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Prosocial Benefits of Feeling Free: Disbelief in Free Will Increases Aggression and Reduces Helpfulness

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Laypersons' belief in free will may foster a sense of thoughtful reflection and willingness to exert energy, thereby promoting helpfulness and reducing aggression, and so disbelief in free will may make behavior more reliant on selfish, automatic impulses and therefore less socially desirable. Three studies tested the hypothesis that disbelief in free will would be linked with decreased helping and increased aggression. In Experiment 1, induced disbelief in free will reduced willingness to help others. Experiment 2 showed that chronic disbelief in free will was associated with reduced helping behavior. In Experiment 3, participants induced disbelief in free will caused participants to act more aggressively than others. Although the findings do not speak to the existence of free will, the current results suggest that disbelief in free will reduces helping and increases aggression.

Keywords: *free will; agency; aggression; helping; prosocial behavior*

Belief in free will seems widespread and intuitive. Almost every person every day has the subjective impression of making a choice in which more than one outcome is possible. The most influential religious beliefs in Western culture give prominent emphasis to doctrines of free will, assuming that human individuals can freely choose whether to perform virtuous or sinful actions and even stating that eternal judgment of individual souls rests on the choices they make. Likewise, the legal system allocates guilt and punishment differentially based on whether the rule breaker could have acted differently, such that perceived reductions in the capacity for free choice (including external pressures, lack of awareness, mental illness, or intense emotion) constitute valid reasons for reduced punishment or even acquittal.

Intellectuals and scientists, however, seem rather less uniformly comfortable with the idea of free will than the general public. Many scientists regard the belief in free will as untenable if not downright absurd. Some scientific writers such as Crick (1994) insist that all human thought and action are strictly determined by brain processes. Although not explicitly siding with them, Wegner (2002) summarized the opposition to free will as embodying the assumption that only "bad scientists" could believe such a thing.

To be sure, the impossibility of free will cannot be proven either empirically or conceptually. Scientists mainly oppose it because they think that determinism is a necessary assumption rather than a proven fact. The human mind understands and explains events in terms of deterministic causality (e.g., Kant, 1787/1967), but perhaps that says more about the way the mind operates than about reality per se. Among disciplines, philosophy lays claim to the most rigorous thinking, and many

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philosophers have retreated to a so-called compatibilism that asserts that free will, or at least freedom of action, can be reconciled with deterministic causation (see Kane, 2002).

The present investigation does not take a position on the reality of free will, nor is it even directly concerned with whether free will exists. Rather, it sought to investigate the consequences of belief in free will. If freedom of action is deeply embedded in Western culture and its social systems, what might be the effects of seeking to undermine and discredit that belief? If one assumes that cultural beliefs are not arbitrary but rather are functional in most cases, the belief in free will may be expected to benefit society in some ways; therefore, undermining that belief might produce antisocial tendencies.

The point of departure for this investigation was a recent investigation by Vohs and Schooler (2008). In different studies, they induced disbelief in free will in several ways, such as by having participants read Crick's (1994) vehement lampooning of the idea of free will or by having them follow a Velten-like procedure in which they read statements asserting the lack of human freedom of action. Afterward, these participants were more willing than control participants to cheat on a test (and, in one case, effectively steal money from the researchers). Those authors speculated that to undermine people's belief in free will could have socially costly consequences in terms of increasing antisocial behavior.

The present experiments sought to extend the Vohs and Schooler (2008) findings into a broader context, namely, helping and aggression. If helping decreases and aggression increases, that would emphatically support and extend Vohs and Schooler's conclusion that disbelief in free will reduces socially desirable behavior. Cheating, after all, can be regarded as a strategy for improving (ostensible) performance, and so one could argue that what drove the increase in cheating was a desire to achieve as high a score as possible. In contrast, if disbelief in free will were shown to increase aggression and reduce helpfulness, then achievement-based explanations would largely be ruled out.

Why would disbelief in free will increase aggression and reduce helping? A belief in free will may be crucial for motivating people to control their automatic impulses in favor of more prosocial forms of behavior. The automatic response for most people seems to be to act selfishly and without concern for strangers, so that a significant amount of self-control and mental energy is required to override this default to help others (DeWall, Baumeister, Gailliot, & Maner, in press) and to restrain aggressive impulses (DeWall, Baumeister, Stillman, & Gailliot, 2007). A disbelief in free will may therefore undermine this prosocial form of control. Consistent with that line of reasoning, Vohs and Schooler (2008) proposed that disbelief in free will serves as a subtle cue that exerting volition is futile and thereby gives people permission not to bother. The idea of not bothering to exert volition appeals to people insofar as volition in the form of self-control and choice requires exertion and depletes energy (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Gailliot et al., 2007; Vohs et al., 2008). In a sense, then, making people disbelieve in free will may serve as a nonconscious prime to act in relatively automatic ways, which would thus include enacting impulses rather than exerting control and restraint.

We examined two related possibilities, as well. One was that inducing belief in free will stimulates a conscious feeling of being active and energetic, thereby making people feel like they want to exert control. Another is that belief in free will supports (and disbelief undermines) a sense of personal responsibility and accountability. Feelings of responsibility and accountability may make people feel that they ought to behave in socially desirable ways, such as performing prosocial acts of helping and restraining antisocial impulses to aggress against others. The deterministic belief essentially says that the person could not act otherwise, which resembles a standard form of excuse ("I couldn't help it") and thus might encourage people to act in short-sighted, impulsive, selfish ways.

To emphasize the inner shift in state, two of the present experiments used a manipulation other than the Crick (1994) essay because the essay itself might in principle have a variety of possible effects. Following the newer procedure developed by Vohs and Schooler (2008), we used a Velten-style procedure that involved having participants read and internalize a series of statements that explicitly promoted or rejected the sense of personal choice and responsibility for one's actions. This procedure has the additional merit of contrasting the promotion of belief in free will in one condition with belief in determinism in a second condition (and, in Experiment 1, a neutral control). These inductions combined statements about the link between freedom and personal choice and about ostensible scientific findings regarding the causation of human behavior by genetic, environmental, and brain processes. Experiment 2 measured disbelief in free will instead of manipulating it. We predicted that disbelief in free will, whether manipulated or measured, would decrease helping and increase aggression.

EXPERIMENT 1

Experiment 1 provided a simple and preliminary test of the hypothesis that disbelief in free will reduces

prosocial tendencies. Participants completed a Velten-style procedure in which (by random assignment) one third of them internalized statements related to disbelief in free will, another one third internalized states related to a belief in free will, and the remainder pondered neutral statements. Participants then reported how likely they would be to offer help to people depicted in several scenarios. We predicted that disbelief in free will would lead to lower helping intentions compared to participants in the condition that encouraged belief in free will.

The neutral condition was of more interest than many standard control conditions. A simple prediction would be that its effects would be intermediate between the two manipulated belief conditions. However, if the neutral control differed from only one of them, that pattern would suggest that the other belief was fairly equivalent to what people normally believe. Our general assumption was that belief in free will promotes socially desirable and harmonious behavior, and so people generally are socialized to believe in free will. On that basis, we expected that the induced free will condition and the neutral control conditions would yield similar results. In contrast, if people mostly disbelieve in free will, the control condition should differ only from the pro–free will condition.

Method

Participants. Participants were 70 undergraduate students (30 female) who participated to fulfill a course requirement. Six participants expressed suspicion about the purpose of the study. Their data were excluded, leaving a total of 64 participants.

Procedure. Participants were run together in a large university classroom. They were asked to sit so that no two people were adjacent to one another. After giving informed consent, participants were given written and oral instructions for the sentence-reading procedure.

The free will belief manipulation was adapted from Vohs and Schooler (2008). Participants were given a packet containing 15 pages, with one sentence on each page. Participants were randomly assigned to read sentences in support of either free will or determinism or, in the neutral control condition, sentences that had no relevance to free will or determinism. After receiving their packets, participants were given written and recorded audio instructions explaining that they would be required to read the packet 1 page at a time. Participants were told that every time they heard a tone, they should move on to read the next page. Tones occurred once every minute, so that it took a total of 15 min to read the full set of sentences.

The determinism sentences included "Science has demonstrated that free will is an illusion"; "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." The free will sentences included "I demonstrate my free will every day when I make decisions," "I am able to override the genetic and environmental factors that sometimes influence my behavior," and "I have feelings of regret when I make bad decisions because I know that ultimately I am responsible for my actions." Neutral statements emphasized geography, scientific facts, and world events, such as "Oceans cover 71% of the earth's surface," "Alkaline power cells generally work longer than ordinary batteries," and "Pocket calculators became common items only after 1970."

Participants were randomly assigned to one of the three conditions (free will, determinism, or neutral control). After reading the sentences, participants completed the Brief Mood Introspection Scale (BMIS; Mayer & Gaschke, 1988).

Participants then read six hypothetical scenarios in which they had the opportunity to help others (e.g., giving money to a homeless person, allowing a fellow classmate to use one's cellular phone). Participants indicated the likelihood that they would help in that situation (based on how they would behave in each situation at the present moment) using a scale from 1 (*not at all likely*) to 9 (*very likely*). Responses to the six scenarios were averaged to form the dependent measure of helping. All participants were probed for suspicion using a funneled debriefing procedure (see Bargh & Chartrand, 2000) and given course credit.

Results

Likelihood of helping. ANOVA on the combined helpfulness index revealed significant variation among conditions, $F(2, 61) = 3.23$, $p < .05$. Pairwise comparisons indicated that participants in the determinism condition ($M = 5.33$, $SD = 1.52$) were less willing to help than were participants in the free will condition ($M = 6.27$, $SD = 1.19$), $F(1, 61) = 4.84$, $p = .03$, and less helpful than participants in the neutral control condition ($M = 6.23$, $SD = 1.28$), $F(1, 61) = 4.99$, $p < 0.03$. There was no difference between the neutral control and the free will conditions, $F < 1$, *ns.*

Mood and arousal. The effect of the manipulation did not appear to be attributable to mood or arousal (as assessed by the BMIS). ANOVA revealed no significant variation among conditions on mood valence, $F(2, 61) = 1.91$, *ns,* or arousal, $F(2, 61) = 1.94$, *ns.*

Validation Studies

To verify the manipulation's effectiveness and check on possible demand characteristics, we performed two separate validation studies. Participants in the first were 54 students in a psychology class. They underwent the free will feelings induction procedure (used in Experiments 1 and 3) and then rated several reactions on scales ranging from 1 (*agree*) to 7 (*disagree*). On the item, "I feel I am free to choose whatever I want to do in my life," ANOVA revealed significant variation among conditions, $F(2, 51) = 3.87$, $p < .05$, and planned comparisons confirmed that participants who had read the free will induction agreed with that more strongly than those who had read the determinism induction, $F(1, 51) = 6.36$, $p < .02$. Those who read the neutral control statements agreed with that statement more strongly than those who had read the determinism induction condition, $F(1, 51) = 4.22$, $p < .05$, but neutral control participants did not differ from participants in the free will induction condition, $F < 1$, *ns*. Thus, the manipulation did induce some differences in feelings of free will, and in particular it appears that the differences were due to reduction of such feelings by the determinism condition, whereas the free will condition appears to be similar to the way people normally feel.

Further results contradicted a demand characteristic explanation for the results of Experiments 1 (decreased helping) and 3 (increased aggression). There were no differences between conditions on the item "The person who wrote those statements probably would want me to be kind and helpful," $F(2, 51) = 1.32$, *ns*. Likewise, there were no differences on "The person who wrote those statements would probably want me to be mean and cruel," $F < 1$, *ns*. (This item was chosen to anticipate Experiment 3 and its aggression measure.) Apparently, the manipulations were not perceived as directly fostering expectations about either helpfulness or aggressiveness.

The second study was inspired by journal reviews of an earlier version of this manuscript. It sought to examine the effect of the manipulation on free will beliefs, perceived accountability, and feelings of agency. Participants were 53 students enrolled in an introductory psychology course who came individually into the lab. Participants underwent the same free will belief manipulation as in Experiment 3 that included free will and determinism conditions (from Experiment 1) but no neutral control condition. Participants then completed the same version of the Free Will and Determinism scale (FAD; Paulhus & Margesson, 1994) used in Study 2 and gave ratings from 1 (*agree*) to 7 (*disagree*) for several items related to feelings of accountability (e.g., "I am held accountable for my actions") and agency (e.g., "Right now, I feel active"; descriptors were taken from Campbell, Bosson, Goheen, Lakey, & Kernis, 2007). The agency items together had an alpha of .87, indicating that they hang together well. For the accountability items, the alpha was somewhat lower (.55) though acceptable, especially as a dependent variable. We report analyses both for the combined scales and for individual items.

FAD scores were coded such that higher numbers indicated greater belief in free will. ANOVA results showed that the free will condition exhibited higher FAD scores ($M = 55.22$, $SD = 5.75$) than the determinism condition ($M = 52.30$, $SD = 3.20$), $F(1, 52) = 5.15$, $p < .03$. Thus, the manipulation induced the predicted difference in free will beliefs such that those in the determinism condition showed lower endorsement of free will beliefs than those in the pro–free will condition.

Further analyses showed no effect of the manipulation on perceptions of accountability or feelings of agency. There were no differences between the conditions on the accountability items "I feel like I have to explain why I do things," "I am held accountable for my actions," or "I don't need to explain the reasons for my actions to anyone"; all Fs < 1, *ns*. There were also no differences between conditions in reports of feeling assertive, active, energetic, outspoken, dominant, or enthusiastic, all Fs < 2.31, ps > .135. Composite scores of the accountability items and of the agency items also yielded no differences between the two conditions, Fs < 1, *ns*. These data suggest that the manipulation affected participants' beliefs in free will but did not directly affect feelings of accountability or agency. They also speak against any idea that the disbelief manipulation induced feelings of learned helplessness.

Discussion

Prosocial tendencies (as indicated by willingness to help) were reduced among participants who were induced to believe in determinism and disbelieve in free will. They were less willing to help across an assortment of situations and opportunities, as compared to participants who were induced to believe in free will and as compared to a neutral control group.

We outlined three hypotheses about why the manipulation would have these effects on behavior and considered several alternative explanations. The effects appeared to be due to altered beliefs in free will versus deterministic inevitability. Mood reports ruled out mediation by emotional state, including both mood valence and arousal. The first validation study indicated that the manipulation was effective in altering belief in free will and determinism and did not convey demand characteristics about expected responses. The second validation study indicated that the manipulation did not alter

feelings of accountability and personal responsibility, nor did it bring about changes in conscious feelings of being active and wanting to exert agentic volition. Taken together, these results point toward the conclusion that disbelief in free will serves as a subtle prime that encourages people to respond automatically (here, by selfishly or lazily spurning the opportunity to help) rather than exerting self-control (possibly because exerting self-control is strenuous and depletes energy resources).

Promoting belief in free will had no effect in comparison to the (neutral) control condition. This suggests that promoting belief in free will does not change people away from their normal state and attitudes—unlike promoting disbelief in free will, which did cause a change. The implication is that most ordinary people believe in free will under normal circumstances. This pattern likewise speaks against the hypothesis that the free will induction specifically gives rise to a personal feeling of active energy or a desire to exert control.

EXPERIMENT 2

Experiment 2 instituted two important changes. First, it shifted to measurement of individual differences. Whereas Experiment 1 manipulated belief in determinism and free will, Experiment 2 measured how much participants chronically disbelieved free will. This was meant to provide converging evidence that manipulated and measured disbelief in free will would have similar effects on prosocial responses.

Second, Experiment 2 measured behavioral commitment to provide actual help rather than relying on self-reported willingness to help in hypothetical scenarios. It used the well-validated "Katie Banks" helping paradigm (Batson et al., 1997; Maner et al., 2002) in which participants can volunteer to help a college student whose parents were killed recently. Although some work has shown convergence between responses to scenarios and actual responses (Robinson & Clore, 2002), other work has shown some discrepancies between imagined helping responses and actual helping behavior (West & Brown, 1975). Because the present procedure involved making a commitment to provide actual help, it is considerably closer to actual behavior than mere hypothetical responses to imaginary scenarios. Based on the findings of Experiment 1, we predicted that higher levels of dispositional belief in free will would be lead to greater helpfulness.

Method

Participants. Participants were 52 undergraduates (31 women, 20 men, 1 not reported) who participated in exchange for partial course credit.

Materials and procedure. Participants arrived at the laboratory individually. They were told simply that the study was exploring the relationship between language comprehension and personality. Participants completed a short version of the FAD (Paulhus & Margesson, 1994) and the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The PANAS is a widely used, standard measure of emotional state.

The FAD is scale developed to assess individual differences in belief in free will and determinism. It has four dimensions, or subscales, as follows, with sample items. First, belief in fate reflects the inability of individuals to control their destiny (e.g., "What will be, will be—there's not much you can do about it" and "I believe that my future has already been pre-determined by fate"). Second, belief in scientific causation emphasizes both biological (e.g., "Your genes determine your future" and "People's biological makeup influences their talents and personality") and environmental (e.g., "Bad behavior is caused by bad life circumstances") causes of human behavior. Third, belief in randomness depicts human life as dependent on chance events (e.g., "Chance events seem to be the major cause of human history" and "No one can predict what will happen in this world"). Last, belief in free will specifically refers to people's ability to decide and control their own behavior and outcomes, with emphasis on personal responsibility for one's actions (e.g., "People have complete control over the decisions they make" and "Criminals are totally responsible for the bad things they do"). Responses to each item range from 1 to 5. Paulhus and Margesson (1994, 2008) report alphas for the most recent version of the subscales ranging from .84 to .61, and 2-month retest reliabilities ranging from .79 to .90. In the 16-item short version used in the present study, we found alpha of .55 (and .66 in other investigations with the same scale), which is close to the alpha of .65 for the full scale according to Paulhus and Margesson (2008). Retest reliability after delays varying at random from 6 to 10 weeks were found to be .76, indicating that these beliefs are fairly stable.

After completing the FAD and PANAS, the experimenter informed participants that they would listen to one of six possible radio broadcasts. Participants rolled a die, ostensibly to determine to which of the broadcasts they would listen to. This procedure was rigged so that all participants listened to the same radio interview that supposedly aired on the radio. During the interview, a woman named Katie Banks described how her parents had been killed in a car accident and how she was now solely responsible for the care of her siblings. Because of that responsibility, she said she would have to drop out of college and take a job unless she could find someone who could help her financially or with the care of her

siblings. After listening to the interview, participants completed measures tapping their cognitive and affective responses to the interview.

The experimenter then informed participants that the study was over. They received a bogus debriefing and received a credit slip for participating. Before leaving, the experimenter explained that the faculty supervisor for the study (Dr. Edmunds) had requested that all participants who heard the Katie Banks interview be given the opportunity to volunteer to help her. Participants were given letters from Dr. Edmunds and Katie that described how participants could volunteer their time helping Katie by performing a variety of tasks (e.g., stuffing envelopes). The experimenter gave participants a volunteer form on which participants indicated how many hours (0 to 9 or more) they were willing to help. After indicating how many hours they would help, participants were given a funneled debriefing to check for suspicion and were dismissed.

Results and Discussion

We predicted that chronic disbelief in free will would predict unhelpful behavior toward Katie Banks. Because the majority of participants (71%) did not volunteer any help, we analyzed the helping data as both a continuous measure (0-9 or more hours) and a dichotomous measure (0 = *did not volunteer to help,* 1 = *volunteered to help*). FAD responses were coded so that higher scores indicated greater disbelief in free will.

Belief in free will was positively associated with helping behavior. Results showed that disbelief in free will predicted a lower number of hours for which participants volunteered, $\beta = -.30$, $t = -2.24$, $p < .03$. Treating helping as a dichotomous measure yielded similar results. Disbelief in free will was associated with a lower tendency to volunteer any help at all, $B = -.15$, $SE = .07$, Wald = 4.95, $p < .03$. These findings suggest that chronic disbelief in free will relates to a lower likelihood of helping another person. These results thus converge with what Experiment 1 found.

Because emotion can play a role in helping behavior (e.g., Cialdini & Kenrick, 1976; Maner et al., 2002), we conducted further analyses to test possible emotion effects. Neither positive affect nor negative affect was associated with helping behavior, both *p*s > .26. When we controlled for positive affect and negative affect, the relationship between chronic disbelief in free will and helping remained significant when helping was treated as both a continuous measure, $\beta = -.37$, $t = -2.66$, $p = .01$, and a dichotomous measure, $B = -.20$, $SE = .08$, Wald = 6.41, $p = .01$. Thus, the link between chronic disbelief in free will and reduced helping behavior was not due to positive or negative affect.

EXPERIMENT 3

Experiment 3 tested the hypothesis that disbelief in free will would influence aggression toward a seemingly innocent target. Most aggression research measures retaliation for an insult, frustration, or other angry provocation, and aggressive behavior under those circumstances can be affected by perceived inappropriateness of the other's behavior. Aggression toward an innocent target is, however, generally perceived as totally inappropriate. To increase the likelihood of getting any aggression toward an innocent target, we sought (unsuccessfully, it turned out) to stimulate feelings of social exclusion and rejection among some participants, based on previous findings that rejected people become slightly more aggressive toward innocent bystanders (Twenge, Baumeister, Tice, & Stucke, 2001; see also Leary, Kowalski, Smith, & Phillips, 2003).

Experiments 1 and 2 found that state and trait beliefs in determinism were related to reduced helping behavior or tendencies, but those results could be taken to show that disbelief in free will makes people passive and lazy rather than indicating a reduction in prosocial behavior. The aggression measure in the current experiment provided an opportunity to rule out the influence of this confound. Aggression is an automatic and antisocial response (DeWall et al., 2007) that, if anything, requires more action than being nonaggressive. The idea that the free will manipulation makes people passive would lead to the prediction that it would make people less aggressive. In contrast, our hypothesis was that exerting control takes energy and that disbelief in free will makes people reluctant to expend their energy in acts of self-control. On that basis, we predicted that disbelief in free will would produce an increase in aggression.

The aggression measure was adapted from Lieberman, Solomon, Greenberg, and McGregor (1999) and consisted of giving a hot and spicy food stimulus to another participant who had expressed a severe dislike for such foods. Aggression is defined as providing aversive stimulation to someone who does not want it and is motivated to avoid it (Baron & Richardson, 1994), and the hot sauce procedure was explicitly designed to satisfy those requirements. The main prediction was that aggression would be highest among participants who had been induced to think a series of thoughts that emphasized a lack of free will.

Method

Participants. Participants were 56 undergraduates (45 female) who participated to fulfill a course requirement. Seven participants expressed suspicion about the social exclusion manipulation and/or the presence of

another person during the aggression measure. Their data were excluded, leaving a total of 49 participants in the final analysis.

Procedure. Participants arrived at the laboratory in single-sex groups of 4 to 6 people. After signing consent forms, participants received name tags on which they wrote their first names. They were then given both written and oral instructions to talk for 10 min using a set of printed questions as a guide (the questions were taken from the closeness induction task developed by Sedikides, Campbell, Reeder, & Elliot, 1999). After 10 min, the experimenter led the participants to individual rooms where they completed a demographic form and an additional page with the following instructions: "We are interested in forming groups in which the members like and respect each other. Below, please name the two people (out of those you met today) you would most like to work with." The experimenter collected these sheets and told the participants he would return with their group assignments.

Participants were assigned randomly to be either accepted or rejected by the other participants. The accepted participants were told, "I have good news for you—everyone chose to work with you." The rejected participants were told, "Unfortunately, no one chose to work with you." This procedure was adapted from Leary, Tambor, Terdal, and Downs (1995) and Nezlek, Kowalski, Leary, Blevins, and Holgate (1997). The experimenter then explained to all participants that the groups could not be worked out as usual, so they would be taking part in a taste preferences study with a new partner. It was explained that the new person was making up an experiment that required 2 participants. This person was always referred to as being the same sex as the participant. Participants then completed the BMIS mood measure and a taste preferences scale that assessed liking for foods of six types (salty, spicy, dry, sweet, sour, and creamy) on a scale from 1 (*extreme disliking*) to 21 (*extreme liking*).

The free will belief manipulation was the same as used in Experiment 1 (from Vohs & Schooler, 2008) except that we did not include a neutral belief control condition. Participants read through 15 sentences, 1 per minute, either asserting human freedom of action or deterministic inevitability.

The aggression measure was adapted from work by Lieberman et al. (1999). After completing the reading task, participants were asked to prepare some food samples for their partner. Participants were given a taste preferences form, which they were told had been filled out by their partner. In reality, all participants received an identical taste preferences form, which had been filled out to highlight the partner's strong dislike for spicy food. It rated all other food types in the moderate range (between 7 and 15 out of 21) but rated spicy foods at 3. For the first food sample, participants were given three crackers and a can of processed cheese. They were told to add cheese to the crackers as they saw fit. After creating this initial food sample, participants were given three tortilla chips and a jar of salsa. The salsa was ostensibly spicy, and the jar had the words "hot" printed on it in several places. Participants were told to add as much salsa as they wanted. Throughout the food preparation procedure, it was stressed that the partner would be required to eat all of the food on the plate. Food samples were measured both before and after they were given to the participants, and the difference provided the dependent measure of aggression (milligrams of salsa used).

After completing the study, participants were given a funneled debriefing to check for suspicion. It was also explained that the acceptance versus rejection feedback had been randomly assigned and that none of the participants actually worked together. Rejected participants were assured that some people had in fact chosen to work with them and that the feedback was not true. All participants were thanked, given course credit, and dismissed.

Results and Discussion

The main measure of aggression was the quantity of hot sauce given by the participant to the other person who had explicitly expressed a dislike for such tastes. Gender was included as a covariate in the analyses because there was a main effect such that males were more aggressive than females, $F(1, 48) = 7.38$, $p < .01$, although gender did not interact with the other variables, $F < 1$, *ns*.

ANCOVA revealed that participants who had read the deterministic sentences gave their partners more of the unwelcome hot sauce ($M = 17.8$ mg, $SD = 16.3$) compared to participants who read the sentences supporting free will ($M = 9.4$, $SD = 11.6$), $F(1, 48) = 6.95$, $p = .01$. Thus, inducing disbelief in free will led to more aggression as compared to inducing belief in free will. The findings confirmed that encouraging a deterministic disbelief in free will resulted in higher aggression than encouraging belief in free will.

One ambiguity with the hot sauce measure is that it could be interpreted as wanting to give the other person more food in total, in which case it could express a prosocial rather than an aggressive intent. If believing in determinism made people want to give the partner more food overall, this would presumably be reflected in giving the partner more cheese as well as more salsa.[1] Hence, we analyzed the amount of cheese allocated.

ANCOVA found no significant difference in cheese portions between the participants who had undergone the determinism induction, $F(1, 48) = 1.87$, *ns*. Thus, apparently the impact of the belief manipulation was specific to the aggressive (salsa) response.

The acceptance versus rejection manipulation did not contribute significantly to aggressive behavior, either as main effect, $F < 1$, *ns,* or in interaction with the free will manipulation, $F(1, 45) = 1.19$, *ns*. The failure to replicate previous work deserves comment. The delay between the rejection manipulation and the aggression measure may well have been a factor. Past laboratory studies finding a link between rejection and aggression have generally administered the aggression measure immediately after the rejection manipulation, whereas in the present study there was a delay of more than half an hour, indeed one filled with other impactful tasks. The importance of temporal proximity between rejection and aggression has been emphasized by Arnold, Homrok, Ortiz, and Stowe (1999). Blackhart, Eckel, and Tice (in press) have likewise shown that the subjective and physiological effects of this laboratory manipulation dissipate during the first half hour. It may also be that the hot sauce measure of aggression used here is less sensitive than the noise blast procedure used by Twenge et al. (2001; likewise the exclusively male sample of school shooters discussed by Leary et al., 2003) and therefore failed to register increased aggressiveness. Also, possibly the higher proportion of female participants in this study than in that previous study may have reduced the ability to detect small effects, insofar as females are less aggressive than males.

We measured mood with the BMIS after the rejection manipulation (but before the free will manipulation). As in much previous work, the rejection manipulation had no effect on either mood valence or mood arousal, both Fs < 1, *ns*.

GENERAL DISCUSSION

The present results support the view that belief in free will is a valuable support for prosocial behavior, as suggested by Vohs and Schooler (2008). Those researchers showed that disbelief in free will made people more willing to cheat on a test. Our findings extend this pattern into two major categories of prosocial and antisocial behavior. Specifically, we found that inducing people to disbelieve in free will led to an increase in aggression and a reduction in willingness to help. Individuals who were chronically high in disbelief in free will were also less likely to help another person in distress as compared to people who were dispositionally skeptical or rejecting of free will. All these results were found to be independent of mood and emotion.

Experiment 1 found that willingness to help was the same in a neutral control group as among participants who were induced to believe in free will. This presumably indicates that most participants generally have such a belief in free will already. Apparently, inducing disbelief is more a departure from the norm than inducing belief in free will.

The broader implication is that many people in Western culture share a belief in human freedom of action and that, moreover, human society benefits from such a belief. (Indeed, we suspect that most cultures will have found beliefs in free will to be socially beneficial and hence will tend to favor and promote those beliefs.) Volition and self-control require the person to expend energy, and these expenditures enable them to act prosocially. Apparently disbelief in free will subtly reduces people's willingness to expend that energy. Hence, disbelief in free will serves as a cue to act on impulse, a style of response that promotes selfish and impulsive actions such as aggressing and refusing to help. Some philosophical analyses may conclude that a fatalistic determinism is compatible with highly ethical behavior, but the present results suggest that many laypersons do not yet appreciate that possibility.

Of course, the present results have nothing to say about whether free will is an objective reality. All of our findings could be perfectly valid even if free will is a complete illusion. It would hardly be the only one. Our results do indicate, however, that belief in free will contributes to socially beneficial actions and outcomes. Indeed, if it is an illusion, those benefits may well explain why society continues to find it useful to promote it.

NOTE

1. To be sure, giving more cheese would not be unambiguously prosocial: One might provide more cheese simply to provide a bigger vehicle for forcing more salsa on the hapless partner.

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