive, uncontrollable events (which contribute to high stress; Evans, Bullinger, & Hygge, 1998; Glass, Singer, & Friedman, 1969; Lefcourt, 1976), may lose the sense that they have freedom to control their lives. The link to self-efficacy in particular suggests that belief in free will invokes a sense of personal agency and being able to guide one's life in desired ways. One of our experimental studies confirmed that believing in free will contributed causally to setting more long-term, ambitious goals for oneself. To be

sure, managing one's life effectively as a result of confident belief in free will might be the causal factor, insofar as making good choices reduces one's exposure to stressful misfortunes.

Belief in free will also had interpersonal aspects, which likely reflect the implications of believing that other people have free will. Stronger belief in free will predicted a greater tendency to feel grateful. We included the gratitude measure because we reasoned that gratitude is enhanced by the sense that one's benefactor could easily have done otherwise, such that one appreciates that the benefactor made the choice to do for one what he or she did.

The tendency to assume that others can behave differently may also explain the tendency to forgive relationship partners. Past work has shown some signs that belief in free will creates a more punitive, less forgiving attitude toward strangers (Shariff et al., 2014). In those cases, it is the transgression that is likely central to the judgment, and believing in free will makes one think that the transgressor could and should have acted differently. The believer in free will holds the person morally responsible and insists on punishment as a way of upholding society's values. In contrast, with a relationship partner, the focus may be more on maintaining a good relationship into the future, and so one important aspect of a transgression is whether the partner is likely to repeat it or not. Believing in free will may enable the person to have faith that the partner will indeed change for the better and not repeat the transgression. Indeed, this touches on one of the central aspects of layperson conceptions of free will: the forgiver can believe that if the same situation were to arise again, the partner would act differently (i.e., not transgress again).

The view of free will as belief in personal agency is quite consistent with the present findings. Setting long-term goals for oneself is an important form of human agency, and our findings indicated that belief in free will causes people to do this. The correlations with self-efficacy, with relationship commitment, and possibly with forgiving relationship partners reflect the operation of agency, in that one chooses to behave in positive ways even though doing so may be difficult. Belief in free will was positively correlated with mindfulness, suggesting that individuals who believe more strongly in free will also have a greater tendency to be aware of their goals, behaviors, and experiences.

Several of our studies linked strong belief in free will to finding life meaningful. We found free will beliefs to correlate significantly with two measures of self-perceived meaningfulness of life. More dramatically, an experimental manipulation in study 3 to reduce belief in free will caused participants to shift toward regarding their lives as relatively meaningless. In our view, this upholds a central theme of existential philosophy, namely, that the choices a person makes help to define the meaning of that person's life (Camus, 1965; Heidegger, 1962; Sartre, 1956). To regard oneself as not really making choices, but instead as an automaton going through the motions as programmed by external forces, is apparently to find life less meaningful. The meaningfulness findings may thus also be related to the theme of personal agency.

The question of human free will has been debated in academic discourse for centuries. Although these debates may take place far removed from the exigencies of

daily life, the present findings suggest that personal opinions about free will are in fact extensively intertwined with many aspects of personality and with other opinions. Indeed, our experimental studies have added to evidence that beliefs about free will directly cause various responses and views (e.g., Vohs & Schooler, 2008). In the attempt to persuade people to believe or disbelieve in free will, many scholars may think they are dealing with an isolated and highly specific opinion, but our findings suggest that free will is linked to basic, wide-ranging views about self and life. Insofar as future research may begin to change the collective understanding of human psychology with regard to the question of free will, the implications may ripple through society and alter human happiness, meaningfulness, agency, and other factors. In addition to being a profoundly important metaphysical question, whether one believes in free will appears to be an important and potent social reality.

Note

[1]   The KNMS is coded such that higher scores indicate a greater belief that life is meaningless.

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