

DEVELOPMENT AND VALIDATION OF A MEASURE OF FREE
WILL BELIEF AND ITS ALTERNATIVES

by

JASMINE MARIE CAREY

B.A., The Ohio State University, 2005

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS

in

THE FACULTY OF GRADUATE STUDIES
(Psychology)

THE UNIVERSITY OF BRITISH COLUMBIA
(Vancouver)

August 2009

© Jasmine Marie Carey, 2009

Abstract

Although the concept has been debated for centuries by philosophers, little is known about lay beliefs concerning free will and its alternatives. We describe the development of FAD-Plus, a 26-item measure of lay beliefs in free will and three closely-related alternatives: scientific determinism, fatalistic determinism, and randomness. Previous measures included only a subset of these variables and/or tended to assume an a priori pattern of relations among these beliefs. Our exploratory factor analyses suggested relatively independent factors; a confirmatory analysis sustained this relative independence. Each of the four subscales (Free Will, Scientific Determinism, Fatalistic determinism, and Randomness) showed acceptable internal consistencies. In addition to establishing the psychometric properties of the FAD-Plus, our two studies suggest that (a) lay beliefs in free will and determinism are relatively independent, (b) believing in free will is distinct from having an internal locus of control, and (c) scientific determinism must be distinguished from fatalistic determinism. Study 1 (N=222) confirmed that beliefs in free will and determinism are unrelated, that is, quite compatible among non-philosophers. In general, free will belief was associated with traditional attitudes such as religiosity and belief in a just world. Controlling for religiosity eliminated associations with conservatism and authoritarianism. In Study 2 (N=161), free will belief showed only a modest correlation ($r = +.35$) with internal locus of control. In both studies, IQ scores were negatively related to belief in fatalistic determinism. Free will belief was also associated with assignment of more severe punishment. Together, our two studies confirm the notion that lay respondents have no trouble believing in both free will and determinism. Our studies also suggest that the negative effects previously associated with determinism are actually due to its overlap with belief in

fatalistic determinism. We conclude that individuals with strong beliefs in free will are morally critical of others as well as themselves.

Table of Contents

Abstract	ii
Table of Contents	iv
List of Tables	v
List of Figures	vi
Acknowledgements	vii
Introduction	1
The FAD-Plus	1
Exploring Lay Beliefs	4
Methods	7
Study 1	7
Study 2	9
Psychometrics	14
Study 1	14
Study 2	15
Construct Validation and The Structure of Lay Beliefs	18
Study 1	18
Study 2	21
General Discussion	28
Development of the FAD-Plus	28
Exploring Lay Beliefs	30
Future Directions	34
References	45
Appendix A	51

List of Tables

Table 1. Exploratory factor analysis.....	36
Table 2. Means and reliabilities of the finalized FAD-Plus subscales.	37
Table 3. Intercorrelations among the finalized FAD-Plus subscales.	38
Table 4. Study 1 correlations of the FAD subscales with political attitudes and IQ.	39
Table 5. Correlations of the FAD-Plus subscales with the Big Five factors.	40
Table 6. Correlations between the FAD-Plus and Perceived Control.	41
Table 7. Correlations between the FAD-Plus and moral foundations.	42
Table 8. Punishment experiment results.	43

List of Figures

Figure 1. Final CFA Model with parameter estimates.	44
--	----

Acknowledgements

I would like to thank my advisor, Dr. Del Paulhus, for trusting me to take the lead on this project; as well as the previous members of the lab, Adam Margesson and Bryce Westlake, who worked on earlier versions of the FAD. I would like to thank my committee, Dr. Ara Norenzayan and Dr. Mark Schaller, for their interesting and insightful comments. Your fresh philosophical perspectives were very helpful. I am also grateful to Dr. Kathleen Vohs and Azim Shariff for their suggestions and ideas while conducting this research.

I would also like to thank my family and friends for their support and encouragement. And a special thanks to Dr. Ronnie Pavlov and Dr. Craig Nathanson for their advice and proofreading skills.

Introduction

The FAD-Plus

The concept of free will has inspired a new wave of theoretical commentary (e.g. Baer et al., 2008; Baumeister & Sommer, 1997) as well as empirical research (Baumeister, Masicampo, & DeWal, 2009; Nichols, 2006; Vohs & Schooler, 2008; Wegner, 2007). Interest from empirical quarters has intensified the need for reliable measures of individual differences in beliefs regarding free will and related concepts such as determinism and randomness. Unfortunately, the extant measures have (at least) one of two deficits: (1) they tap only a subset of the related variables or (2) they rely on *a priori* assumptions regarding relations among these beliefs -- for example, that free will and determinism are incompatible.

In one early effort, Viney, Waldman, and Barchilon (1982) developed a scale based directly on the philosophical debate over free will vs. determinism. Administration of the instrument required a preparatory lecture to clarify the concepts to the respondents. The lecture implied that free will and determinism are mutually exclusive and all seven items in the scale assumed bipolarity. Even with the preparatory lecture, typical college students had difficulty understanding the items. As a result, the reliability of the 7-item scale was satisfactory only in samples of philosophy students. Such concerns led Nichols (2006) to discourage use of the Viney instrument.

To better capture the complexity of the relationship between free will and determinism, Stroessner and Green (1990) included multiple facets in their scale. Attitudes toward free will were measured separately from two forms of determinism: psychosocial and religious-philosophical determinism. The subscales were derived from orthogonal factors and totaled separately. Because the correlations among the subscales were not provided, it is not clear what

the final associations among the three measures were.

Two other measures have recently appeared in the literature. Rather than target free will directly, Keller (2004) developed an 18-item measure of genetic determinism. Another recent measure, FWD, was developed by Rakos, Laurene, Skala, and Slane (2008). It returns to the earlier conception of Free Will and Determinism as opposites, thereby re-confounding the concepts isolated by Stroessner and Green (1990).

Preliminary version: The FAD-4

The combination of burgeoning interest in the topic and the inadequacy of extant measures motivated us to develop a 4-factor instrument. A preliminary version labeled FAD-4 has been available for a number of years (Paulhus & Margesson, 1994). It included seven Likert-style items per subscale.

Beliefs in free will have always been contrasted with alternative views of human agency (for a review, see Baer et al., 2008). Based on our survey of the literature, the key alternatives are scientific determinism, fatalistic determinism, and randomness. Unfortunately, all of the previous instruments reviewed above omitted, confounded, or mislabeled one or more of these key constructs.

Unlike some previous instruments, the FAD-4 items were written in straightforward language and avoided philosophical jargon. Items on the Free Will subscale focused on (1) responsibility for actions and (2) complete control of one's own actions/results. Items on the Scientific Determinism subscale tapped beliefs about the scientific causes of human behavior. They included both biological and environmental causes. Items on the Fatalistic Determinism subscale concerned how unknown forces control behavior/outcomes. The key notion was that the future is inevitable. Finally, items on the Randomness subscale disputed predictability,

focusing on the idea that people have no genuine control over behavior and outcomes because life events are random.

Applications

Although it was never published, the preliminary version of the FAD has proved useful in a number of published studies. Vohs and Schooler (2008), for example, showed that scores on the Free Will subscale could be lowered by a subtle experimental induction. This reduction on Free Will scores was associated with a willingness to cheat for financial gain. Baumeister et al. (2009) showed a similar promotion of antisocial behavior (aggression) when Free Will beliefs were undermined with an experimental induction. In addition, scores on the Free Will scale predicted a behavioral indicator of altruism. In short, the FAD-4 has already shown its utility as both a trait and state measure.

The Present Report

Despite some recent success, the FAD-4 is not without weaknesses (Paulhus & Margesson, 1994). Subscales reliabilities sometimes slip below .60 and several items exhibit double loadings. In this report, we describe our refinement of the original FAD-4 items and the finalization of the current version; the FAD-Plus.

As with previous instruments, we ran into psychometric problems in attempting to include reversals for each subscale. Although the inclusion of reversals is considered necessary by some researchers, others point out the drawbacks (Holden & Jackson, 1988; Paulhus & Vazire, 2008). In measuring free will and its alternatives, it is inevitable that reversals for one subscale would overlap with one or more of the other subscales. To avoid this problem, we decided to include only positively keyed items in the new version of the FAD.¹

In the two studies reported here, we modified the FAD-4 items in several ways. First, we

¹ Below we point out and address potential problems ensuing from acquiescent responding.

replaced the reversals (con-trait items) in the FAD-4 dataset with pro-trait items. We also eliminated pro-trait items that implied more than one construct. Study 1 provides an exploratory factor analysis which is followed up in Study 2 with a confirmatory factor analysis.

Exploring Lay Beliefs

For centuries, philosophers have debated whether or not human beings have free will. Only recently, however, have psychologists taken up the challenge with empirical methods. Rather than attempting to determine its existence, psychologists have tackled more practicable issues such as the effects of believing in free will (e.g., Baumeister, Masicampo, & DeWall, 2009; Vohs & Schooler, 2008). In the present paper, we address several basic issues regarding individual differences in beliefs about free will and its alternatives, notably, determinism.

Definitions. Philosophical discussion of issues regarding the concepts of free will and determinism hinges on rigorous definitions. Unfortunately, the diversity and complexity of definitions are less than helpful in the context of our empirical goals. More relevant for our goal of studying lay beliefs are simple everyday definitions.

For our limited purposes, we define *free will* as the ability to select and act on one's choices independent of external forces. We define *determinism* as the notion that the future is completely predictable from the past. Even with agreement on such definitions, there are a number of possible viewpoints regarding their relationship.

Incompatible? One classic position on the issue is labeled *Incompatibilism*. Arguing that the logic of determinism precludes free will, incompatibilists on the side of determinism are called "hard determinists". Adherents include the philosopher, Immanuel Kant, and social scientists such as Richard Dawkins, Daniel Wegner (2002), and John Bargh (2008).

Many scientists feel compelled to be hard determinists because they believe that

determinism and scientific causation are synonymous. Assuming that believing in a fully causal universe is a necessary condition for conducting scientific research, they must reject free will (Mele, 2008).

In opposition are the *Compatibilists*. They see nothing about determinism that precludes free will, and vice versa. Many classic philosophers were compatibilists, including Thomas Hobbes and William James. More recent compatibilists are Alfred Mele (2008) and Daniel Dennet (2008). One version asserts that all free will requires is the ability to make a reasoned choice about one's actions. As opposed to the Libertarian view of free action as uncaused, compatibilists define free action as being uncoerced. This view leaves room for determinism because having a direct cause for an action no longer means that it isn't freely chosen. In contemporary psychology, Albert Bandura (2008) and Roy Baumeister (2008) hold this view of free will.

Current Research

Debates over the existence of free will are sure to continue. We do not take a position on that hoary problem. Instead, we turn to questions more amenable to psychological research. In particular, we seek to clarify what average people believe: Are they compatibilists or incompatibilists? Does it matter what they believe?

Using empirical methods, one can investigate the impact of beliefs about free will on attitudes, moral judgments, and behavior. The recent studies mentioned earlier have suggested that free will belief is adaptive in promoting altruism and reducing cheating and aggression (Baumeister et al., 2009; Vohs & Schooler, 2008). The present paper continues that exploration with an emphasis on individual differences. We attempt to more closely examine the link between individual belief in free will and morality.

Old wine in new bottles? Although the empirical research on free will is limited, there is an abundance of research on locus of control (Rotter, 1966). Individuals vary in their belief that control over human behavior resides within individuals or outside of them in forces such as powerful others and chance (Levenson, 1973). We tackle that issue of discriminant validity by comparing the FAD-Plus to a standard measure of perceived control.

Individual Differences. We also consider the alternative that those believing in free will are uneducated or unsophisticated, possibly because of low intelligence. Inclusion of an IQ test in our research will help determine if any of these beliefs – free will, determinism, or randomness – can be explained by low intelligence. We also included measures of basic personality dimensions to evaluate possible temperamental substrates for philosophical beliefs.

In the present paper, we use the FAD-Plus to investigate whether lay beliefs are incompatible (i.e., negatively correlated) or compatible (i.e., uncorrelated). We also investigate whether believing in free will is distinct from having an internal locus of control. Finally, we compare the correlates of scientific and fatalistic versions of determinism. Our key predictions concern the correlates of free will beliefs. In some cases, we also make predictions regarding the three alternatives.

To anticipate, our two studies suggest that (a) lay beliefs in free will and determinism are relatively independent, (b) believing in free will is distinct from having an internal locus of control, and (c) scientific determinism must be distinguished from fatalistic determinism.

Methods

Study 1

Sample

Respondents were 257 undergraduate students who participated to receive extra credits in introductory psychology courses: 60% were female and the mean age was 20.6. Because results were similar for male and female participants, we pooled the genders in all of our analyses. To avoid the possibility of generating artifactual ethnic factors, we only included respondents of European heritage.

Procedure

The data were collected as part of an online survey. Participants logged on to the web site and completed 30 minutes worth of questionnaires at their leisure. Because participants made up their own identification code, their responses could not be linked to their name or student I.D. number. In sum, the subject pool system was organized to maximize confidentiality.

Measures

FAD-Plus. The 23 pro-trait items from the FAD-4 were presented in 5-point Likert format. We chose to use only the pro-trait items from this earlier version due to the double loading of the reversals.

Religiosity. We included a single item measure of religiosity ("How religious are you?"). Conceptually, its relation with free will is ambiguous. Certainly, the existence of free will is an essential tenet of Christian theology. However, another important tenet of Christianity is God's omnipotence. Because we measured free will belief and determinism separately, we were able to predict that we would find positive correlations between religiosity and both free will and some form of determinism.

Conservatism. Participants were given a single-item measure of conservatism, rating themselves on a scale from "Very Conservative" to "Very Liberal." The relation between political affiliation and belief in free will could also be complex. On one hand, conservative values stress self-control and taking responsibility for one's actions (Weiner, 1993). By contrast, liberals tend to see people (including criminals) as victims of the system (Jost, 2003). This argument suggests that free will belief should be associated with conservatism, and deterministic beliefs, with liberalism.

At odds with this prediction is the finding that genetic determinism is associated with a conservative ideology (Keller, 2005). We attribute that finding to a confounding of fatalistic with scientific determinism in Keller's measure. The former is linked to a pattern of traditionalist attitudes whereas the latter should be more progressive. The FAD-Plus measure of scientific determinism, however, includes belief in environmental as well as genetic determinism. This balanced combination should nullify associations with social attitudes.

Belief in a just world. Belief in a just world (Lerner, 1980) is the tendency (for at least some individuals) to believe that people deserve the things that happen to them. This belief appears to entail a concomitant belief in free will so that people can freely choose their actions and be held responsible. We used Lerner's 12-item individual difference measure: Six-item subscales tap belief in a just world for the self (JWB-self, $\alpha = .84$) and for others (JWB-others, $\alpha = .90$).

This measure was included to address the concern that belief in determinism instead of free will is merely an excuse for misbehavior (e.g., Vohs & Schooler, 2008). If so, then (a) low scores on JWB-self should represent excusing one's own behavior and (b) low scores on JWB-others should represent excusing other people's misbehavior. Following Baumeister's (2008)

self-regulation interpretation, free will belief should correlate positively with both subscales.

Right wing authoritarianism. Obedience to authority is a defining element of conservative ideology (Altemeyer, 1998). If free will is related to political conservatism, it should also correlate with Right Wing Authoritarianism (RWA). Participants were given a short (15-item) measure of RWA (Zakrisson, 2005), which had good reliability in this sample, $\alpha = .83$.

Intelligence. Finally, participants completed a vocabulary test designed to measure verbal IQ (UBC Word; Nathanson & Paulhus, 2007). Each item provided a stem word and four possible synonyms. Instructions were to select as many correct options as possible in eight minutes and then submit their answers. This measure was very reliable with an alpha of .88.

Although previous research is limited a number of reasonable predictions are possible. It stands to reason that those with higher IQ should better understand the complexities of science. Hence they are most likely to agree with the Scientific Determinism items (e.g., Scientists have shown that ...). Also, critics may allege that those who believe in free will are incapable of understanding the complexities of science. If so, free will belief should correlate negatively with intelligence. However, that claim is based at least partly on the (possibly false) assumption that those who believe in free will do not believe in scientific determinism. Fatalistic determinism has a more resigned flavor, hinting of failure and incompetence. Together, these arguments lead us to predict that correlations with IQ will be positive for Scientific Determinism, negative for Fatalistic Determinism, and null for Free Will.

Study 2

Sample

Participants were 177 undergraduate students who again received extra credits in introductory psychology courses: 65% were female and the mean age was 20.2. As in Study 1

we pooled male and female participants and only used those of European heritage.

Procedure

The data were collected using the same online procedure as in Study 1.

Measures

The FAD-Plus. Two alterations were made to the 23 item set from Study 1. First, in line with our critique of previous measures, we reworded several items to remove any hint of bipolarity. Second, we added three items (all worded in the pro-trait direction) to help replenish the con-trait items removed from the original FAD-4. Additional items were intended to help improve the subscale reliabilities.

Big five inventory. To explore the relationship between personality and philosophical beliefs we included a measure of the Big Five personality traits. Participants completed the Big Five Inventory (BFI, John & Srivastana, 1999). Because this was primarily an exploratory investigation, we made no predictions regarding which traits would relate to the FAD beliefs. Reliabilities of the five factors ranged from .81 to .87.

Intelligence. To replicate and extend the intelligence findings from Study 1, we administered the UBC Word test (Nathanson & Paulhus, 2007) to all participants. Because many respondents took more than the allotted eight minutes in Study 1, a salient timer was added to the survey page in Study 2. With a more prominent timing indicator, we hoped to achieve an even more accurate evaluation of IQ. Reliability was very similar to that found in Study 1 ($\alpha = .89$).

Locus of control. It is easy to confuse notions of free will and determinism with internal or external locus of control. Therefore it is important (in lay samples, especially) to establish that they are not redundant concepts. To measure internal vs. external control we used the Multidimensional Locus of Control scale (MLOC; Levenson, 1973). The MLOC separates

external control into control by chance and powerful others. The subscale reliabilities were; .67 for internal control, .77 for control by chance, and .83 for powerful others. Free will was expected to correlate with internal control, whereas deterministic beliefs should correlate with the both types of external control.

Moral foundations. To clarify the associations between free will belief, conservatism, and morality, we used the Moral Foundations Questionnaire (MFQ; Graham, Haidt, & Nosek, 2009). The MFQ measures domains of moral concern that distinguish between conservatives and liberals. Liberals endorse the Harm/care and Fairness/reciprocity foundations more highly than the three others. These two foundations are labelled *individuating*, due to their focus on the rights of the individual. Conservatives endorse all five foundations equally, including Ingroup/loyalty, Authority/respect, and Purity/sanctity. These are the *binding* foundations because they emphasize the importance of maintaining the group. Alpha reliabilities for the subscales were somewhat low, ranging from .53 to .72. We anticipate that our analyses will give a more detailed picture of how free will and determinism beliefs relate to these two types of morality.

Associations with Punitiveness

To continue our investigation of the moral correlates of free will and determinism we investigated their tendencies toward punitiveness, that is, assignment of punishment to criminals. Assignment of moral responsibility is one of the major implications of belief in either free will or determinism. The justice argument is that without belief in free will (a) there can be no sense of moral responsibility and (b) people can no longer be punished for bad behavior. Under the consequentialist argument (i.e. punishment is intended to protect society or rehabilitate the criminal), punishment can still be implement without the need for moral responsibility (Greene & Cohen, 2004). A society based on the latter view would have no need for punishment as

retribution, but would still apply it to minimize harm to society.

To test the interplay of people's different beliefs, we designed two criminal scenarios to separate the types of judgments that should be affected by either determinism or free will. Given our findings that people are capable of believing in both free will and determinism, we cannot be totally confident in our predictions.

Method. The design required collecting reactions to two criminal scenarios. In the first, subjects were presented with a description of a child molester who had already been convicted. They were then asked to assign a prison sentence from two years to life. They were also asked to rate how blameworthy the defendant was on a 7 point scale from "Not at all blameworthy" to "Completely blameworthy". After giving their ratings, they were told that before the sentencing new evidence had been found that the defendant was abused as a child and has several psychiatric disorders. They were then asked to redo their ratings. This time, the possible prison sentences included an option for no prison time, just psychiatric treatment. We predicted that belief in free will should positively correlate with assigned prison sentence and blame in the first set of ratings and that belief in determinism (either fatalistic determinism or scientific determinism) would be negatively correlated with sentencing and blame in the second set of ratings.

Second was a scenario where retributive punishment was controlled for consequentialist punishment. Subjects were given a description of a rapist who has also already been found guilty. They were then told about the use of chemical castration to prevent rapists from repeating their offence and that the threat of punishment does not deter rapists, thereby taking away any consequentialist reason for putting the defendant in prison. Subjects were then given the same prison and blame questions as in scenario one. Our prediction was that those who are high on

free will belief would give a higher prison sentence because retribution would be the only reason to punish the defendant.

Psychometrics

Study 1

Analyses

The exploratory factor analysis (EFA) was applied to the 23-item FAD-4 set using maximum likelihood extraction with oblimin rotation. An oblique rotation was chosen to allow for the possibility of correlated factors. To retain items, we used a cut-off of at least a .35 loading.

Factors

Results are presented in Table 1. The first seven eigenvalues were 5.0, 4.1, 4.0, 4.0, 1.5, 1.1, .91. Although two other factors were slightly above 1.0, the elbow between four and five suggested that four factors would be selected. That decision was supported by the fact that (as can be seen in Table 1), the factors were easily interpreted (Lee & Ashton, 2007).

The first factor was dominated by items related to beliefs in fatalistic determinism: For example, the highest loading item was “Fate determines future events.” The second factor was dominated by items related to free will. For example, “People have complete control over the decisions they make.” The third factor captures items related to randomness and chance, for example, “Life is random.” Finally, the fourth factor includes items related to genetic determinism (e.g., “Biology determines personality.”) as well as environmental determinism (e.g., “Environment causes personality.”).

The extracted factors were relatively orthogonal, with intercorrelations ranging from $-.19$ to $+.08$. Of course, subscales derived from orthogonal factors do not necessarily sustain the same low intercorrelations.

Subscales

Four subscales were assembled using the means of the highest loading items on each factor. As with the factor correlations, the subscale associations are relatively small: The only significant value was the correlation of Fatalistic Determinism with Randomness ($r = .14$, $p < .05$, two-tailed).

Summary

Overall, the results of Study 1 appear to provide support for the distinctiveness of four conceptual factors related to free will. Rather than rest our conclusions entirely on exploratory analyses, we proceeded in Study 2 to apply a confirmatory procedure. At the same time, we took the opportunity to improve the item set.

Study 2

Analyses

The hypothesized structure for our initial model was based on the results of Study 1, that is relative orthogonality with the exception of Fatalistic Determinism and Randomness. Accordingly, we allowed no cross-loadings and only allowed Fatalistic Determinism and Randomness to covary: In other words, the model incorporated estimations of 26 loadings, one covariance, and four factor variances. The raw data were analyzed using maximum likelihood extraction. Analyses were conducted with the well-recognized statistical software known as EQS (Bentler, 2004).

A total of 13 subjects had missing data. After verifying that they were missing at random (a different pattern of missing data for each subject), we used Maximum Likelihood missing data handling to estimate the missing values (Savalei & Bentler, 2005). As a result, we were able to include all 177 subjects. The raw data had a normalized kurtosis estimate of $Z = 5.84$:

Accordingly, all fit statistics and standard errors reported here are the robust estimates as is recommended to correct for non-normal data (Bentler, 2004).

Although rejected by the chi-squared index ($\chi^2(298) = 388.74, p < .01$), the initial model did fit according to the RMSEA index (RMSEA = .04, 95% CI .03 - .05). Note that the χ^2 fit index is widely acknowledged to be too stringent (Bentler, 2005; Hoyle, 2007), especially for personality data (Church & Burke, 1990; Raykov, 1998). Nonetheless, we were curious about the source of the misfit. LM test results were used to determine which parameter constraints could be released to improve the fit of the χ^2 . We freed the top six suggested parameters, which were all error covariances. With the added error covariances the model now fit by both the scaled χ^2 and RMSEA ($S\chi^2(292) = 326.58, p = .08$; RMSEA = .03, 95% CI .00 - .04). An examination of these item pairs confirmed that they had a common topic or common wording. The final model with parameter estimates can be found in Figure 1.

Subscales

The means for the subscales were computed according to the key in Appendix A. Means, standard deviations and reliabilities are presented in Table 2. Note that belief in Free Will received the highest ratings (supporting Rakos, 2008). The intercorrelations are provided in Table 3. They continue to be relatively small. Note that, as in Study 1, the highest correlation is between Fatalistic Determinism and Randomness ($r = .19, p < .05$). We conjecture that these two beliefs have something in common, namely, they are external, unpredictable and unknowable. One possibility is that both beliefs are motivated by a need for mystery (see Carey & Paulhus, 2008).

Acquiescence

Given our choice to avoid reversals, however, we had to consider the possibility that the intercorrelations were inflated (made more positive) by individual differences in acquiescence. If so, some of the true construct correlations may actually be negative. This confounding with acquiescence should not be a problem in most analyses with the FAD subscales, because the appropriate analysis would involve pitting them against one another in a regression equation. Thus, common acquiescent responding will be controlled.

Nonetheless, we were concerned that the intercorrelations might unduly influence our conceptual conclusions. Following Wood et al. (2007), we created an acquiescence score by summing the BFI items (without recoding reversals). This acquiescence measure was partialled from the correlations in Table 3. Along with the raw values, the partial correlations are included in parentheses. It is clear that the pattern of correlations shows little change when acquiescence was controlled.

Summary

Our exploratory factor analysis in Study 1 yielded four relatively independent factors. A confirmatory factor analysis in Study 2 sustained this relative independence. The final versions of the four subscales (Free Will, Determinism, Fatalistic determinism, and Randomness) showed acceptable internal consistencies. The final set of items is presented in Appendix A, in a format appropriate for administration.

Construct Validation and the Structure of Lay Beliefs

Study 1

In addition to collecting data for our exploratory factor analysis, we collected data on a number of individual difference variable. Specifically, we included measures of; religiosity, conservatism, authoritarianism, belief in a just world, and IQ.

Results

Results from Study 1 are presented in Table 4. Unless otherwise specified, all significance tests are 2-tailed.

Religiosity. Our single item measure of religiosity correlated with both the Free Will ($r = .35, p < .001$) and Fatalistic determinism ($r = .32, p < .001$) subscales. We also found that scientific based determinism was negatively correlated with religiosity ($r = -.14, p < .05$).

Conservatism. Initially we found a positive correlation between conservatism and Free Will ($r = .22, p < .001$). However, conservatism correlated highly with religiosity in this sample ($r = .35, p < .001$). The relationship between conservatism and religiosity entirely mediated the relationship between conservatism and Free Will ($\beta = .11, n.s.$). We also found no relationship between political affiliation and any form of determinism.

Just world belief. We found that only belief in fatalistic determinism negatively correlated with belief in a just world and only in reference to the self ($r = -.27, p < .001$). Belief in randomness had a small negative correlation with belief in a just world for others, but it did not reach a significance level of $\alpha = .05$ ($r = -.12, p = .08$). Free will belief correlated positively for others ($r = .28, p < .28$). A regression controlling for religiosity (which correlated negatively with belief in a just world for the self; $r = -.14, p < .05$) also showed a positive relationship between Free Will and just world belief for the self ($\beta = .16, p < .05$). Surprisingly,

the Determinism subscale also correlated positively with belief in a just world for others ($r = .15$, $p < .05$).

Right wing authoritarianism. Initial correlations indicated a positive relationship between RWA and both the Free Will and Fatalistic determinism subscales ($r = .30$, $p < .001$ and $r = .37$, $p < .001$; respectively). The high correlation between religiosity and RWA ($r = .54$, $p < .001$), suggested that a partial regression controlling for religiosity would be a better measure of their relationship. Once we controlled for religiosity, free will was no longer related to RWA ($\beta = .11$, NS), however fatalistic determinism was still significantly related ($\beta = .19$, $p < .05$).

Intelligence. Based on responses to the UBC Word test, IQ was scored the number of correct answers. Note from Table 4, that IQ correlated significantly and negatively with Fatalistic Determinism ($r = -.22$, $p < .001$) but was uncorrelated with Free Will and Scientific Determinism.

Discussion

Religiosity. As hypothesized, religiosity correlated positively with belief in free will. This belief is part of the canon in Christianity, which ties it directly to moral responsibility (Myers, 2008). Because we wanted to investigate the correlates of free will that extend beyond religious dogma, we partialled religiousness out of further correlations with the Free Will scale (see below).

Interestingly, religiosity was also correlated positively with fatalistic determinism. Apparently, the type of determinism associated with religious belief is one of inevitability. This is not to say that religion necessitates fatalism, but the deterministic elements of religion (i.e., God's plan) have a fatalistic flavor. A future that is in God's hands is no less beyond human control than fate.

The positive correlation of religion with both Free Will and Fatalistic Determinism subscales indicates that religious individuals do not see these seemingly contradictory beliefs as irreconcilable. Such complexities highlight the importance of measuring determinism separately from free will.

Conservatism. Independent of religiousness, free will was not associated with conservatism. Nor did scientific determinism correlate with conservatism -- despite previous findings with Keller's (2005) measure of belief in genetic determinism. The explanation, we believe, derives from the fact that both environmental and genetic determinism items are included on the Scientific Determinism subscale: As a result, there is a net cancelation of the conservative bias of genetic determinism with the liberal bias of environmental determinism.

The results with belief in a just world and RWA provide a more detailed picture of how these variables relate to conservatism. The responsibility of free will is necessary for belief in a just world and this argument holds for the self as well as for others. Belief in fatalistic determinism provides an exemption from responsibility, but that excuse only applies to the self. The positive correlation with scientific determinism suggests that people see scientific causes as a reason to be punished, not an excuse.

The association of RWA with fatalistic determinism suggests that the latter entails submitting to an omnipotent authority (e.g., God). It also explains why fatalistic determinism has no overall correlation with conservatism: It is negatively correlated with some aspects of conservatism and positively correlated with others. This argument also explains the lack of association between free will and conservatism. The only aspects of conservatism related to free will are mediated by religiosity.

Intelligence. Consistent with our prediction, free will belief was uncorrelated with IQ

scores. Contrary to our prediction, neither was scientific determinism.

However, Fatalistic Determinism was negatively related to intelligence. One possible explanation is that people endowed with less intelligence respond with learned helplessness: That is, they cope by attributing their failures to fatalistic inevitability. Another possibility is that they may have difficulty following the complexities of deterministic arguments and prefer the simplicity of fatalistic determinism as the explanation.

Study 2

In Study 1, we established links of the FAD-Plus subscales with key individual differences. The just world belief results suggested that we needed to further explore the implications for morality. The intelligence results called for an explanation of why fatalistic determinism predicts lower intelligence.

We also remain concerned that our pattern of findings could be a repackaging of the well established locus of control literature. After all, laypersons tend to think in terms of internal and external causes rather than the deeper philosophical issues. As a result, in Study 2, we used the Levenson (1973) measures of Internal Control, Powerful Others and Chance to evaluate the overlap with the FAD subscales. If they overlap, then our Free Will subscale should correlate with Levenson's Internal Control; Fatalistic Determinism should correlate with Levenson's Powerful Others; and Randomness should correlate with Levenson's Chance subscale. Confirmation of discriminant validity with respect to locus of control would help to justify the need for the FAD-Plus as a valuable instrument.

We also consider it important to explore correlates of the FAD subscales with basic personality dimensions. After all, there is already evidence for temperamental substrates for social beliefs (Tesser, 1993). Given the current consensus that the Big Five traits capture the

major dimensions of personality space (Saucier & Goldberg, 1996), addition of a standard instrument to our battery of measures would be useful.

Results

Big five. Table 5 contains the correlations between the Big Five traits and the FAD-Plus subscales. Belief in free will correlates with Extraversion ($r = .20, p < .01$) and Agreeableness ($r = .17, p < .05$). Belief in fatalistic determinism correlated positively with Agreeableness ($r = .19, p < .05$), but negatively with Emotional Stability ($r = -.22, p < .01$). Unlike with social attitudes (Saucier, 2005), Openness to Experience was of little importance.

Intelligence and test taking behavior. We found no correlation between Fatalistic Determinism and total number of correct answers on the UBC Word test. However, those same individuals also attempted more questions ($r = .30, p < .001$). As a result, performance operationalized as the proportion of correct answers did correlate negatively with belief in fatalistic determinism ($r = -.24, p < .005$).

Locus of control. The correlations of the FAD-Plus subscales with the subscales of Levenson's Multidimensional Locus of Control scale (MLOC, 1973) are presented in Table 6. As predicted, free will belief correlated moderately with an internal locus of control ($r = .35, p < .001$) but not with either type of external control.

As expected, the Chance subscale of the MLOC was correlated with belief in randomness ($r = .20, p < .01$) but even more highly correlated with belief in fatalistic determinism ($r = .50, p < .001$), difference $Z = 2.2, p < .01$. Fatalistic Determinism was also correlated with belief in control by powerful others ($r = .27, p < .01$) and negatively correlated with internal control ($r = -.19, p < .01$). In short, Fatalistic Determinism showed a complete pattern of external control.

To control for their overlap, we then controlled for Fatalistic Determinism when

examining correlations with Scientific Determinism. As a result, Scientific Determinism was positively related to internal control ($\beta = .16, p < .05$). Scientific Determinism was also seen as external (correlated with powerful others, $r = .28, p < .001$). In short, Scientific Determinism is associated with both internal and external sources of control. However, it was no longer related to chance ($\beta = .11, p = .11$).

Moral foundations questionnaire. The correlations among the FAD-Plus and MFQ subscales are presented in Table 7. Free will belief was related to all three binding moral foundations, even when controlling for religiosity² (Ingroup $\beta = .23, p < .005$; Authority $\beta = .25, p < .001$; Purity $\beta = .14, p < .05$). Scientific Determinism correlated with both Ingroup ($r = .16, p < .05$) and Authority ($r = .22, p < .005$). As with locus of control, we controlled for belief in fatalistic determinism. The regression coefficients indicated that there was no unique relationship between scientific determinism and in-group loyalty ($\beta = .14, n.s.$). The association with obedience to authority was small, but still significant ($\beta = .14, p < .05$).

Fatalistic determinism was still related to Purity when controlling for religiosity ($\beta = .23, p < .005$), but it was no longer related to the Ingroup or Authority subscales. Belief in Fatalistic determinism was also positively correlated with Harm, which is one of the moral foundations more highly endorsed by liberals ($r = .16, p < .05$). Belief in randomness correlated with both the Harm and Fairness subscales ($r = .16, p < .05$ and $r = .17, p < .05$; respectively).

Punishment Experiment

Recall that we asked participants to assign blame and assign prison sentences for two criminal scenarios. The correlations of the FAD-Plus subscales with assignment of punishment are presented in Table 8. The tabled values are the mean values for the two items -- prison

² The three conservative moral foundations all correlated highly with religiosity (Ingroup $r = .25, p < .001$; Authority $r = .30, p < .001$; Purity $r = .48, p < .001$).

sentence and blame.

Molester Scenario. The Free Will subscale was a significant predictor of punishment both at Time 1 ($r = .32$) and Time 2 ($r = .22$). Apparently, the association was not altered by the removal of any consequential value of punishment. None of the other subscales correlated significantly with punishment before or after the manipulation.

Rape Scenario. In the second criminal scenario, all consequentialist value of punishment was expressly absent in the instructions. Moreover, we removed all participants who indicated that they did not believe that chemical castration would have the stated effect. This restriction left us with an N of 118. As hypothesized, only free will predicted higher punishment ($r = .23$, $p < .01$).

Discussion

Big Five. We followed the standard practice in the personality literature of examining correlations with the fundamental personality dimensions, that is, the Big Five factors. A substantial literature has demonstrated that all five have a genetic basis (Jang, Livesley, & Vernon, 1996). Therefore, it is reasonable to assume the causal direction involves the personality traits preceding and possibly influencing beliefs (see Tesser, 1993). The causal mechanism is likely to be complex and involve person-environment interactions of the sort outlined by Tesser (1993).

The link between free will and extraversion may derive from the fact that extraverts are outgoing and more assertive: Their dominance over situations may lead them to be more confident in the fact that they have free will to control things around them. Note that extraversion is also associated with more positive affect, which may suggest a relation between positive affect and belief in free will. The link with agreeableness could also induce one to feel responsible for

positive social relationships, again promoting a belief in one's free will.

Its association with fatalistic determinism probably relates more to the cooperative and trusting side of agreeableness. Perhaps those who believe in fatalistic determinism do so because they believe religious or cultural teachings without questioning them, or giving any deeper consideration. Emotional instability may also lead to a belief in fatalistic determinism due to the paranoia that the world is somehow against you and you cannot avoid bad things happening.

Intelligence and test taking behavior. The only belief that handicapped IQ performance was fatalistic determinism. The negative association found in Study 2 was significant ($r = -.24$) and similar to the Study 1 value ($r = -.22$). The pattern in Study 2 suggested a possible mechanism for the negative correlation with IQ, namely, test taking style. Consistent with the concept, those who believe in fatalistic determinism, assume that their success is pre-determined: With a time limit, they feel that they may as well answer as many questions as possible, perhaps even randomly. This result is consistent with our earlier speculation that such individuals do not understand the causal relationship between their ability and their performance.

Locus of control. Although coherent, none of the correlations with locus of control were high enough to imply redundancy with that any of the FAD-Plus subscales. Free will belief correlated only with internal control, providing further support for compatibility. Fatalistic determinism appears to behave like the more traditional conception of determinism; it was positively related to all forms of external control and negatively related to internal control.

We conjectured that those who believe in fatalistic determinism would tend to interpret scientific determinism as fatalistic (i.e. that it is inevitable and unknowable). The effects on the relation between scientific determinism and all locus of control subscales when controlling for fatalistic determinism supported this hypothesis. The correlation between scientific determinism

and powerful others makes sense because one's environment is controlled by parents and society. However, it appears that people also interpret these causes of behavior as internal to the individual and part of internal control.

Moral foundations. These findings show that belief in free will is associated with greater endorsement of the binding moral foundations. This pattern appears to contradict the lack of association in Study 1 between conservatism and free will belief. Whether they are conservative or liberal, those who believe strongly in free will endorse these moral foundations more highly than people who are lower in free will belief. Future research should attempt to tease apart the impact of free will belief on moral and non-moral aspects of conservatism.

The relationship between Scientific Determinism and Authority/respect first struck us as odd. It must be acknowledged that even believers in science must rely on authority. Scientists cannot replicate every previous scientific experiment; instead, we believe their results out of respect for the skill and integrity of those doing the research. Scientific Determinism was once again not related to the Ingroup/loyalty foundation, which is associated with prejudicial attitudes. This finding supports our hypothesis that the combination of genetic and environmental determinism cancels out the relationship between genetic determinism and prejudice.

Fatalistic determinism seems to be related to more simplistic types of moral reasoning. Purity measures one's tendency to associate following social rules, specifically religious rules or rules regarding sex, as moral imperatives. Not hurting others is also a frequently stated explicit "rule". Those who believe in fatalistic determinism may be more likely to base their moral judgments on rules rather than more subjective concepts like Fairness.

Belief in randomness was the only subscale to correlate with both individuating moral foundations. Liberal morality focuses on protecting the individual from either harm or unfairness

(Haidt, 2008): Hence there usually has to be a victim for liberals to consider an act immoral.

Random events have no perpetrators, only victims. Believing that our lives are shaped by random events may cause one's morality to be more focused on whether there is a victim when deciding the morality of a situation.

Punishment. In the Molester Scenario, the Time 1 results can be interpreted as a base line for Time 2. Participants are told that the defendant is guilty of a terrible crime. Only Free Will showed a significant association with punishment. At Time 2, the punishment was significantly lower than at Time 1, $t(159) = 3.12, p < .01$. Note from Table 8, however, that the pattern was very similar. Again, only Free will predicted punishment. Free Will was still associated with higher punishment after being given a potential excuse for the crime. Interestingly, neither scientific nor fatalistic determinism was negatively related to punishment after the manipulation. Belief in any type of determinism did not cause them to accept the defendant's previous abuse as an excuse.

The Rape Scenario used a different set of instructions to isolate an example of punishment free of consequentialist motivation. The instructions specified that society would not be helped by imprisoning the defendant; therefore the only reason to punish him would be to exact revenge. Nonetheless, free will belief was still positively correlated with greater punishment. These results supported the hypothesis that free will is related to retributive punishment.

General Discussion

Development of the FAD-Plus

We have provided details about the development of the FAD-Plus, a 26-item measure of lay beliefs in free will and three closely-related alternatives. The instrument is comprised of four subscales: Free Will, Scientific Determinism, Fatalistic Determinism, and Randomness. The final set of items is presented in Appendix A, in a format appropriate for administration. We hope that future research in the area will take full advantage of this instrument. For the moment, the psychometric details in Table 2 can be considered norms.

Together the FAD-Plus items provide a belief survey that overcomes serious difficulties with previous measures, which aimed only at a subset of these variables and tended to assume specific theoretical relations among these beliefs. We believe that our scale construction procedures have helped avoid several of these pitfalls. First, previous attempts to include reversals led to an inevitable confounding of free will with its alternatives. By including only pro-trait items, we allowed the data to better reveal the underlying associations among the four constructs. Second, we ensured that our items were not double-loaded, that is, implying an alternative belief. Third, we avoided philosophical jargon (e.g., words such as ‘determinism’ or ‘libertarianism’).

As a result, our exploratory factor analysis in Study 1 yielded four relatively independent factors. A confirmatory factor analysis in Study 2 sustained this relative independence. The final versions of the four subscales (Free Will, Scientific Determinism, Fatalistic Determinism, and Randomness) showed acceptable internal consistencies.

Clarifying the four constructs

Our scale development follows most closely from the measure developed by Stroessner

and Green (1990). They showed that a free will factor could be separated from determinism factors. Results with the FAD-Plus confirmed Free Will and different forms of determinism as orthogonal. Our instrument goes further to incorporate belief in randomness as well, which addresses another possible position in the free will debate.

Previous measures of determinism have confounded causation and inevitability. Our scientific determinism subscale maintains the narrower emphasis on scientific causality. One can believe that environments can be manipulated to improve society with no implication of inevitability. We also made an effort to cancel out political biases by including both genetic and environmental arguments. In that sense, our measure differs from the Genetic Determinism scale developed by Keller (2005). The latter demonstrates a strong bias toward conservative political beliefs. As Rychlak and Rychlak (1990) note however, environmental and genetic versions are equally deterministic.

Our inclusion of a Fatalistic Determinism subscale highlights its distinctiveness from scientific determinism. This measure is not unlike Stroessner and Green's (1990) Philosophical Determinism subscale, but our items do not force a link to religiosity. Nonetheless, it retains the flavor of inevitability.

We also broadened the scope of previous instruments by including randomness as a third alternative to free will. This empirical distinction has conceptual implications. For example, the distinctiveness of this factor helps address the commonly-heard, but odd, argument that difficulties with predicting human behavior support the operation of free will.

We are confident in the FAD-Plus as an instrument for use in studying lay beliefs regarding free will. The distinctions that we have confirmed among the four constructs facilitated clearer conclusions about the significance and impact of such beliefs on the behavior of ordinary

citizens in our further investigations.

Exploring Lay Beliefs

Our research using the FAD-Plus was designed with several goals in mind. One was to confirm that lay beliefs in free will and determinism are relatively independent. Another was to establish that free will belief is not synonymous with internal locus of control. We also demonstrated the importance of distinguishing scientific determinism from fatalistic determinism. In addition to achieving these intended goals, our more exploratory analyses helped to expand on the recent research linking free will belief and morality.

Compatibilism

Not only is free will uncorrelated with determinism, several external variables correlate in the same direction with both free will and (some type of) determinism. This pattern is only possible if lay individuals do not see the two as incompatible.

An everyday understanding of free will is simply a common sense explanation of how people make choices. People perceive that they are making decisions every time they choose between options. This feeling of control will feel self-evident, no matter what one believes about the existence of free will (Wegner, 2008). Given this experience, which many interpret as ‘proof’, it is unsurprising that the huge majority of people believe in free will.

At the same time, most people would also agree that decisions are often constrained by the situation. Free will, in this case, is understood as the ability to control one’s choices and be free of coercion (Baumeister, 2008). This notion is different from behavior being totally uncaused, which is what hard determinists require for their definition of free will (Bargh, 2008). With this less restricted definition of free will, it is easy to see how people can believe that they have free will, but sometimes they are not free to exercise it. This definition does not logically

lead to the conclusion that either free will or determinism does not exist.

Two Types of Determinism?

Our findings also support the separation of scientific and fatalistic types of determinism. This distinction is important because they address different aspects of the philosophical concept. Compatibilists tend to make a distinction between causation and determinism (Baumeister, 2008; Bandura, 2008). The original conception of determinism is that everything that happens could be predicted from the beginning of the universe simply through knowing the laws of nature. Everything that happens is completely predicted by previous events.

Some assumptions that are made about this type of determinism lead to troubling logical conclusions. People fear that if everything is completely predictable, then it must mean that they have no control over the future and their choices do not matter (Pinker, 2008). Scientific causation does not directly imply that, however. Once we controlled for common variance with Fatalistic Determinism, Scientific Determinism was related to internal control. This suggests that scientific causes of behavior are seen as being internal to the individual, or part of their own decision making process. For example, just because someone has a genetic predisposition to like chocolate does not mean that they have no part in the decision to eat it.

The type of determinism that does undermine autonomy is fatalistic determinism. Fatalistic determinism contains the idea that our actions do not matter because the future is already set. It does not imply a specific type of causation, although our data suggest that a common belief is that God is the ultimate source of all future events. People who are high in this belief have a sense that one cannot know or affect what will happen in the future. This pessimistic tone is what leads fatalistic determinism to correlate with the negative attitudes that people associate with determinism – in particular, external locus of control, excusing moral

responsibility, and lack of emotional stability.

Our findings also suggest that belief in fatalistic determinism leads people to interpret causal explanations as inevitable. A misunderstanding of the probabilistic nature of scientific causation leads them to believe that a predisposition to do a behavior is the same as having no control over it. This misunderstanding may also be responsible for the relationship between genetic determinism and prejudice (Keller, 2005). Once we controlled for belief in fatalistic determinism, there was no relation between the Ingroup/loyalty moral foundation and scientific determinism. Those who believe in fatalistic determinism interpret genetic differences as the cause of group differences because they fail to understand the mechanisms by which genetics affect behavior.

Free Will and Morality

One of our over-arching goals was to clarify the relationship between morality and free will belief. Our findings suggest that the tendency to believe in free will is tied to assigning moral responsibility and blame. In particular, our analyses of criminal scenarios (molestation and rape), indicated that free will belief was associated with assigning higher punishment to the defendant. Results with the rapist scenario supported the case that free will belief is linked to punishment for retributive rather than consequentialist (i.e., crime reduction) reasons.

This linkage is clarified by some of our other findings. We found that individuals believing in free will also believe in a just world for themselves and others. Hence, free will belief may encourage a stricter type of universal morality. Those who believe in free will are more critical about holding themselves and others to that moral code. Interestingly, this moral code is traditionalist in nature. For example, free will belief was positively correlated with religiosity, belief in a just world, and the binding moral foundations.

Our understanding of the relation between free will and traditional morality is consistent with Baumeister's (2008) notion that free will belief involves greater self-regulation: A greater ability to control one's impulses reduces maladaptive reactions to temptation. As outlined by Haidt (2008), the 'binding' moral foundations are intended to commit people to their social roles and put the needs of the community above personal desires. (Only the binding moral foundations focus on constraining behavior in advance, whereas the individuating moral foundations focus on the amelioration of victims.³) Integrating these two notions, we hold that free will belief commits people to control their own impulses and criticize others for not doing the same. If others misbehave, those high in free will are willing to apply the necessary sanctions, that is, punishment.

Some commentators take this argument to the limit. They fear that a whole-sale undermining of free will belief could potentially lead to the breakdown of society's moral foundations (Vohs & Schooler, 2008; Baumeister et. al., 2009). We cannot go that far, based on our individual difference data. However, we do agree that a belief in free will encourages people to be critical of their own and others' misbehavior.

Construct Validity

Although targeted at our three theoretical issues, the present data have also provided support for the construct validity of the FAD-Plus, especially the Free Will subscale. For example, its modest overlap with internal locus of control supports the discriminant validity with respect to an ostensibly similar concept. This finding is consistent with the minimal overlap found earlier by Stroessner and Green (1990). Believing in free will is not synonymous with

³ Jost (2006) words this trade off as follows: "We need tradition, order, structure, closure, discipline, and conscientiousness, to be sure; but if the human race is to continue to survive new challenges, we will also just as surely need creativity, curiosity, tolerance, diversity, and open-mindedness." (p. 667).

having a perception that one's behavior is under internal control. Our findings also support the distinctiveness of three alternatives to free will: randomness and two types of determinism.

Scientific Determinism demonstrated links with both internal and external control agents. That pattern justifies the inclusion of items tapping belief in genetic as well environmental causes – as long as they are scientifically based. Fatalistic Determinism showed the most traditional and expected pattern, correlating negatively with internal control and positively with measures of external control. Finally, the belief in randomness proved to be distinct from causation by chance. In sum, the relative independence of the four subscales supported the inclusion of all four beliefs in the FAD-Plus.

The typical approach to establishing construct validity is to demonstrate a convergence of self-reports with observer ratings and overt behavior (e.g., Simms & Watson, 2008). That traditional approach is a challenge in the case of metaphysical beliefs. However, our punishment experiment seems to provide some behavioral evidence that is consistent with theories about free will belief. We were able to confirm the theory that only believers in free will justify punishment for the sake of revenge. Though this situation was hypothetical, participants were being asked to make judgements in which we can clearly see the influence of their beliefs.

Future Directions

The studies presented here raise a number of theoretical questions that require further investigation. Our consistent finding that confusion with fatalistic determinism leads to a misunderstanding of scientific causation should be tested directly. So should our hypothesis that fatalism is responsible for the link between genetic determinism and prejudice. A strong belief in fatalistic determinism may actually mediate this association.

Of special importance is an experiment showing that undermining free will leads people

to be less morally critical. A manipulated reduction in free will belief has already been shown to induce people to be less critical of their own behavior (Vohs & Schooler, 2008). Yet to be shown is that undermining free will makes people more lenient toward others as well. An experimental manipulation that simultaneously influences both forms of leniency would be ideal.

Links with prosocial behavior should also be followed up. Previous work suggests that individual differences in free will should lead to greater altruism (Baumeister et. al., 2009). Unfortunately, the measure of free will used in that study was a combination of several of our current subscales. We hope to reevaluate their claim using our more differentiated measures. There may be some relationship with other subscales which was not evident in their report.

Consistent with that demonstration of an association with altruism, we found positive correlations of free will with two fundamental personality dimensions, Extraversion and Agreeableness. The association with extraversion suggests that people who believe in free will have more positive affect, which may promote a greater sense of well-being. The correlation with agreeableness suggests that they also have better interpersonal relations. Moreover, our data suggest that those who believe strongly in free will have a more internal locus of control than those who don't. We plan to continue testing these more positive aspects of free will belief.

Table 1. Exploratory factor analysis.

	FAD Subscales			
	Fatalistic	Free Will	Randomness	Scientific
	Determinism			Determinism
1. Fate determines future	.844	-.083	-.039	.045
2. Biology determines personality	.118	-.187	-.097	.412
3. Chance caused history	.154	-.165	.554	.160
4. Complete control over decisions	-.068	.606	.013	-.205
5. Can't change destiny	.653	-.143	.083	.194
6. Environment causes behavior	.025	-.277	.084	.397
7. Can't predict events	.032	.243	.457	-.015
8. Have full responsibility	.011	.505	.086	-.104
9. Fate has a plan	.863	.119	-.031	-.015
10. Can figure out all behavior	.033	-.008	-.038	.497
11. Life is luck	.093	.039	.566	-.060
12. Overcome any obstacle	.040	.616	-.068	.042
13. Mysterious forces at work	.549	.006	.279	.048
14. Genes determine future	.106	-.228	.053	.525
15. Can't predict people	-.031	.277	.194	-.286
16. Criminals are responsible	.039	.539	.066	-.202
17. What will be will be	.572	.022	.079	-.079
18. Environment creates personality	-.085	.032	.055	.505
19. Random events	-.038	-.142	.416	.058
20. Take away mystery	.385	.258	.105	-.263
21. Life is random	.101	.106	.617	-.019
22. Humans follow laws of nature	-.077	.050	.080	.512
23. Can overcome desires	.133	.517	-.033	.034

Note. N = 257. Maximum likelihood extraction with oblimin rotation.

Table 2. Means and reliabilities of the finalized FAD-Plus subscales.

	FAD subscales			
	Free Will	Scientific Determinism	Fatalistic Determinism	Randomness
Mean	3.35	3.02	2.41	3.28
Standard Deviation	.58	.56	.81	.57
Alpha	.69	.69	.82	.63

Note. Data from a sample of 177 undergraduates from University of British Columbia.

Table 3. Intercorrelations among the finalized FAD-Plus subscales.

FAD Subscales				
	Free Will	Scientific Determinism	Fatalistic Determinism	Randomness
Free Will	--	.13 (.11)	.13 (.11)	.02 (.01)
Scientific Determinism		--	.09 (.08)	.01 (-.01)
Fatalistic Determinism			--	.19* (.18)
Randomness				--

Note. * indicates $p < .05$ two-tailed. The values in parentheses are controlled for acquiescence. Total $N = 177$.

Table 4. Study 1 correlations of the FAD-Plus subscales with political attitudes and IQ.

	FAD subscales			
	Free Will	Scientific Determinism	Fatalistic Determinism	Randomness
Religiosity	.35**	-.14*	.32**	.06
Conservatism	.22** (.11)	-.04	.11	.06
Authoritarianism	.30** (.11)	-.10	.37**	.03
Just World Belief- Other	.28** (.32**)	.16*	.06	-.12
Just World Belief-Self	.10 (.16*)	.01	-.27**	-.04
IQ	-.06 (.01)	.05	-.22**	-.13

Note. Values in parentheses are the standardized regression coefficients after controlling for Religiosity. * $p < .05$, ** $p < .001$, two-tailed.

Table 5. Correlations of the FAD-Plus subscales with the Big Five factors.

	FAD subscales			
	Free Will	Scientific Determinism	Fatalistic Determinism	Randomness
Extraversion	.20**	.09	-.09	.05
Agreeableness	.17*	-.01	.19*	.07
Conscientiousness	-.04	-.08	-.03	-.13
Emotional Stability	.07	.04	-.22**	-.03
Openness	.03	.02	.04	.10

Note. * $p < .05$, ** $p < .01$, two-tailed

Table 6. Correlations between the FAD-Plus and Perceived Control.

	FAD subscales			
	Free Will	Scientific Determinism	Fatalistic Determinism	Randomness
Chance	-.01	.16* (.11)	.49**	.20*
Powerful Others	.07	.28** (.25**)	.27**	.05
Internal	.35**	.14 (.16*)	-.19*	-.13

Note. Values in parentheses are standardized regression coefficients when controlling for Fatalistic Determinism. * $p < .05$, ** $p < .001$, two-tailed

Table 7. Correlations between the FAD-Plus and moral foundations.

	FAD subscales			
	Free Will	Scientific Determinism	Fatalistic Determinism	Randomness
Harm/Care	.07	.02	.17*	.16*
Fairness/Reciprocity	.07	.09	.09	.17*
Ingroup/Loyalty	.27** (.23*) ^a	.16* (.14) ^b	.17* (.09) ^a	.02
Authority/Respect	.30** (.25**) ^a	.22* (.14*) ^b	.23* (.14) ^a	-.06
Purity/Sanctity	.22* (.14*) ^a	.13 (.10) ^b	.38** (.23*) ^a	.07

Note. ^a Standardized regression coefficients when controlling for Religiosity. ^b

Standardized regression coefficients when controlling for Fatalistic Determinism. * $p < .05$, ** $p < .001$, two-tailed

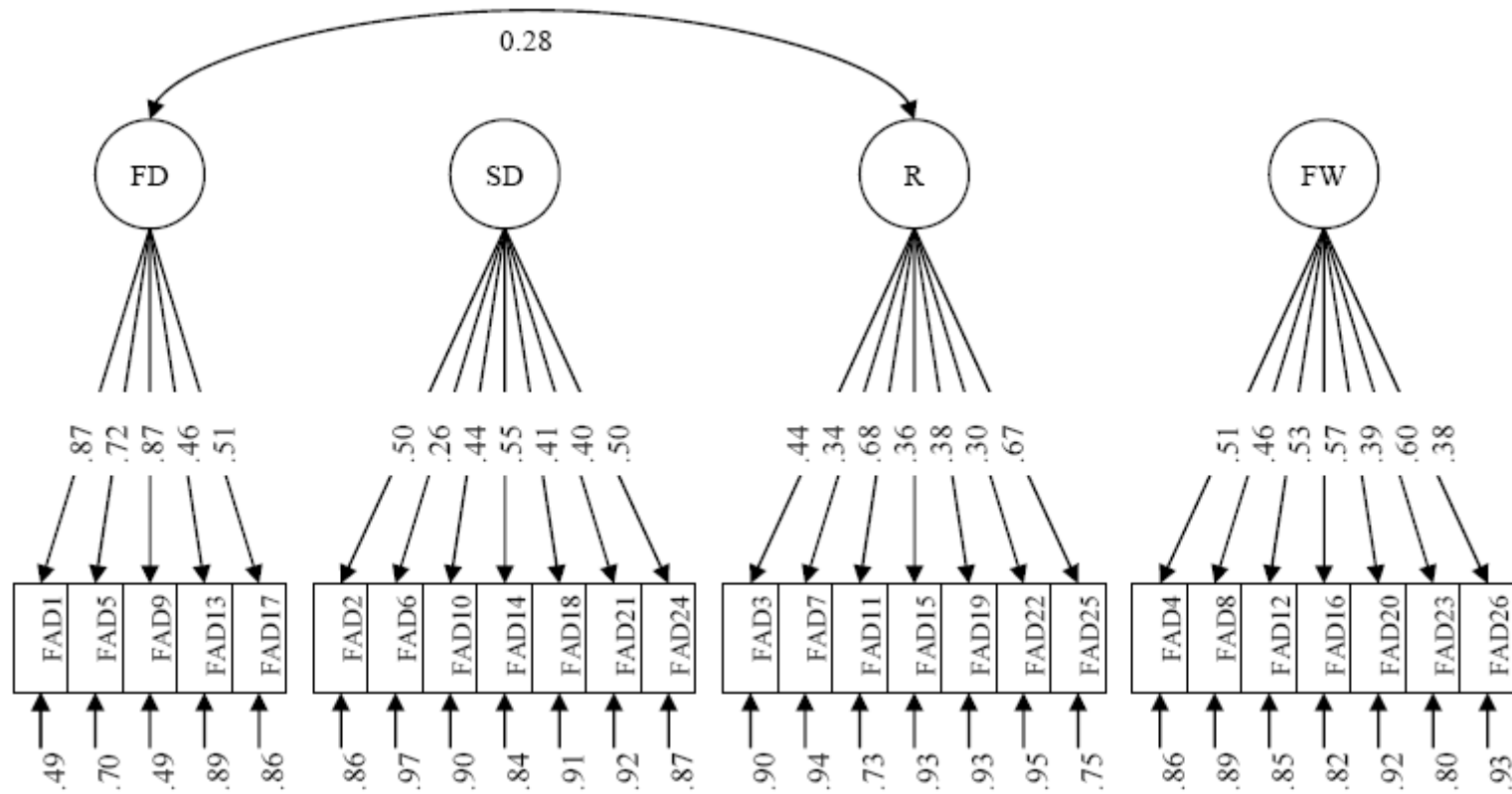
Table 8. Punishment experiment results.

		Free Will	Scientific Determinism	Fatalistic Determinism	Randomness
Molester	Time 1	.22*	.01	-.01	.06
Scenario	Time 2	.17*	-.02	-.14	-.09
Rape		.28**	-.07	.00	.01
Scenario					

Note. The Molester Scenario compared punishment before (Time 1) and after (Time 2) the addition of a scientific deterministic cause for the defendant's behavior. In the Rape Scenario, the situation was controlled so that assignment of punishment would only serve as retribution.

* $p < .05$, ** $p < .001$, two-tailed.

Figure 1. Final CFA Model with parameter estimates.



Note. FD = Fatalistic Determinism, SD = Scientific Determinism, R = Randomness, FW = Free Will. Six allowed error covariances are not shown

References

- Altemeyer, B. (1998). The other “authoritarian personality”. *Advances in Experimental Social Psychology*, 30, 47–92.
- Baer, J. (2008). Free will requires determinism. In Baer, J., Kaufman, J. C., & Baumeister, R. F. (Eds.), *Are we free? Psychology and free will* (pp. 304-310). New York: Oxford University Press.
- Baer, J., Kaufman, J. C., & Baumeister, R. F. (Eds.), *Are we free? Psychology and free will*. New York: Oxford University Press.
- Bandura, A. (2008). Reconstructing of “free will” from the agentic perspective of social cognitive theory. In Baer, J., Kaufman, J. C., & Baumeister, R. F. (Eds.), *Are we free? Psychology and free will* (pp. 86-127). New York: Oxford University Press.
- Bargh, J. A. (2008). Free Will is unnatural. In Baer, J., Kaufman, J. C., & Baumeister, R. F. (Eds.), *Are we free? Psychology and free will* (pp. 128-154). New York: Oxford University Press.
- Baumeister, R. F. (2008). Free will, consciousness, and cultural animals. In Baer, J., Kaufman, J. C., & Baumeister, R. F. (Eds.), *Are we free? Psychology and free will* (pp. 65-85). New York: Oxford University Press.
- Baumeister, R. F., Masicampo, E. J., & DeWall, N. D. (2009) Prosocial benefits of feeling free: Disbelief in free will increases aggression and reduces helpfulness. *Personality and Social Psychology Bulletin*, 35, 260-268.
- Baumeister, R.F., & Sommer, K.L. (1997). Consciousness, free choice, and automaticity. In R.S. Wyer (Ed.), *Automaticity of everyday life* (pp. 75-82). Hillsdale, NJ: Erlbaum.

- Bentler, P. M. (2004). *EQS structural equations program manual*. Encino, CA: Multivariate Software, Inc.
- Carey, J., & Paulhus, D.L. (2008). *Need for mystery: Development and measurement of a new construct*. Presented at the meeting of the Society for Personality and Social Psychology, Tampa, FL.
- Church, A. T., & Burke, P. J. (1994). Exploratory and confirmatory tests of the Big Five and Tellegen's three- and four-dimensional models. *Journal of Personality and Social Psychology*, 66, 93-114.
- Dennet, D. C. (2008). Some observations on the psychology of thinking about free will. In Baer, J., Kaufman, J. C., & Baumeister, R. F. (Eds.), *Are we free? Psychology and free will* (pp. 248-259). New York: Oxford University Press.
- Graham, J., Haidt, J., & Nosek, B. A. (2009). Liberals and conservatives rely on different sets of moral foundations. *Journal of Personality and Social Psychology*, 96, 1029-1046.
- Greene, J. & Cohen, J. (2004). For the law, neuroscience changes nothing and everything. *Philosophical Transactions of the Royal Society*, 359, 1775-1785.
- Haidt, J. (2008). Morality. *Perspectives on Psychological Science*, 3, 65–72.
- Holden, R.R. (2009). Social desirability. In M.R. Leary & R.H. Hoyle (Eds.), *Measures of individual differences in self-presentation* (pp.178-199). New York: Guilford.
- Hoyle, R. H. (2007). Structural equation modeling. In R.W. Robins, R. C. Fraley, & R. F. Krueger (Eds), *Handbook of research methods in personality psychology* (pp. 444-460). New York: Guilford.
- Jang, K. L., Livesley, W. J., & Vernon, P. A. (1996). Heritability of the Big Five personality dimensions and their facets: A twin study. *Journal of Personality*, 64, 577–591.

- John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds). *Handbook of personality: Theory and research* (pp. 102–138). New York: Guilford Press.
- Jost, J. T. (2006). The end of the end of ideology. *American Psychologist*, *61*, 651-670.
- Jost, J. T., Glaser, J., Kruglanski, A. W. & Sulloway, F. J. (2003). Political conservatism as motivated social cognition. *Psychological Bulletin*, *129*, 339–375.
- Kane, R. (1996). *The significance of free will*. Oxford, U.K.: Oxford University Press.
- Keller, J. (2005). In genes we trust: The biological component of psychological essentialism and its relationship to mechanisms of motivated social cognition. *Journal of Personality and Social Psychology*, *85*, 686-702.
- Lee, K., & Ashton, M.C. (2007). Factor analysis in personality research. In R.W. Robins, R. C. Fraley, & R. F. Krueger (Eds), *Handbook of research methods in personality psychology* (pp.424-443). New York: Guilford.
- Lerner, M. J. (1980). *The belief in a just world: A fundamental delusion*. New York: Plenum Press.
- Levenson, H. (1973). Multidimensional locus of control in psychiatric patients. *Journal of Consulting and Clinical Psychology*, *41*, 397- 404.
- Mele, A. R. (2008). Psychology and free will: a commentary. In Baer, J., Kaufman, J. C., & Baumeister, R. F. (Eds.), *Are we free? Psychology and free will* (pp. 325-346). New York: Oxford University Press.
- Myers, D. G. (2008). Determined and free. In Baer, J., Kaufman, J. C., & Baumeister, R. F. (Eds.), *Are we free? Psychology and free will* (pp. 32-43). New York: Oxford University Press.

- Nathanson, C., Paulhus, D. L. (2007, June). *Validation of the UBC Word Test*. Poster presented at the 68th annual meeting of the CPA, Ottawa, ON
- Nichols, S. (2006). Folk intuitions on free will. *Journal of Culture and Cognition*, 6, 58-86.
- Paulhus, D. L. & Margesson, A. (1994). *Free Will and Determinism (FAD-4) scale*. Unpublished measure, University of British Columbia, Vancouver.
- Paulhus, D.L. & Van Selst, M. (1990). The Spheres of Control scale: Ten years of research. *Personality and Individual Differences*, 11, 1029-1036
- Paulhus, D.L., & Vazire, S. (2007). The self-report method. In R.W. Robins, R. C. Fraley, & R. F. Krueger (Eds), *Handbook of research methods in personality psychology* (pp. 224-239). New York: Guilford.
- Pinker, S. (2008). The fear of determinism. In Baer, J., Kaufman, J. C., & Baumeister, R. F. (Eds.), *Are we free? Psychology and free will*. (pp. 311-324), New York, NY: Oxford University Press.
- Rakos, R.F., Laurene, K. R., Skala, S., & Slane, S. (2008). Belief in free will: measurement and conceptualization innovations. *Behavior and Social Issues*, 17, 20-39.
- Rotter, J. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General & Applied*, 80, 1-28.
- Raykov, T. (1998). On the use of confirmatory factor analysis in personality research. *Personality and Individual Differences*, 24, 291-293.
- Rychlak, J.F., & Rychlak, R.J. (1990). The insanity defense and the question of human agency. *New Ideas in Psychology*, 8, 3-24.

- Savalei, V., & Bentler, P.M. (2005). A statistically justified pairwise ML method for incomplete nonnormal data: A comparison with direct ML and pairwise ADF. *Structural Equation Modeling, 12*, 183-214.
- Saucier, G. (2005). Isms and the structure of social attitudes. *Journal of Personality and Social Psychology, 78*, 366-385.
- Saucier, G., & Goldberg, L. (1996). The language of personality: Lexical perspectives on the five-factor model In J.S. Wiggins (Ed.), *The five-factor model of personality: Perspectives (pp.21-50)*. New York: Guilford.
- Simms, L.J., & Watson, D. (2008). The construct validation approach to personality scale construction. In R.W. Robins, R.C. Fraley, & R.F. Krueger (Eds.), *Handbook of research methods in personality psychology* (pp. 240-258). New York: Guilford Press.
- Streossner, S. J. & Green, C. W. (1990). Effects of belief in free will or determinism on attitudes toward punishment and locus of control. *Journal of Social Psychology, 130*, 789-799.
- Tesser, A. (1993). On the importance of heritability in psychological research: The case of attitudes. *Psychological Review, 100*, 129-142.
- van Inwagen, P. (1983). *An essay on free will*. Oxford: Oxford University Press.
- Viney, W., Waldman, D., & Barchilon, J. (1982). Attitudes toward punishment in relation to beliefs in free will and determinism. *Human Relations, 35*, 939-950.
- Vohs, K. D. & Schooler, J. (2008). The value of believing in free will: Encouraging a belief in determinism increases cheating. *Psychological Science, 19*, 49-54.
- Wegner, D.M. (2002). *The illusion of conscious will*. Cambridge, MA: MIT Press.
- Weiner, B. (1993). On sin and sickness: A theory of perceived responsibility and social motivation. *American Psychologist, 48*, 957-965.

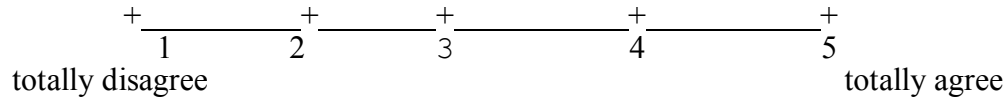
Wood, D., Gosling, S.D., & Potter, J. (2007). Normality evaluations and their relation to personality traits and well-being. *Journal of Personality and Social Psychology, 93*, 861-879.

Zakrisson, I. (2005). Construction of a short version of the right-wing authoritarianism (RWA) scale. *Personality and Individual Differences, 39*, 863-

Appendix A

FAD-Plus: Free Will and Determinism

For each statement below, choose a number from 1 to 5 to indicate how much you agree or disagree.



1. I believe that the future has already been determined by fate.
2. People's biological makeup determines their talents and personality.
3. Chance events seem to be the major cause of human history.
4. People have complete control over the decisions they make.
5. No matter how hard you try, you can't change your destiny.
6. Psychologists and psychiatrists will eventually figure out all human behavior.
7. No one can predict what will happen in this world.
8. People must take full responsibility for any bad choices they make.
9. Fate already has a plan for everyone.
10. Your genes determine your future.
11. Life is a matter of luck - just like throwing dice or flipping a coin.
12. People can overcome any obstacles if they truly want to.
13. Whether people like it or not, mysterious forces seem to move their lives.
14. Science has shown how your past environment created your current intelligence and personality.
15. People's futures cannot be predicted.
16. Criminals are totally responsible for the bad things they do.
17. Whatever will be, will be – there's not much you can do about it.

18. As with other animals, human behavior always follows the laws of nature.
19. There are random events going on - even at the level of atoms and molecules.
20. People have complete free will.
21. Parents' character will determine the character of their children.
22. It will never be possible to predict human behavior precisely.
23. People are always at fault for their bad behavior.
24. Childhood environment will determine your success as an adult.
25. Life is hard to predict because it is almost totally random.
26. Strength of mind can always overcome the body's desires.

Subscales

Free Will: 4, 8, 12, 16, 20, 23, 26.

Scientific Determinism: 2, 6, 10, 14, 18, 21, 24.

Fatalistic Determinism: 1, 5, 9, 13, 17.

Randomness: 3, 7, 11, 15, 19, 22, 25.