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## **The Psychological Advantage of Unfalsifiability: The Appeal of Untestable Religious and Political Ideologies**

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# The Psychological Advantage of Unfalsifiability: The Appeal of Untestable Religious and Political Ideologies

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We propose that people may gain certain “offensive” and “defensive” advantages for their cherished belief systems (e.g., religious and political views) by including aspects of unfalsifiability in those belief systems, such that some aspects of the beliefs cannot be tested empirically and conclusively refuted. This may seem peculiar, irrational, or at least undesirable to many people because it is assumed that the primary purpose of a belief is to know objective truth. However, past research suggests that accuracy is only one psychological motivation among many, and falsifiability or testability may be less important when the purpose of a belief serves other psychological motives (e.g., to maintain one’s worldviews, serve an identity). In Experiments 1 and 2 we demonstrate the “offensive” function of unfalsifiability: that it allows religious adherents to hold their beliefs with more conviction and political partisans to polarize and criticize their opponents more extremely. Next we demonstrate unfalsifiability’s “defensive” function: When facts threaten their worldviews, religious participants frame specific reasons for their beliefs in more unfalsifiable terms (Experiment 3) and political partisans construe political issues as more unfalsifiable (“moral opinion”) instead of falsifiable (“a matter of facts”; Experiment 4). We conclude by discussing how in a world where beliefs and ideas are becoming more easily testable by data, unfalsifiability might be an attractive aspect to include in one’s belief systems, and how unfalsifiability may contribute to polarization, intractability, and the marginalization of science in public discourse.

*Keywords:* ideology, motivated social cognition, falsifiability, worldview defense

Many belief systems and worldviews contain elements of unfalsifiability (Popper, 1962). These beliefs lack the ability to be tested and proven false—and, sometimes, true. This seems peculiar to many people, because it is often assumed that the primary purpose of a belief is epistemological, to know something true about the world. Many people find themselves especially vexed by this seeming contradiction—that is, by the fact that some of humankind’s most widespread and important belief systems are also some of the least testable and scientifically tenable (e.g., Freud, 1927; Popper, 1962; Sagan, 1995).

Indeed, some of the most popular and influential scientific, political, religious, and metaphysical systems of belief—or world-

views—ranging from Marxism to psychoanalysis to the power of the market’s invisible hand, have been accused of being largely untestable (Dawkins, 2006; Harris, 2004; Phillips, 2006; Popper, 1962; but see Andersen, Chen, & Miranda, 2002; Baumeister, Dale, & Sommer, 1998; Jost, 1995). Why then do people hold such belief systems and why do such belief systems persist, and sometimes flourish, on a macro social level?

To the extent that people want to be objectively “right,” they should value testability and dislike unfalsifiability. But being accurate—though important (e.g., Cacioppo & Petty, 1982)—is only one psychological motivation among many. Overwhelming research on motivated cognition demonstrates that attitudes and beliefs are often propelled by goal-directed motivational processes that shape thoughts in service of those directional motivations; thus, people model their modes of perception to allow for those desires to become reality (for reviews see Kruglanski, 1996; Kunda, 1990; Kunda & Spencer, 2003). To pick a few examples of such directional motivations: People want to: view the world and their social groups as orderly (Friesen, Kay, Eibach, & Galinsky, 2014; Kay, Gaucher, Napier, Callan, & Laurin, 2008), view their social systems as legitimate (Jost & Banaji, 1994), be valued ingroup members (Turner, Brown, & Tajfel, 1979), see the self as a certain, secure, and valued member of society (Baumeister & Leary, 1995; Greenberg, Solomon, & Pyszczynski, 1997; Hirsh, Mar, & Peterson, 2012; McGregor, 2006a; van den Bos, 2009), have fulfilling relationships (Twenge & King, 2005), and see life as meaningful (Heine, Proulx, & Vohs, 2006; King & Hicks, 2009).

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When accuracy motives are strong (e.g., Cacioppo & Petty, 1982; Kunda, Davies, Adams, & Spencer, 2002), the falsifiability of a belief may well be important. However, when a belief system is serving important psychological needs such as providing meaning or self-worth, it may become risky to subject that belief to rigorous testing. When one takes into account the existential motives driving many beliefs, it becomes more plausible that unfalsifiability—despite its negative connotations to scientists and empiricists—may have psychological utility.

We propose to explore two possible benefits of unfalsifiability, an “offensive” function that allows people to hold their beliefs more strongly and a “defensive” function that allows people to reconstruct their beliefs behind unfalsifiable justifications and become more resistant to contradictory facts. Across four studies, in the context of both religious and political beliefs, we offer the first empirical tests that show that people can derive psychological benefits from worldviews that contain unfalsifiability and can actively shield their belief systems with unfalsifiability in response to threat. We also show that individual differences in the strength of religious and political ideology predict the extent to which people prefer and turn to unfalsifiability. This work extends previous theory on the possible psychological benefits of unfalsifiable religious beliefs (Freud, 1927, 1937; Kay, Gaucher, et al., 2010; Vail et al., 2010), is the first to propose specific offensive and defensive functions of unfalsifiability, offer empirical support for those functions, and demonstrate the utility of unfalsifiability in both spiritual and secular contexts. We conclude with a discussion of how, in a world where beliefs and ideas are becoming more testable by data, unfalsifiability might remain a catalyst that increases the attractiveness of some belief systems. We also distinguish unfalsifiability from other forms of motivated cognition (e.g., Lord, Ross, & Lepper, 1979), and discuss how unfalsifiability may contribute to polarization, intractability, and the marginalization of science in public discourse.

### The Appeal of Unfalsifiability

Many belief systems have been accused of being unfalsifiable, where the accusers intend this label as a self-evidently negative characteristic. Theorizing about whether unfalsifiability might be psychologically useful, however, has generally been limited to discussions of religious belief. Freud (1927), for example, argued that because religious ideas cannot be proven factually, their primary benefit must be psychological. He speculated that one benefit might be a type of pride gained from wrestling with untestable beliefs and ultimately deciding to have faith in them anyway (Freud, 1937). More recently, from a terror management perspective, Vail and colleagues (2010) wrote:

The irrefutability of these types of beliefs is one of the main criticisms leveled against religion . . . [however,] we propose that concepts such as eternal life and spiritual realms serve their death-denying [psychological] function and enhance social solidarity, in part, *because they are removed from the realm of rational argument and empirical evidence.* [emphasis added]

In other words, religious beliefs might be especially effective at serving existential psychological needs because they are, to some extent, unfalsifiable. These theoretical predictions have remained untested empirically, though they are consistent with related work

showing that priming religion makes people react less negatively to errors or inconsistency (Inzlicht & Tullett, 2010). Moreover, we propose that unfalsifiability also might make other, secular worldviews more attractive. Though it is tempting to assume that existential needs are primarily addressed through religious or spiritual belief systems, recent research has demonstrated that political ideologies, too, are driven by motives such as needs for meaning, symbolic immortality, control, justice identity, or some combination thereof (Jost, Kay, & Thorisdottir, 2009; Jost, Glaser, Kruglanski, & Sulloway, 2003; Jost & Major, 2001; Kay et al., 2009; Kay & Jost, 2003; Knowles, Lowery, Hogan, & Chow, 2009). In fact, several psychological models propose that political and religious ideologies are relatively substitutable for one another because they are rooted in the same psychological needs (e.g., Heine et al., 2006; Kay, Whitson, Gaucher, & Galinsky, 2009; McGregor, 2006a; van den Bos, 2009). Therefore, to the extent that the inclusion of some unfalsifiable aspects might benefit religious beliefs, it seems plausible that unfalsifiability might also bolster other types of worldviews or self-views that fulfill deeply held existential psychological needs.

### Unfalsifiability and Other Forms of Motivated Cognition

Psychological research has identified many methods by which people rationalize and defend their worldviews or beliefs. For example, individuals who hear threatening information might dismiss it by derogating its source (Bastardi, Uhlmann, & Ross, 2011; Fein & Spencer, 1997; Lord et al., 1979; Sinclair & Kunda, 1999, 2000; Westen, Blagov, Harenski, Kilts, & Hamann, 2006), engaging in biased information processing (Callan, Kay, Davidenko, & Ellard, 2009; Ditto & Boardman, 1995; Ditto & Lopez, 1992; Ditto, Munro, Apanovitch, Scepansky, & Lockhart, 2003; Lewandowsky, Oberauer, & Gignac, 2013; Mercier & Sperber, 2011; Munro & Ditto, 1997; for a review see Ditto, 2009), or avoiding it altogether (Shepherd & Kay, 2012). As another example, research into illusory superiority, or the “above average” effect (e.g., Alicke, 1985; Brown, 1986) shows that people tend to make more extreme self-serving attributions on ambiguous traits (e.g., sensitive, sophisticated) rather than more objective criteria (e.g., well-read, mathematical; Dunning, Meyerowitz, & Holzberg, 1989). These processes of rationalization and worldview defense that occur within individuals are well-studied. Less is known, however, about what characteristics make some worldviews gain primacy over others (see Dawkins, 1976; Lynch, 1996).

Departing from this past focus on individual-level processes of motivated worldview defense, we propose unfalsifiability is a characteristic of the content of various worldviews where its presence helps their dissemination and, once established, makes them more resistant to disconfirmation. For example, about whether psychoanalysis is unfalsifiable, Popper (1962) wrote: “I could not think of any human behavior which could not be interpreted in terms of [psychoanalysis]. It was precisely this fact—that they always fitted, that they were always confirmed—which in the eyes of their admirers constituted the strongest argument in favor of these theories.” If the specific content of a worldview is to some extent unfalsifiable—that facts can only be confirmatory—then that worldview might have strong advantages over other worldviews that are more easily tested and, perhaps, disconfirmed. If psychoanalysis is to some extent unfalsifiable, it

might explain, in part, why it captured and continues to capture so much intellectual attention.

From this perspective, the fact that some of the most popular and most passionately held ideas throughout history are also some of the least testable ones becomes less paradoxical. They are popular and retain their popularity because they are also unfalsifiable (e.g., Freud, 1927; Kay, Gaucher, McGregor, & Nash, 2010; Vail et al., 2010). Compared to beliefs with clearly and easily falsifiable attributes, beliefs that include unfalsifiable elements—whether spiritual or political—may be much more attractive to people, psychologically, insofar as they can never be “taken away.”

Put another way, unfalsifiability should not be attractive in itself, but act as a catalyst that, at least in some situations, improves the effectiveness of worldviews that are already held for other distinct motivational reasons. This reasoning leads to two hypotheses. First, the increased presence of unfalsifiability within a worldview or belief should allow those who are committed to a worldview in some way, or hold a belief for psychological reasons, to more zealously adopt it. Second, when strong believers experience a factual challenge to a cherished belief they should increasingly imbue that belief with elements of unfalsifiability in order to protect it from threat. That is, framing one’s beliefs in more unfalsifiable terms may make those beliefs less subject to disconfirmation.

Across four experiments we provide tests of these hypotheses. Furthermore, we propose two specific ways in which unfalsifiability might give certain worldviews an advantage: (a) that its presence within a belief system offensively allows adherents to express and enjoy their beliefs with more conviction (Experiments 1 and 2), and (b) that it defensively mitigates the threat of contradictory factual information (Experiments 3 and 4). In all studies, we also include individual differences of belief strength. To the extent that unfalsifiability is not attractive in itself, but rather is a catalyst that improves the effectiveness of some worldviews, then only individuals who hold strong beliefs, whether religious or political, should benefit from and use the offensive and defensive functions of unfalsifiability.

## Experiment 1

To the extent that unfalsifiability may be one characteristic of some beliefs or worldviews that gives them an advantage over others, we expected that worldviews that are more unfalsifiable would have more-strongly committed believers than less unfalsifiable worldviews. Rather than compare multiple worldviews that differ in their levels of unfalsifiability, however, we chose to examine a single cherished belief (i.e., religion) and manipulate its perceived unfalsifiability. We expected that a manipulation increasing the perceived unfalsifiability of religion would produce a relative increase in the strength of participants’ religious beliefs, compared to when the same religious claims are framed as falsifiable.

In Experiment 1, participants read that scientists agree that religious claims can never be testable by science (i.e., are unfalsifiable) or will eventually be testable (i.e., are falsifiable). We predicted that increasing the perceived unfalsifiability of religion would increase religious belief strength. Furthermore, if we are correct that unfalsifiability is a catalyst for increasing conviction rather than appealing in itself, it should be that unfalsifiability will mainly be appealing to people who are already committed to a religious worldview. That is, the effect of unfalsifiability should be moderated by participant religiosity such that the manipulation increases the strength of preexisting religious

belief more strongly, or exclusively, for participants higher in chronic religiosity.

## Method

**Participants.** One hundred six American participants were recruited online via a commercial survey company (Toluna Online; <http://www.toluna-group.com/>). Three participants were excluded for response sets (answering all 4s), leaving 103 (60% male, ages 18 to 65,  $M = 41.7$ ,  $SD = 13.9$ ). All effects reported as significant remained so,  $p < .05$ , when all participants were included.

**Materials and procedure.** Participants first completed a 3-item religiosity premeasure (“I consider myself to be a religious person,” “Having a spiritual life is important to me,” and, “I regularly attend church or other religious services”), responding on a 7-point Likert scale ranging from *Strongly disagree* to *Strongly agree*, embedded in filler items ( $\alpha = .86$ ). Participants then read the manipulation of religion’s unfalsifiability: one of two fake news articles that reported on a recent scientific conference ostensibly about science and God (~300 words; see Appendix 1). In the *unfalsifiable condition*, the article concluded that God’s existence will never be proven or disproven. In the *falsifiable condition*, the article concluded that God’s existence will eventually be proven or disproven.

Importantly, because threats to one’s beliefs can provoke increased commitment to those beliefs (e.g., McGregor, 2006b), a pilot test indicated that neither article was seen as more threatening than the other to religious beliefs generally. A separate sample ( $N = 62$ ), between-participants, rated whether each passage was likely to *challenge*, *threaten*, and *make someone question* religious belief (three items, 1–5 scale,  $\alpha = .60$ ). There were no significant differences between the falsifiable ( $M = 2.07$ ,  $SD = .67$ ,  $n = 31$ ) and unfalsifiable ( $M = 1.89$ ,  $SD = .72$ ,  $n = 31$ ) passages,  $t(60) = 1.09$ ,  $p = .28$ , Cohen’s  $d = .26$ . Furthermore, when analyzed using multiple regression, mean-centered participant religiosity (same three items as Experiment 1, 1–5 scale,  $\alpha = .78$ , original  $M = 1.98$ ,  $SD = 1.06$ ) did not predict threat ratings,  $B = .17$ ,  $t(59) = 1.32$ ,  $p = .19$ , or at Step 2 interact with the type of passage,  $B = .06$ ,  $t(58) = .29$ ,  $p = .77$ , indicating that religious participants in particular were not more likely to view one passage as more threatening than the other.

After the article, participants completed a 30-item measure assessing the strength of their religious beliefs ( $\alpha = .97$ ; see Appendix 2)<sup>1</sup> and a 2-item manipulation check (“No matter how much technology we have, there are some questions—such as whether God exists—that are impossible to answer with science,”

<sup>1</sup> Based on previous theory (Kay, Shepherd, Blatz, Chua, & Galinsky (2010); Shepherd et al., 2011) the measure of religious belief strength contained items assessing perceptions that God provides both control (items 1–14) and meaning (items 15–30). We had considered that these different facets of religious belief might be more or less unfalsifiable and thus respond differently to an unfalsifiability manipulation. This did not appear to be the case; the two subscales were highly correlated,  $r(101) = .90$ ,  $p < .001$ , and a factor analysis was most consistent with a one-factor solution. Therefore, results are reported using the mean of all items. We did, however, also examine each subscale individually. Each subscale was reliable (control:  $\alpha = .94$ ; meaning:  $\alpha = .97$ ). When the subscales were analyzed separately using the method from Study 1, the pattern of means was the same for each subscale, though significance levels were slightly weaker: The two-way interaction of the meaning items alone became nonsignificant,  $p < .18$  but all other effects remain significant,  $p < .05$ , or marginally so,  $p < .10$ .

and, “There are many ‘big questions’ to which we humans will never know the answers,”  $r(101) = .47, p < .001$ . These items were answered on a 7-point Likert scale (1 = *Strongly disagree*, 7 = *Strongly agree*). Finally, participants completed demographics. In all studies, participants were given feedback at the study’s end that included a description of the study’s purpose and an explanation of any deception.

## Results and Discussion

**Manipulation check.** First, we found that the manipulation of unfalsifiability affected the perceived unfalsifiability of the existence of God, such that participants perceived God’s existence as more untestable in the unfalsifiable condition ( $M = 5.93, SD = 1.45$ ) than in the falsifiable condition ( $M = 5.12, SD = 1.57$ ),  $t(101) = 2.71, p = .008$ , Cohen’s  $d = .54$ . Furthermore, using multiple regression (Aiken & West, 1991), we analyzed whether this effect was moderated by participant religiosity. In addition to the effect of the manipulation (effect coded: 1 = unfalsifiable,  $-1 =$  falsifiable),  $B = .25, t(100) = 2.63, p = .01$ , there was a main effect of religiosity,  $B = .23, t(100) = 2.43, p = .02$ , but no interaction at Step 2,  $B = -.16, t(99) = -1.20, p = .23$ . This suggests that the manipulation’s effect on the perceived unfalsifiability of religion occurred regardless of participant religiosity.

**Main analyses.** We predicted that participants in the unfalsifiable condition ( $n = 51$ ) would show stronger religious beliefs compared to the falsifiable condition ( $n = 52$ ), but that this effect would also be moderated by premeasured participant religiosity such that the effect of condition would occur more strongly or exclusively for higher religiosity participants. To test these hypotheses, we regressed religious belief strength on mean-centered religiosity (original  $M = 4.28, SD = 1.86$ ) and experimental condition (effect-coded: 1 = unfalsifiable;  $-1 =$  falsifiable). There was a strong main effect of religiosity,  $B = .79, t(100) = 12.75, p < .001$ , and no main effect of unfalsifiability condition,  $B = .05, t = .80, p = .43$ . More importantly, adding the religiosity-by-condition interaction revealed the predicted interaction, shown in Figure 1,  $B = .12, t(99) = 2.01, p = .047$ . Simple slopes analysis (Aiken & West, 1991) showed that the unfalsifiability manipulation increased belief strength for participants higher in religiosity ( $+1 SD$ ),  $B = .17, t(99) = 2.00, p = .048$ , but did not significantly affect those lower in religiosity ( $-1 SD$ ),  $B = -.07, t(99) = -0.86, p = .39$ . Put another way, the significant two-way interaction indicated that the relationship between premeasured and postmanipulation belief strength was stronger in the unfalsifiability condition,  $B = .91, t(99) = 10.56, p < .001$ , than in the falsifiability condition,  $B = .66, t(99) = 7.75, p < .001$ .

## Discussion

Experiment 1 provided an initial demonstration that unfalsifiability may have psychological utility, having an offensive function that increased the belief strength of religious adherents. To the extent that people with strong beliefs are more likely to promote or advocate for those beliefs (Akhtar, Paunesku, & Tormala, 2013), this finding suggests that worldviews that contain elements of unfalsifiability may be more likely to rise to prominence than worldviews that lack unfalsifiability, all else being equal.

It could be, however, that the observed effects are not about religiosity per se, but rather about some other individual difference

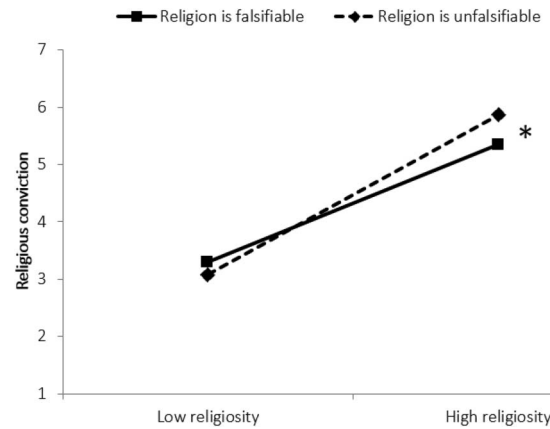


Figure 1. Experiment 1: Relationship between premeasured religiosity and postmanipulation religious conviction, by experimental condition, at  $\pm 1 SD$  religiosity. \*  $p < .05$ . Scale range 1–7.

correlated with religiosity. It could also be that unfalsifiability only produces increases in belief strength in religious contexts and not in other, secular worldviews. In Experiment 2, therefore, we address these issues by examining whether unfalsifiability also promotes increased conviction about one’s political beliefs. Examining political beliefs also allowed us to test whether unfalsifiability might be useful to people on both sides of an issue (or, in this case, on both sides of the political spectrum). We also examine whether unfalsifiability affects not just the strength of one’s beliefs, but one specific way in which people might use that conviction: to criticize a political candidate.

## Experiment 2

People are motivated to maintain positive beliefs about politicians, in-groups, and ideologies they identify with and prefer to discredit politicians, out-groups, and ideologies they do not support (Redlawsk, 2002; Westen et al., 2006). Such zealous beliefs can provide people with positive emotions (McGregor, 2006b). In Experiment 1, religious individuals showed increased belief strength when their beliefs were framed as unfalsifiable. In Experiment 2, we examined the political domain and whether more unfalsifiable political issues might enable more extreme opinions.

We reasoned that among average Americans in the realm of politics there is an air of unfalsifiability such that people are not chronically thinking about how political stances may be falsified by verifiable numerical data or factual analysis (Delli Carpini & Keeter, 1991). Accordingly, we hypothesized that when some political issues are framed as easily falsifiable, partisans would hold less extreme political opinions because salient testability might raise concerns about being proven incorrect. Put another way, when issues are unfalsifiable people are free to be extremists but this freedom might be reduced when an issue becomes about facts and verifiable numbers.

To investigate this hypothesis, we had American participants rate the performance of the current (in 2013) President of the United States, Democrat Barack Obama, on various issues of importance like foreign policy and the economy. Though performance on some issues (e.g., foreign policy) might be naturally

more unfalsifiable than others (e.g., job creation), we chose to hold the specific issues constant across conditions and instead manipulate whether the falsifiability of some issues was mentioned. Specifically, in the *falsifiable condition*, we made some issues less unfalsifiable by stating that the President's performance on those issues can be easily and objectively tested by available data. In the *unfalsifiable condition*, there was no mention of falsifiability. We chose to frame issues in one condition as less unfalsifiable (i.e., more testable) rather than more unfalsifiable because research shows that many Americans do not know how to properly evaluate the effectiveness of many political issues (Delli Carpini & Keeter, 1991). We reasoned that in political domains, for the average person, many political issues have a high baseline level of unfalsifiability and it would be easier to reduce perceived unfalsifiability by highlighting the testability of some issues than to increase it by highlighting the difficulty in testing political issues.

To the extent that (a) political partisans are motivated to esteem or derogate the President and (b) unfalsifiability promotes more zealous political attitudes, participants' ratings of the President's performance should be more extreme when falsifiability is not mentioned, and more moderate when falsifiability is mentioned. Put another way, we would always expect those who oppose President Obama to rate his performance more negatively than those who support him, but we expected this difference to be exacerbated when the concept of falsifiability was relatively less salient.

## Method

**Participants.** United States residents were recruited on Amazon's Mechanical Turk website (MTurk; <http://www.mturk.com>). Research suggests that data obtained using MTurk are as reliable as traditional methods in terms of internal consistency and test-retest reliability (Buhrmester, Kwang, & Gosling, 2011; Mason & Suri, 2012). Only participants who first passed an initial attention check (based on Oppenheimer, Meyvis, & Davidenko, 2009) that measured whether they took time to read the entire directions of an unrelated question were admitted ( $N = 179$ , 71% male,  $M$  age = 29.8 years,  $SD = 10.2$ ).

**Materials and procedure.** We first assessed a priori levels of support for President Obama. Participants indicated how much they agreed with three separate statements ("I like President Obama," "I support President Obama," and "I oppose President Obama"—reverse coded) on an unnumbered sliding scale with 101 distinct points, anchored at *Not All* and *Very Much*. These three items were used to create a measure of support for President Obama ( $\alpha = .94$ ,  $M = 66.51$ ,  $SD = 27.96$ ).

On the next page, participants were randomly assigned to read one of two passages asking them which issues should be the basis for judging whether President Obama is a good or bad president. All participants were shown five issues: health of Americans, happiness of Americans, foreign policy, job creation, and the housing market. In the falsifiable condition, falsifiability was made salient by marking two of the five issues as easily testable and by including a statement that discussed the testability of the issues: "Some of the issues can simply be easily tested by numbers, such as job creation and the housing market. You can easily look these up online. Others cannot be as simply tested by numbers: health of Americans, happiness of Americans, and foreign policy." In the

unfalsifiable condition, participants were shown the list of five issues with no mention of testability.

On the next page participants completed the dependent variable. Participants assessed the president's performance on the five issues ( $\alpha = .89$ ) using an unnumbered sliding scale that ranged from 0 (*Very Bad*) to 100 (*Very Good*).<sup>2</sup>

## Results

We predicted that supporters of the president would rate his performance more positively than opponents of the president, but that this difference would be less extreme in the falsifiable condition where falsifiability was mentioned. That is, we predicted an interaction between premeasured support for the president and the saliency of falsifiability.

To test these hypotheses, we regressed participants' mean rating of the president's performance on the five items on whether falsifiability was mentioned (dummy-coded: 0 = *testability mentioned*, 1 = *testability not mentioned*), mean-centered support for President Obama, and the interaction of falsifiability and premeasured support. As predicted, there was a falsifiability by support interaction,  $B = .24$ ,  $t(175) = 3.92$ ,  $p < .001$ , such that support of Obama had a stronger and more polarizing effect on ratings of Obama's performance when falsifiability was not mentioned compared to when it was mentioned (see Figure 2). This was reflected by a steeper polarization slope in the unfalsifiable condition,  $B = .96$ ,  $t(175) = 19.36$ ,  $p < .001$ , compared to the falsifiable condition,  $B = .65$ ,  $t(175) = 10.58$ ,  $p < .001$ .

Put another way, participants lower in support for Obama ( $-1 SD$ ) rated his performance worse in the unfalsifiable condition than in the falsifiable condition,  $B = -.23$ ,  $t(175) = -4.10$ ,  $p < .001$ . There was no difference between conditions for participants higher in support for Obama ( $+1 SD$ ),  $B = .08$ ,  $t(175) = 1.51$ ,  $p = .13$ .<sup>3</sup>

## Discussion

These findings provide further support for the psychological utility of unfalsifiability. When people wish to hold certain political beliefs—such as to disparage the president's performance—it is easier to do so in domains that are less falsifiable, as suggested by the stronger relationship between individual differences in support for the president and evaluation of his performance when falsifiability was not mentioned. This complements Experiment 1's findings that introducing unfalsifiability produces more zealous religious belief.

<sup>2</sup> In addition to rating the president's performance on each issue, participants rank-ordered each issue's importance for determining the president's performance overall. Although one might predict that within the falsifiability mentioned condition, the two items labelled as easily testable would be rated less important relative to the three items identified as less easily testable, this was not the case.

<sup>3</sup> One conservative test of our hypothesis would have been a between-items difference within the *falsifiability mentioned* condition, such that the three items labeled as "not as easily testable by numbers" would have produced more polarized ratings of the president's performance even relative to the two items labelled "more easily testable." This difference was not significant. We suspect that the initial instructions discussing testability in the falsifiability mentioned condition created a general mindset of falsifiability that overwhelmed any relatively more subtle differences in perceived unfalsifiability between the issues labeled as easily versus less-easily testable.

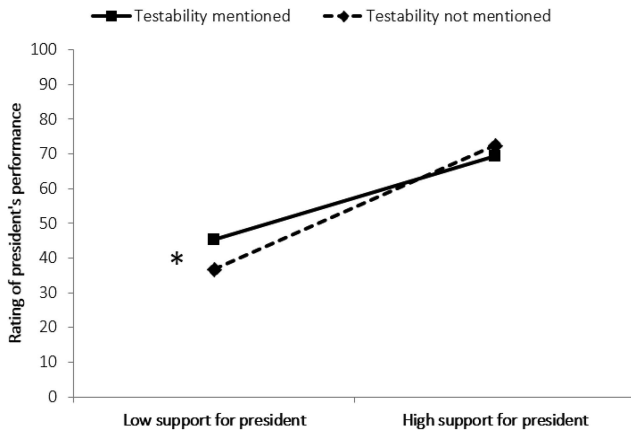


Figure 2. Experiment 2: Relationship between premeasured support for President Obama and ratings of the president's performance, by experimental condition, at  $\pm 1$  SD support. \*  $p < .05$ . Scale range 0–100.

Across these first two studies, then, we have observed that unfalsifiability may have an offensive function, allowing ideologues to commit to their beliefs more strongly and criticize their opponents more stridently. Next we shift directions to examine the defensive function of unfalsifiability. We investigate whether people will construe a cherished belief as more unfalsifiable by shifting the rationale behind their beliefs to frame them in more unfalsifiable terms (Experiments 3 and 4) when they are under factual attack.

### Experiment 3

Our main hypothesis regarding the defensive function of unfalsifiability is that people make their cherished beliefs more unfalsifiable when those beliefs are threatened. As an example, if someone is asked why she chose her car, there are many different reasons she could offer. Some reasons, like the gas mileage or safety rating, are more falsifiable. Others, like the feel of the car or personality of the car, are more unfalsifiable. These reasons might be equally valid reasons for choosing a car, but they differ in their degree of unfalsifiability. Furthermore, if someone is criticized for owning a gas-guzzling convertible, that driver might decide to reply, "Well, you can't beat the feeling of driving fast and feeling the wind in my hair," which is much harder to prove wrong than gas mileage. Similarly, if someone is asked why he is religious, he could provide a more falsifiable answer like, "Archeological evidence supports what the Bible says," or a more unfalsifiable answer like, "So I can go to heaven when I die" or "I can feel God's presence."

In Experiment 3 we reasoned that individuals' reported reasons for their own religious belief might not be invariant but, rather, responsive to salient motivational needs. This would be consistent with research showing that people cling to conceptualizations of God that provide, for example, meaning or control when those respective psychological needs were induced (Shepherd, Kay, Landau, & Keefer, 2011; Kay et al., 2008). It would also be consistent with more general research showing that individuals have limited insight into their own cognitive processes and reasons

that are cognitively accessible are assumed to be causal (Nisbett & Wilson, 1977).

To the extent that unfalsifiable reasons for religious belief are less subject to disconfirmation, they might be especially useful in belief maintenance when one's worldview is under threat. We predicted, therefore, that when religious people are presented with a threat to their worldview and asked to report the importance of various reasons for their religious faith, they would increase the reported importance of unfalsifiable reasons for their belief. Put another way, they would shield their beliefs by reframing them in more unfalsifiable terms.

### Method

**Participants.** Because we asked participants to introspect about their own religious beliefs, we prescreened Canadian undergraduate participants for a minimal level of religiosity using an item from a mass testing session: "How religious to you consider yourself?" Participants originally responded on a 7-point Likert scale (1 = *Not at all*, 7 = *Extremely*). Because the experimental materials would not make sense to the nonreligious, we only recruited individuals who had answered 2 (*Slightly religious*) or above ( $N = 126$ ). Nine were excluded because an attention check indicated they had not read the manipulation passage, which left 117 participants (74% female, ages 18–52,  $M = 20.9$  years,  $SD = 5.6$ ). All effects reported as significant remained so,  $p < .05$ , when all participants were included.

**Materials and procedure.** Participants were told that the study involved religious beliefs in contemporary society. They were randomly assigned to read a *religious threat* passage or a *no-threat* passage (see Appendix 3). Both passages began by reporting the recent scientific discovery of the Higgs boson, a subatomic particle critical to understanding the physical makeup of the universe. The religious threat passage then claimed that these findings undermine religious belief, while the no-threat passage stated that the Higgs is important to understanding nature and its discovery is consistent with religious belief.

A pilot test indicated that the threat passage was perceived as more threatening to religious belief than the no-threat passage. A separate sample ( $N = 88$ ), between participants, rated whether each passage was likely to *challenge*, *threaten*, and *make someone question* religious belief (three items, 1–5 scale,  $\alpha = .73$ ). The threat passage was more threatening ( $M = 2.31$ ,  $SD = .89$ ,  $n = 43$ ) than the no-threat passage ( $M = 1.84$ ,  $SD = .83$ ,  $n = 45$ ),  $t(86) = 2.56$ ,  $p < .01$ , Cohen's  $d = .55$ . When analyzed using multiple regression, mean-centered participant religiosity (same three items as Experiment 1, 1–5 scale,  $\alpha = .85$ , original  $M = 2.43$ ,  $SD = 1.29$ ) was marginally associated with perceiving the passages as less threatening,  $B = -.18$ ,  $t(85) = -1.75$ ,  $p = .08$ , but the main effect of passage type remained significant,  $B = .27$ ,  $t(85) = 2.65$ ,  $p = .01$ , and at Step 2 religiosity did not interact with type of passage,  $B = .07$ ,  $t(84) = .70$ ,  $p = .49$ .

Following several filler questions about the article to maintain the cover story, participants were asked to rate the importance of 10 possible reasons for why they believe in God, presented in random order. Seven of the items ( $\alpha = .88$ ) were intended to be relatively more unfalsifiable (i.e., less testable). For example: "Living a moral life would be impossible without God," and, "I worry about where I'll go when I die if I don't believe in God."

The remaining three reasons ( $\alpha = .88$ ) were intended to be relatively less unfalsifiable reasons (i.e., more testable). For example: “Scientific evidence demonstrates that God exists,” and, “Historical and archeological evidence shows how God intervened in the world.” For simplicity, we refer to the item groups as *unfalsifiable reasons* and *falsifiable reasons*, respectively, though they likely vary by degree of testability rather than being categorically different. All items were rated on a sliding scale from 0 (*Not at all important to why I believe*) to 100 (*Very important to why I believe*). A factor analysis using Experiment 3’s data and a separate pilot test supported our categorization of the 10 reasons for belief as unfalsifiable or falsifiable.<sup>4</sup> Finally, participants completed demographics.

## Results

To the extent that unfalsifiability is useful in defending one’s worldviews, we predicted a main effect such that participants in the threat article condition would report that unfalsifiable reasons were more important to their beliefs, compared to participants in the no-threat condition. In contrast, we predicted that the threat article would not affect the importance of the falsifiable reasons for belief. We also predicted an interaction between threat condition and participant religiosity such that the manipulation would most strongly affect highly religious participants (like occurred in Experiment 1).

First we examined the importance of unfalsifiable reasons for belief. Using multiple regression we entered mean-centered premeasured religiosity (original  $M = 3.85$ ,  $SD = 1.42$ ) and threat condition (effect-coded: 1 = threat;  $-1$  = no threat) as predictors. There was a strong main effect of religiosity,  $B = .72$ ,  $t(114) = 10.98$ ,  $p < .001$ , so that more religious participants rated the unfalsifiable reasons as more important than less religious participants. There was no main effect of threat,  $B = .03$ ,  $t(114) = .42$ ,  $p = .68$ . Adding the threat-by-religiosity interaction revealed the predicted interaction,  $B = .19$ ,  $t(113) = 2.95$ ,  $p = .004$ , see Figure 3a. Simple effects analysis (Aiken & West, 1991) revealed that threat caused participants higher in religiosity ( $+1 SD$ ) to assign more importance to unfalsifiable reasons for their beliefs,  $B = .22$ ,  $t(113) = 2.40$ ,  $p = .02$ , and participants lower in religiosity ( $-1 SD$ ) to assign them marginally less importance,  $B = -.16$ ,  $t(113) = -1.79$ ,  $p = .08$ . Put another way, religiosity predicted the importance of unfalsifiable reasons more strongly after threat,  $B = .93$ ,  $t(113) = 9.73$ ,  $p < .001$ , than after no threat,  $B = .55$ ,  $t(113) = 6.53$ ,  $p < .001$ .

Next we examined the importance of falsifiable reasons for belief. We used the same regression above but with falsifiable reasons as the dependent variable. Here, as predicted, the only significant predictor was religiosity,  $B = .52$ ,  $t(114) = 6.41$ ,  $p < .001$ . Neither the main effect of threat,  $B = .01$ ,  $t(114) = .15$ ,  $p = .89$ , nor the two-way interaction,  $B = .10$ ,  $t(113) = 1.20$ ,  $p = .23$ , were significant (see Figure 3b). Though the interaction was nonsignificant we also examined the simple effects of threat at  $\pm 1 SD$  on religiosity. The effect of threat was nonsignificant at both low,  $B = -.09$ ,  $t(113) = -.75$ ,  $p = .46$ , and high,  $B = .11$ ,  $t(113) = .96$ ,  $p = .34$ , religiosity.

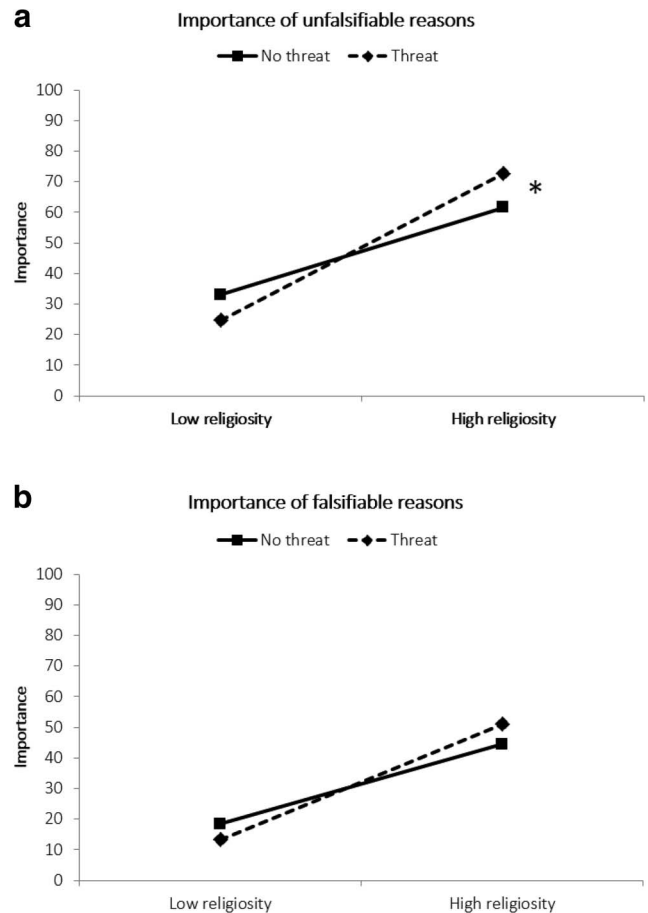


Figure 3. Experiment 3: Relationship between premeasured religiosity, by threat condition, and ratings of the importance of unfalsifiable (3a) and falsifiable (3b) reasons for religious belief, at  $\pm 1 SD$  religiosity. \*  $p < .05$ . Scale range 0–100.

## Discussion

Experiment 3 provided evidence that unfalsifiability might have psychological utility as a defensive strategy against worldview threat. When faced with information contradicting their beliefs, people can protect their cherished worldviews by emphasizing the relatively more unfalsifiable parts of them that are, presumably, less subject to disconfirmation.

One could also argue that—even in the absence of threat—unfalsifiable reasons for belief (e.g., to get to heaven) are more central or important to standard religious conviction, but falsifiable

<sup>4</sup> A separate sample ( $N = 48$ ), within participants, rated the testability of each of the reasons for religious belief (1–8 scale ranging from *completely untestable* to *completely testable*). Supporting our a priori categorization of the items, the unfalsifiable reasons were seen as less testable ( $M = 3.63$ ,  $SD = 1.36$ ) than the falsifiable reasons ( $M = 4.76$ ,  $SD = 1.67$ ),  $t(47) = 4.18$ ,  $p < .001$ , Cohen’s  $d = .61$ . Furthermore, a factor analysis of the importance ratings from Experiment 3 using a principal components analysis, varimax rotation, produced a 2-factor solution corresponding to our hypothesized categorization that, after rotation, accounted for 37% (unfalsifiable reasons) and 28% (falsifiable reasons) of the variance in importance ratings.



reasons for belief (e.g., archeological evidence) are not only more testable but also less central or important to the average believer. From this perspective, the pattern of results in Experiment 3 could have occurred because threat caused people to turn to or emphasize the more central religious tenets but not the less central religious tenets, regardless of their unfalsifiability. Put simply, threat increased the perceived importance of the most important reasons for belief. This relationship between the centrality of a belief and its level of unfalsifiability is a potential confound in Experiment 3. It may, however, be unavoidable when studying the rich context of religious belief because, according to our theorizing, we would expect those tenets of a belief system that are more unfalsifiable to gradually become more central and more important over time (a point we expand upon in the General Discussion). Furthermore, there was also a nonsignificant trend for falsifiable beliefs to increase in importance after threat, which could represent a general defensive increase in religious zeal generally (see, e.g., McGregor, Nash, & Prentice, 2012) rather than unfalsifiable beliefs specifically.

Given these potential limitations in Experiment 3, in Experiment 4 we sought additional evidence for the defensive function of unfalsifiable beliefs while holding constant the specific belief in question. We also returned to the domain of political beliefs.

### Experiment 4

One's political position—for example, on capital punishment—might be based on more or less falsifiable reasons. That is, one might support capital punishment if it reduces crime (a more easily falsifiable position) or oppose it because it is an intrinsic violation of human rights (a more unfalsifiable position). Based on Experiment 3's findings about the reasons for religious beliefs, however, we expected that people's reported reasons for their political positions might not be invariant, but rather in flux dependent on their motivational needs at the moment. Experiment 4 tested the hypothesis that people will shift their reported reasons for a political stance to be more unfalsifiable (i.e., based on "moral opinion") because this unfalsifiability allows them to maintain their stated stance even when the facts appear to contradict it. In other words, by shielding their political stance in unfalsifiable terms they avoid having to revise it based on potentially contradictory facts.

### Method

**Participants.** One hundred ninety-nine participants were recruited via Amazon's Mechanical Turk website for a study on current issues. Participants first reported whether they believed same-sex marriage should be (a) legal, (b) not be legal, or (c) they had no strong opinion. As our predictions are only relevant for participants who have established views on the issue, the no-opinion group was dropped, leaving 124 who supported and 50 who opposed same-sex marriage (61% female;  $M$  age = 32.0,  $SD$  = 12.7).

**Materials and procedure.** All participants read a passage about supposed data on the outcomes of children raised by same-sex parents (e.g., career success, criminality, intelligence) relative to children raised by opposite sex parents. The passage was manipulated so that for participants in the *same outcomes* condition, the article stated that children raised by same-sex couples have the

same outcomes as those raised by opposite sex couples. In the *worse outcomes* condition, the passage stated that children raised by same-sex couples have worse outcomes. Thus the ostensible facts either supported or opposed participants' political position.

Participants then rated whether the issue of same-sex marriage was less unfalsifiable—operationalized as fact-based—or more unfalsifiable—operationalized as opinion-based. This was measured using two items, one about legality, "Whether same-sex marriage should be legal is . . .", and one about child rearing, "Whether same-sex couples raise children as well as man-woman couples is . . .". Both items were answered on a 4-point forced choice scale (1 = *Completely a matter of fact* to 4 = *Completely a matter of opinion*).<sup>5</sup>

### Results

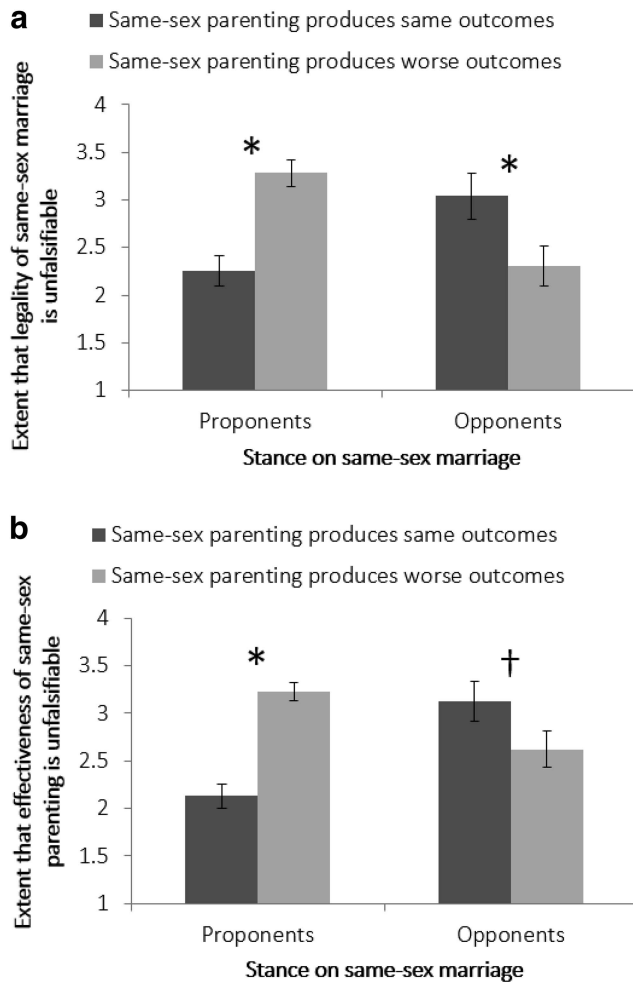
We predicted a two-way, crossover interaction between premeasured stance on same-sex marriage and parenting outcomes condition, such that participants with either position on same-sex marriage would report that the issue is more unfalsifiable (i.e., opinion-based) when they read facts inconsistent with their position. Specifically, we predicted that proponents of same-sex marriage would report the issue as more unfalsifiable when they read that children raised by same-sex parents have worse outcomes. In contrast, we predicted opponents of same-sex marriage would report the issue as more unfalsifiable when they read that children raised by same-sex parents have the same outcomes.

The two dependent measure items, legality and parenting, were analyzed separately in two 2 (Stance: proponent vs. opponent of same sex marriage)  $\times$  2 (Parenting outcomes: same vs. worse) between-subjects ANOVAs. We analyzed the two items separately because for opponents of same-sex marriage the two items were not significantly correlated.

**Legality.** An interaction between premeasured attitude and parenting outcomes emerged,  $F(1, 170) = 9.39, p = .003, \eta_p^2 = .052$  (see Figure 4a). Analyses of the simple effects revealed that proponents of same-sex marriage construed the issue as more unfalsifiable in the worse outcomes condition ( $M = 3.28, SD = 1.12$ ) than in the same outcomes condition ( $M = 2.26, SD = 1.24$ ),  $F(1, 170) = 5.83, p = .02, \text{Cohen's } d = .86$ . In contrast, opponents of same-sex marriage construed the issue as more unfalsifiable in the same outcomes condition ( $M = 3.04, SD = 1.20$ ) than in the worse outcomes condition ( $M = 2.31, SD = 1.09$ ),  $F(1, 170) = 5.49, p = .02, \text{Cohen's } d = .64$ .

**Effectiveness of same-sex parenting.** We observed the same interaction between stance and parenting outcomes,  $F(1, 170) = 25.92, p < .001, \eta_p^2 = .132$  (see Figure 4b). Proponents of same-sex marriage construed the issue as more unfalsifiable in the

<sup>5</sup> We also asked participants to indicate the relevance of moral principles and factual evidence to the issue of same-sex marriage independent from each other using four statements answered on a different agree-disagree Likert scale (e.g., "To what extent do you agree with: My opinion of same-sex marriage is based on scientific facts [morals]."). These secondary items had low reliability ( $\alpha = .33$  after reverse coding), and we suspect that measuring attitudes toward morals and facts independently did not capture the underlying dimension of falsifiability versus unfalsifiability because participants could endorse both moral and factual reasons for their beliefs simultaneously. The six items (standardized) had low reliability ( $\alpha = .47$ ) but analysis of the collapsed mean scores revealed the same pattern and significant interaction,  $F(1, 166) = 8.65, p = .004, \eta^2 = .046$ .



**Figure 4.** Experiment 4. Perceptions of the legality of same-sex marriage (4a) and effectiveness of same-sex parenting (4b) based on the interaction of participants' pre-measured stance on same-sex marriage and the manipulation article about same-sex marriage data. Higher values indicate issue is perceived as more a matter of moral opinion (i.e., unfalsifiable). Scale range: 1–4, \*  $p < .05$ , †  $p < .10$ . Error bars are standard error.

worse outcomes condition ( $M = 3.23$ ,  $SD = 0.82$ ) than in the same outcomes condition ( $M = 2.13$ ,  $SD = 1.02$ ),  $F(1, 170) = 5.83$ ,  $p = .02$ , Cohen's  $d = 1.19$ . In contrast, opponents of same-sex marriage construed the issue as more unfalsifiable in the same outcomes condition ( $M = 3.13$ ,  $SD = 1.03$ ) than in the worse outcomes condition ( $M = 2.62$ ,  $SD = 0.94$ ),  $F(1, 170) = 3.66$ ,  $p = .06$ , Cohen's  $d = .52$ .

## Discussion

When one holds a political position and encounters facts that appear to contradict that position, the rational response would be to revise one's belief to be more in line with the new information. Instead, when faced with threatening information, both proponents and opponents of same-sex marriage reported that the political issues of same-sex marriage and parenting were less about "facts" and more matters of moral opinion. In other words, they protected their political beliefs by framing the issue as more unfalsifiable.

Furthermore, Experiment 4 differs from classic findings that people derogate the methodology of studies that contradict their beliefs. For example, in Lord et al. (1979), comments from participants motivated to derogate a specific single study on capital punishment criticized its quality (e.g., by writing that more data were needed or that variables were selected in a biased way). In other words, they still valued empirical tests but argued that the current tests were flawed. In contrast, in the present study participants who were motivated to derogate a finding about same-sex marriage de-emphasized using factual information to inform the issue and instead prioritized the importance of unfalsifiable moral opinion.

## General Discussion

Much research on existential and epistemic motivations has shown that people's political or religious worldviews and beliefs often have a motivational basis (for reviews see Jost, Banaji, & Nosek, 2004; Sedikides, 2010). They are held, in part, to help satisfy individual-level motives. Much is also known about how people, on the individual level, defend these worldviews from factual threat. For example, people engage in biased information processing (Westen et al., 2006) or source derogation (Lord et al., 1979). Less is known, however, about what characteristics make some worldviews gain primacy over others (though see Dawkins, 1976; Lynch, 1996). The offensive and defensive prosperities of unfalsifiability may make it a good candidate. To the extent that beliefs held more strongly are more psychologically fulfilling (e.g., McGregor, 2006b; McGregor, Zanna, Holmes, & Spencer, 2001), and to the extent that unfalsifiability can increase zeal, belief systems that included aspects of unfalsifiability may have been ideally suited to serve psychological needs. Put another way, unfalsifiable belief systems may allow individual differences in belief strength to be expressed more strongly—whether in religious zeal, political opprobrium, or defensive retrenchment in one's position. This work extends past theorizing on the possible benefits of unfalsifiable religious beliefs (Freud, 1927, 1937; Kay, Gaucher, et al. (2010); Vail et al., 2010), is the first to propose specific offensive and defensive functions of unfalsifiability, offer empirical support for those functions, and demonstrate the utility of unfalsifiability in both spiritual and secular contexts.

When taken in tandem, the offensive and defensive functions of unfalsifiability might also provide insight into how some worldviews might become relatively more unfalsifiable over time. To the extent that specific unfalsifiable tenets of a worldview are the ones most often used offensively to criticize others and defensively least susceptible to disconfirmation, they may, over time, become the tenets that are most central or important to that worldview, even in the absence of threat. To be clear, we are not arguing that falsifiable questions like, "Can we prove God's existence?" or the objective performance of a president are irrelevant to belief. Rather, that it is a matter of degree of emphasis or focus. For example, in the *New York Times*, anthropologist T. M. Luhmann (2013) wrote:

Why do people believe in God? What is our evidence that there is an invisible agent who has a real impact on our lives? How can those people be so confident? These are the questions that university-educated liberals ask about faith. They are deep questions. But they are also abstract and intellectual. They are philosophical questions. In

an evangelical church, the questions would probably have circled around how to feel God's love and how to be more aware of God's presence. Those are fundamentally practical questions. You could imagine that if you were going to spend an hour or two each week fretting over one or the other, you might opt for the practical.

We suggest that when people turn to unfalsifiability, it is because these "practical" issues—for us, existential motives—like having positive self-worth, being a valued group member, or obtaining symbolic immortality, have temporarily trumped questions of belief accuracy or testability.

### Future Directions

Other research also shows that motivated reasoning often requires some ambiguity or "wobble room" (Dunning et al., 1989; Fernbach, Rogers, Fox, & Sloman, 2013; Mazar, Amir, & Ariely, 2008; Mishra, Mishra, & Shiv, 2011; Sloman, Fernbach, & Hagemayer, 2010). That is, strong facts are hard to ignore (Petty & Cacioppo, 1986), but if one's beliefs becomes unfalsifiable (e.g., opinion-based) then facts may be obviated altogether. Thus, it is possible that unfalsifiable ideologies might serve existential motivations even in situations where other motivated processes might be less able to operate, such as in the presence of unambiguous contrary evidence.

Future research might also more directly examine when people will turn to unfalsifiability versus engaging in other motivated belief defenses, such as source or methods derogation (e.g., Lord et al., 1979; Sinclair & Kunda, 1999, 2000), and when such strategies go together or diverge. It might be that only one technique or the other is necessary; for example, if someone has framed an issue as unfalsifiable then it might no longer be necessary to derogate the methods of a study that contradicts one's position. Or, vice versa, if one has already sufficiently justified one's beliefs by derogating the source of threatening information there might be no need to defensively reframe that issue in unfalsifiable terms. There may also be circumstances where unfalsifiability is less effective because decreasing the testability of a belief also means foregoing the possibility of being proven absolutely correct about it via empirical tests. If so, when the need to be correct (i.e., not just avoid being wrong) is salient, individuals may turn to other forms of motivated defense than unfalsifiability.

Another future question is whether there are degrees of unfalsifiability. A strict definition of unfalsifiability is some proposition that is permanently, absolutely untestable. Our definition of unfalsifiability also includes propositions that are exceptionally or temporarily impossible to test or evaluate. Although the current work operationalized unfalsifiability as categorical (e.g., testable or not), we suspect that for psychological purposes, the perceived unfalsifiability of some proposition ranges on a continuum from *practically and imminently testable* to *permanently impossible to test*. Supporting this continuum view, we were able to increase religious commitment by increasing unfalsifiability (Experiment 1), but also decrease political polarization by increasing falsifiability (Experiment 2). However, it remains to be seen with certainty whether unfalsifiability represents a continuum offering a range of psychological utility.

To the extent that data-informed public policies allow more effective use of resources (see Baron, 2012; Borstein, 2012), this research also raises the question of how people might be encour-

aged to rely less on unfalsifiable beliefs within political domains. We suggest three intervention-based avenues of future research. First, motivation-based psychological interventions that address the core psychological need that the unfalsifiable beliefs are defending might reduce the tendency to fall back on unfalsifiability. For example, if one is relying on unfalsifiable political ideology that serves needs for social belonging, then a belongingness affirmation should reduce defensiveness about those beliefs (cf. Sherman, Kinias, Major, Kim, & Prenovost, 2007; Sherman, Nelson, & Steele, 2000). Second, to the extent that individuals sometimes approach political issues with an unfalsifiable mindset, an intervention that reminds people about the empirical testability of public policies might reduce one outcome of unfalsifiability, polarization (Experiment 2). Third, encouraging a public commitment to testability or science before criticizing a policy could reduce the "defensive function" of unfalsifiability by making people less likely to turn to an ideology's more unfalsifiable aspects.

To be clear, in suggesting these interventions within public policy domains we do not imply a goal of reducing all types of unfalsifiable beliefs. In some cases, unfalsifiable beliefs might promote psychological well-being, perhaps even more powerfully because they are unfalsifiable (see Vail et al., 2010 for a discussion of this idea in the context of religious belief and death anxiety). It could be that in many cases the psychological utility gained by holding some types of unfalsifiable beliefs is beneficial to individuals without having negative consequences for society in the same way that, for example, an unfalsifiable public policy might.

### Implications

We conclude with a discussion of the macro social effects of unfalsifiability on belief, particularly how unfalsifiability may lead to polarization and intractability at a societal level and how people may actively wish to remove science from the discussion in an order to give their cherished beliefs an armor of unfalsifiability. Experiment 4 in particular may resonate with anyone who has watched cable news and seen a pundit tell a scientist that the data is just the scientist's "opinion" and immediately turn a conversation of objective metrics into a conversation of "beliefs." It seems as if people are motivated not only to deny isolated scientific findings but reduce the role of scientific inquiry in answering important social questions as doing so shields one's own beliefs in an armor of unfalsifiability. For example, 2012 Republican vice-presidential candidate Paul Ryan said: "Even if Washington could be good at picking winners and losers—which they're not—they shouldn't be in the business of picking winners and losers. That's not the role of government." (Stewart, 2012) Ryan believes the facts are on his side, but should he turn out to be wrong, he has already preemptively couched the issue of limited government as unfalsifiable moral principle instead of the more falsifiable question of government effectiveness.

It seems increasingly difficult to have rational discussion in the polarized political climate (DiMaggio, Evans, & Bryson, 1996). The current research suggests that this difficulty may be, at least in part, because people's beliefs are not based on falsifiable statements. Moreover, if including unfalsifiability is one defensive response to threat, popular beliefs systems may evolve to include more aspects of unfalsifiability over time, such as by marginalizing the relevance of science if they suspect that science does not

support their beliefs. To the extent that scientific inquiry is the best method to test hypotheses and falsify beliefs, people who have salient psychological needs, other than needs for accuracy, may progressively distance their beliefs from science and the corresponding social discourse. Scientists must be aware of such tendencies and see that even flawless and clearly communicated science may not convince people because people often have a powerful trump card hidden up their sleeve: unfalsifiability.

Our findings also have applied applications for the communication of science, and future research should take into account the defensive functions of unfalsifiability. For instance when unfalsifiability is most likely to be incorporated, under what mindsets people will permit themselves to hold falsifiable beliefs, how does temporary versus ultimate unfalsifiability influence beliefs, and how unfalsifiability might feel uncomfortable.

These results and speculations suggest that unfalsifiability may be a dangerous force in society at large. Though it might benefit individuals psychologically or groups socially, unfalsifiability might also lead people and societies to continually make truth-defying decisions. To the extent that the success of a society largely depends on its ability to respect good data and change behavior accordingly (Sheikh, 2013), a devotion not just to ideas but to testing those ideas is necessary for the welfare and improvement of the society. Understanding the appeal of unfalsifiability is therefore an important question for a world that seems, on the one hand, actively interested in testable scientific data as evidenced by recent reforms in the United States to evidence-based policy (Baron, 2012; Borstein, 2012) but, on the other hand, at times seems to wish to remove the data from the discussion. This puzzle must be solved if evidence-based policy is to win out.

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(Appendices follow)

## Appendix 1

### Manipulation of Religion's Perceived Unfalsifiability (Experiment 1)

#### Science May [Never] Be Able to Answer Questions About God

**[Both Conditions].** A common belief, across many different religions, is that God exists and is in control, at least in part, of the events that unfold in the universe. Can we test whether God, or some type of supernatural force, is operating in our universe? At a recent conference at Harvard University, almost 100 of the world's greatest minds debated these questions. Is science able to confirm or deny religious beliefs?

**[Unfalsifiable Condition].** One speaker, Dr. John Wentworth, professor of physics at the Massachusetts Institute of Technology, argued that regardless of future advances, science will likely never discover whether the supernatural exists. Wentworth described recent advances in theoretical and metaphysical physics and how they have not provided answers to many "big questions" about the universe. Even as scientists gain a better appreciation for the operation and development of existence and consciousness, it will never become possible to test hypotheses that support or refute the possibility of God's existence. "Almost always, our research raises more questions than it answers, therefore the question of God's existence just isn't scientifically testable," he said.

Another speaker, Dr. Sheila Channing, Director of Neuroscience at Johns Hopkins University, argued that technology breakthroughs in neuroscience and brain imaging are raising more questions than they answer. "Is human consciousness something more than just neurons firing? Can science prove the existence of

the soul? The more we investigate the brain, the more mysteries we find. We will probably never know." In the end, she concluded that science cannot give definite answers to questions about the supernatural.

**[Falsifiable Condition].** One speaker, Dr. John Wentworth, professor of physics at the Massachusetts Institute of Technology argued that yes, one day science will be able to shed light on whether the supernatural exists. Wentworth described recent advances in theoretical and metaphysical physics and how they have allowed scientists to answer many "big questions" about the universe. Although this will not likely happen any time in the near future, he suggested that as scientists gain a better appreciation for the operation and development of existence and consciousness, it will become possible to test hypotheses that support or refute the possibility of God's existence. "Eventually, we may be able to test scientifically whether or not God exists," he said.

Another speaker, Dr. Sheila Channing, Director of Neuroscience at Johns Hopkins University, argued that technology breakthroughs in neuroscience and brain imaging are providing many new insights. "Is human consciousness something more than just neurons firing? Can science prove the existence of the soul? We don't know the answer yet, but the answer is not decades, but years away." In the end, she concluded that science may soon provide definite answers to questions about the supernatural.

**[Both Conditions].** Both experts emphasized that their goal is not to prove or disprove aspects of religious beliefs, only that they are scientists looking for answers—whatever they may be.

## Appendix 2

### Religious Belief Strength (Experiment 1)

1. I feel that God is at least partly responsible for control over the ongoing events in our universe
2. I feel that God has a hand in running my life.
3. If events in my life are out of control, I often turn to God.
4. It's important to me to believe that God is in control of my life.
5. I find it comforting to know that there is a greater power looking over me.
6. I feel I am not in control of my life—God or something supernatural is.
7. To a great extent my life is controlled by spiritual forces or by God.
8. If you think that God will eventually fix everything for you, you are setting yourself up for a disappointment.
9. Too many people's lives never improve because they think that God will eventually do everything for them.
10. I'd rather be in charge of my own life than have it be controlled by God.
11. My life is determined more by my own actions than by supernatural or spiritual forces.

(Appendices continue)

12. It's unsettling to think that there's a God or some supernatural force controlling my fate.
13. When I get what I want, it's usually because I worked hard for it, not because of God or fate.
14. The idea that God is directing everyone's lives is a bit silly.
15. God provides an important sense of meaning and purpose in my life.
16. When I think about the most meaningful aspects of my life, they all revolve around my spirituality.
17. It is a good thing that we have religion to give people hope and something to believe in.
18. My spiritual or religious beliefs provide a sense of purpose in my life.
19. Even though they were written long ago, the meaning behind many religious and spiritual texts is just as relevant today.
20. Without my spirituality or religion, I wouldn't have much purpose in life.
21. In life, I think God can answer the questions, "Why am I here, and what is my purpose?"
22. Ultimately, questions about meaning in life can only be answered through God or spirituality.
23. People can live with a sense of purpose even if they are not religious.
24. People can make sense of their lives just as easily using sources other than religion.
25. In the search for meaning in life, I look to places other than God.
26. Religious beliefs about life and the universe are less necessary in our society today than they were in the past.
27. Religious stories about miracles and heaven are no different than fairy tales and bedtime stories.
28. I would find religious texts and stories to be pretty useless when I am looking for answers to life's questions.
29. Most of the answers that God/religion provide for understanding life do not really work for me.
30. The quest for insight and a life perspective through God is a dead end.

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*Note.* Item order was randomized for each participant. Reverse-scored: 8–14, 23–30. Item 1 from Kay et al. (2008). Items 8, 9, 14, 25, 29, 30 from Kay, Shepherd, et al. (2010).

### Appendix 3

#### Religious Threat Manipulation from Experiment 3

##### **[Threat Condition] Experiments' Findings Raise Questions About God's Existence; [Nonthreat Condition] Experiments' Findings Give Insight Into Workings of the Universe**

**[Both Conditions].** In a much anticipated announcement, researchers at the Large Hadron Collider (LHC) have announced their discovery of the "Higgs boson," a subatomic particle commonly known as "The God Particle." The LHC is the world's largest atom smasher, where physicists work to learn more about the fabric of the universe. "We have reached a milestone in our understanding of nature," said Dr. Rolf Heuer, the LHC's director.

**[Threat Condition].** Some scientists have argued that these experiments offer a naturalistic answer to many questions about the universe's beginnings. In the past, these could only be answered by religious explanations or the actions of God. University of Arizona physicist Dr. Laurence Krauss wrote, "The Higgs boson actually should probably be called the *Godless* particle . . . [it] permeates all of space and is largely responsible for the

existence of stars, planets and humans. Modern physics has said for years: The many features of our universe can be largely accidental consequences of the conditions associated with the universe's 'birth,' consistent with the laws of physics . . . everything we see could arise naturally without supernatural shenanigans."

**[Nonthreat Condition].** The Higgs boson is the last undiscovered particle predicted to exist by the standard model of matter that scientists have been hunting for almost 50 years. It is thought to give all other particles their mass, and some have dubbed it "the God particle" because of its importance. One scientist, Dr. Larry Vardiman, a Christian, wrote that scientists have "the best seat in the house" to observe God's handiwork.

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*Note.* Manipulation based on Boyle (2012), CERN (2012), and Vardiman (2012).

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