Political and Non-Political Belief Change Elicits Behavioral Change

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ABSTRACT

Beliefs have long been posited to be a predictor of behavior. However, empirical evidence of the relationship between beliefs and behaviors has been mostly correlational in nature and provided conflicting findings. Here, we investigated the causal impact of beliefs on behaviors across three experiments (N=659). Participants rated the accuracy of a set of health-related statements (belief pre-test) and chose corresponding campaigns to which they could donate funds in an incentivized choice task (behavior pre-test). They were then provided with relevant evidence in favor of the correct statements and against the incorrect statements. Finally, they rated the accuracy of the initial set of statements again (belief post-test) and were given a chance to change their donation choices (behavior post-test). We found that evidence changed beliefs and this, in turn, led to behavioral change. In two pre-registered follow-up experiments, we replicated these findings with politically charged topics, and found a partisan asymmetry in the effect of belief change on behavioral change in Democrats (but not in Republicans). We discuss the implications of this work for interventions aimed at promoting constructive behaviors such as recycling, donating, or employing preventative health measures.

Keywords: belief change, behavioral change, health beliefs; political beliefs

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Behavior is consequential in every aspect of life. Understanding, predicting, and encouraging optimal behaviors in the population at large is therefore of critical concern to a wide range of individuals from policy makers interested in promoting pro-environmental behaviors to public health officials interested in facilitating preventative health behaviors. Accordingly, entire research fields have dedicated resources to documenting predictors of behavior, to unveil ways in which individuals can be nudged towards behaviors beneficial to themselves and to society (Thaler & Sunstein, 2009). People's beliefs have been posited to be one such predictor (Ajzen, 1991; Hochbaum, 1958). And indeed, real-world examples of beliefs influencing behavior are readily available. For instance, the now widespread false belief that vaccines cause autism has deterred many parents from vaccinating their children, which led to an increase in preventable hospitalizations, deaths, and spending (Poland & Spier, 2010; Ratzan, 2010; Larson et al., 2011). In the current paper, we examine the causal influence of belief change on behavior change.

Several models theorized the psychological factors that impact behavior. Among these factors, the theory of planned behavior (Ajzen, 1985, 1991; an extension of the theory of reasoned action, Fishbein & Ajzen, 1975), emphasizes intentions arising from attitudes, beliefs, and social norms as the main drivers of human behavior. Similarly, the health belief model emphasizes beliefs and attitudes as predictors of human decision making (Hochbaum, 1958; Rosenstock, 1960, 1974). Several studies provided empirical support for these theories. For instance, individuals who believed they were susceptible to tuberculosis and believed in the benefits of early detection were more likely to have a voluntary chest X-ray (82%) than individuals who didn't hold these beliefs (21%) (Hochbaum, 1958).

Despite being widely influential, these theories suffer from criticism that they lack experimental testing, the empirical studies supporting them being primarily based on correlational designs (Noar & Zimmerman, 2005; Champion & Skinner, 2008). Another limitation of these theories is their specific focus on health-related beliefs and corresponding behaviors, thus lacking generalizability to other types of beliefs. We address these limitations by experimentally testing the causal connection between beliefs and behaviors, while going beyond health beliefs and exploring the space of politically charged topics. Our interest in studying the change of political beliefs stems from prior observations that partisan identities can impair belief updating (Van Bavel & Periera, 2018), and that evidence of fact checking is particularly ineffective for political topics (for a review, see Van Bavel et al., 2021).

A belief is a mental acceptance of the truth of a statement (Schwitzgebel, 2010). Beliefs are thought to provide the 'mental scaffolding' for appraising one's environment (Halligan, 2007), thus constructing the "mental architecture" for interpreting the world (Jha, 2005). They are different from knowledge in the conviction they are held with (Fishbein & Ajzen, 1975), and the self-referential element they contain (Connors & Halligan, 2015). Beliefs are also different from attitudes in that they lack the evaluative (e.g., good/bad) component of attitudes, being centered instead on the accuracy component (i.e., true/false) (Eagly & Chaiken, 1993).

A fundamental property of beliefs is that they are subject to change, given their dynamic nature (Bendixen, 2002). Indeed, prior work has identified several strategies that proved effective at changing beliefs, such as using fictional narratives (Wheeler, Green, & Brock, 1999), nudging accuracy goals (Pennycook et al., 2020), manipulating memory accessibility (Vlasceanu & Coman, 2018; Vlasceanu, Morais, Duker et al., 2020), appending emotional arousing images (Vlasceanu, Goebel et al., 2020), triggering prediction errors (Vlasceanu, Morais & Coman, 2021), or increasing the salience of social norms (Vlasceanu & Coman, 2020b).

Even though the literature documenting the relation between beliefs and behavior is extensive (Sulat et al., 2018), it suffers from important limitations. First, the empirical investigations into this relation offer conflicting findings. Some studies found that beliefs influence behavior, for example religious beliefs predict crime rates (Shariff & Rhemtulla, 2012), and beliefs about intelligence predict learning success (Mangels et al., 2006). However, other studies reported that beliefs are an unreliable predictor of behavior. For example, beliefs about outgroup members do not predict behaviors towards them (Paluck, 2009). This apparent inconsistency in results could be explained by the fact that work in this literature has rarely used experimental manipulations (Noar & Zimmerman, 2005; Champion & Skinner, 2008), which constrains the causal links that could be inferred from such data.

Current research

Across three experiments, we studied the causal impact of beliefs on behaviors. To test behavioral change as a function of belief change, we designed an experiment composed of five phases. First, participants rated the accuracy of a set of statements (belief pre-test phase). In experiment 1, these statements were health-related, and in experiments 2 and 3 (i.e., pre-registered replications of experiment 1) they were politically charged. In all experiments, half of the statements were accurate, and half were inaccurate. Participants were then told they would be able to help address some of the issues brought up by these statements, by donating funds allocated by our team (a fixed amount) to campaigns corresponding to each statement, designed to raise awareness about the issues (i.e., in an incentivized choice task; behavior pre-test). In the evidence phase, participants were shown the true accuracy of the initial statements, as denoted by scientific investigations into each matter. Then, they were asked to evaluate each statement again (belief post-test) and were given the opportunity to adjust their fund allocation choices (behavior post-test).

Our first hypothesis is that beliefs at pre-test will predict behavior at pre-test. Our second hypothesis is that belief change (belief post-test minus belief pre-test) will cause behavioral change (behavior post-test minus behavior pre-test). More specifically, an intervention aimed at increasing a statement's believability will lead to increased monetary support allocated to the corresponding campaign and decreasing a statement's believability will lead to decreased monetary support allocated to the corresponding campaign.

Open science practices.

The materials and data can be found on our open science framework page:
https://osf.io/6rqkn/
The data analysis (in python and R) can be viewed as a jupyter notebook here:
https://github.com/mvlasceanu/BeliefBehavior
The pre-registrations can be found here:
Experiment 2: https://aspredicted.org/blind.php?x=vp6sa6
Experiment 3: https://aspredicted.org/blind.php?x=6bu9jq

Experiment 1

Methods

Participants. We aimed for a sample size of 200 participants to achieve a 0.8 power for an effect size of 0.2 in a two tailed paired sample t-test at an alpha level of 0.05. A total of 200 participants were recruited for the experiment on Cloud Research, a participant-sourcing platform for online research providing immediate access to millions of diverse, high-quality respondents around the world (Litman, Robinson, & Abberbock, 2016). Participants were compensated at the platform's standard rate. Of the 200 total participants, 183 passed the pre-established attention checks and were included in the rest of the analyses (M_{age}=53; SD_{age}=17; 63% female). The experiment was approved by the Institutional Review Board at Princeton University.

Stimulus materials. We used a set of 16 statements (e.g., "*A child's untreated wandering eye can lead to permanent vision loss in that eye*"; Appendix 1), pretested in prior work (Vlasceanu & Coman, 2020) on a Cloud Research sample (N=217; M_{age}=54.16, SD_{age}=16.3; 82% women), in which we collected believability ratings (i.e., "*How accurate or inaccurate do you think this statement is*" on a scale from 0 = *Extremely Inaccurate* to 100 = *Extremely Accurate*). The pretest ensured that all the statements were moderately believable (M=51.02, SD=24.6), to avoid any floor or ceiling effects in belief change. Half of the statements were actually accurate, while the other half were inaccurate pieces of information, as determined by published scientific papers or other official sources.

For each of the 16 statements, we designed a corresponding donation campaign (e.g., "*Campaign for raising awareness about the danger of children's untreated wandering eyes"*), tailored to raise awareness about that specific topic.

Lastly, for each of the 16 statements, we also constructed a piece of evidence, arguing in favor of the accurate statements (e.g., "*Studies/reports show that a child's untreated wandering eye can lead to permanent vision loss in that eye"*) and against the inaccurate statements (e.g., "*Studies/reports show that allergy shots are not helpful for food allergies"*).

Design and procedure. Data collection occurred in August 2020. Participants were told they would participate in an experiment about people's evaluation of information and were directed to the survey on the Qualtrics platform. After completing the informed consent form, participants were directed to the first phase (pre-test), in which they rated a set of 16 statements (one on each page) by indicating the degree to which they believed each statement (i.e., "*How accurate do you think this statement is*," from 1 = *Extremely inaccurate* to 100 = *Extremely accurate*). In the second phase (behavior pre-test), participants were told they would be able to help address some of the issues brought up by these statements, by donating funds allocated by our team to campaigns corresponding to each statement (e.g., "*Campaign for raising awareness about the danger of children's untreated wandering eyes"*), designed to raise awareness (i.e., *"For each person completing this survey, our team will donate $100 to a campaign, (or will allocate the donation to multiple campaigns) according to each person's preference. In this phase, you will choose how to allocate the $100 donation"*).

In the evidence phase, participants were provided evidence in favor of the accurate information against the inaccurate information from the first phase, as denoted by scientific investigations into each matter. The evidence instructions were: *"You will now see which statements are accurate and which are not, based on scientific studies and official reports."* Then, participants were asked to evaluate each statement again (belief post-test) and were given the opportunity to adjust their fund allocation choices (behavior post-test). Finally, participants answered the demographic information questions and were debriefed. In the debrief, we informed participants the campaigns were not real, and their donations would not be carried through.

Results

To test our first hypothesis, that beliefs at pre-test will predict behavior at pre-test, we conducted a linear mixed model with behavior at pre-test as the dependent variable and belief at pre-test as the fixed effect, including by-participant and by-item random intercepts. We found a significant effect of belief at pre-test $\beta=0.17$, $SE=0.01$, $t(1449)=9.26$, $p<0.001$ on behavior at pre-test (Fig. 1A). This result suggests that people's beliefs predict their corresponding behaviors.

For our second hypothesis, that belief change will cause behavioral change, we ran a linear mixed model with behavior change as the dependent variable, belief change and behavior at pre-test as fixed effects, including by-participant and by-item random intercepts. In the second model we included behavior at pre-test as a fixed effect to observe the independent effect of belief change on behavior change while controlling for initial behavioral tendencies that could potentially confound the relationship of interest. We found a significant effect of belief change $\beta=0.08$, $SE=0.01$, $t(1308)=6.8$, $p<0.001$ on behavioral change (Fig. 1B). This result suggests that belief change causes behavioral change.

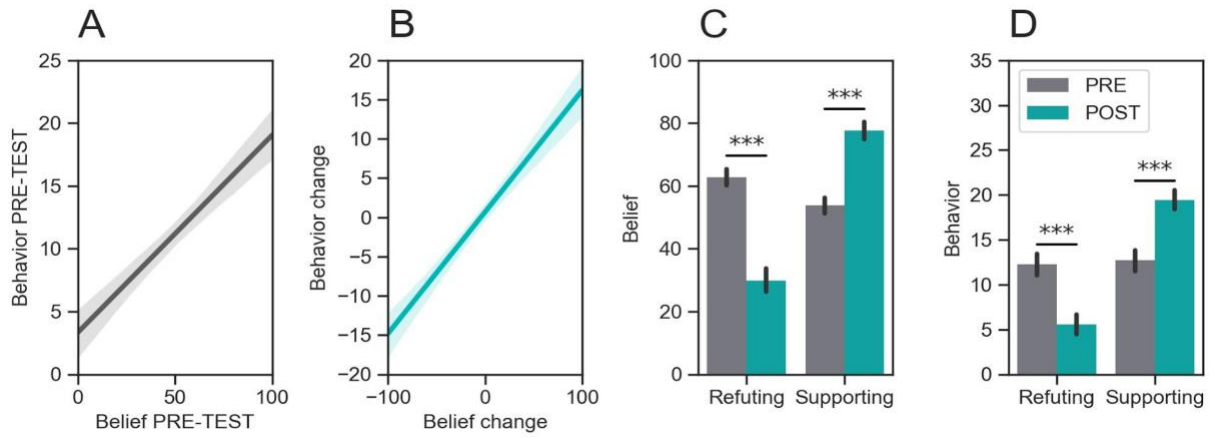

Figure 1. Behavior at pre-test as a function of belief at pre-test (**Panel A**). Behavior change as a function of belief change (**Panel B**). Belief (**Panel C**) and behavior (**Panel D)** data split by the evidence manipulation (refuting vs. supporting belief evidence) and by time point (pre-test in grey vs. post-test in green). The results suggest that beliefs predict behaviors, and belief change causes behavioral change.

To assess whether the effect of evidence type (in favor/against) on behavioral change would be mediated by the degree of belief change, we ran a mediation model following guidelines and using the R mediation package published by Tingley and colleagues (2014). As Figure 2 illustrates, the regression coefficient between evidence type (in favor/against) and behavior change was statistically significant, as were the regression coefficients between evidence type and belief change and between belief change and behavior change when controlling for evidence type.

We tested the significance of the indirect effect using bootstrapping procedures. The indirect effect was computed for each of 10,000 bootstrapped samples, and the 95% confidence interval was computed by determining the indirect effects at the 2.5th and 97.5th percentiles. The bootstrapped indirect effect was 4.58, and the 95% confidence interval ranged from 2.48 to 6.71. Thus, the indirect effect was statistically significant, $p<0.001$ (Table 1; Table 2). This result suggests that the effect of evidence on behavioral change is partially mediated by belief change.

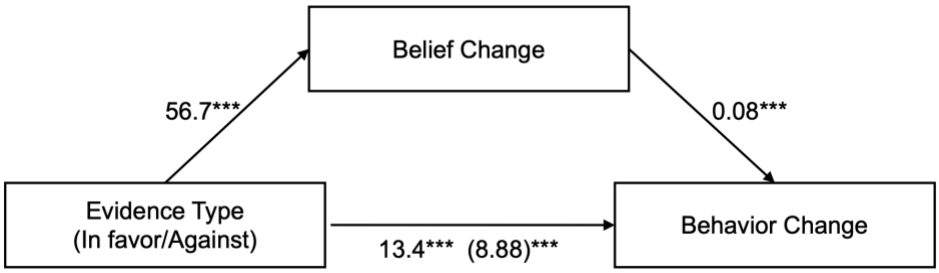

Figure 2. Regression coefficients for the relationship between evidence type (in favor versus against) and behavior change as mediated by belief change. The standardized regression coefficient between evidence type and behavior change, controlling for belief change, is in parentheses. This result suggests that the effect of evidence on behavioral change is partially mediated by belief change.

Table 1
Regression analyses associated with the mediation model.

Predictors	*b* (s.e.)	*t*	*F*	*df*	R^2	*p*
Model 1						
Evidence type	13.4 (0.95)	14.1***	200.7	(1, 364)	0.355	<0.001
Model 2						
Evidence type	8.88 (1.38)	6.40	115.2	(2, 363)	0.38	<0.001
Belief change	0.08 (0.01)	4.42***			0.38	<0.001

b = regression coefficients; s.e. = standard error
* p<0.05; ** p<0.01; *** p<0.001

Table 2
Causal mediation analyses: nonparametric bootstrap CI, with 10,000 simulations

	Estimate	95%CI lower	95%CI upper	p
Indirect Effect (ACME)	4.58	2.48	6.71	<0.001***
Direct Effect (ADE)	8.86	6.14	11.64	<0.001***
Total Effect	13.44	11.56	15.26	<0.001***
Proportion Mediated	0.34	0.17	0.50	<0.001***

ACME = average causal mediation effects; ADE = average direct effect

Discussion

In experiment 1, we found support for our two hypotheses: (1) that belief predicts behavior, and (2) that belief change predicts behavioral change. Moreover, when investigating the mechanism of the latter process, we found that evidence caused belief change, which, in turn, caused behavioral change. This experiment suffers however from two important limitations. First, contrary to real-world scenarios, participants' donation behavior came at no personal cost. And second, the health beliefs tested here were fairly neutral, thus moderately endorsed. In real-world circumstances, people's beliefs are typically ideologically charged.

To overcome these limitations, in experiment 2 we allowed participants to keep the funds to themselves if they did not want to engage in the donation behavior, increasing the ecological validity of the paradigm. Moreover, the beliefs tested in experiment 2 were partisan (i.e., Democratic or Republican). To increase the generalizability of our findings, we changed the population from which we sampled our participants, from Cloud Research workers to Princeton University students.

Experiment 2

Methods

Participants. To replicate experiment 1, we aimed again for a sample size of 200 participants. However, only a total of 90 Princeton University students signed up for the experiment and completed it before our data collection stopping date (i.e., the 2020 Presidential election), which decreased our power of finding an effect of 0.2 to 0.46. Participants were compensated with subject pool research credit. Of them, 83 passed the pre-established attention checks (M_{age}=19.45; SD_{age}=1.26; 68% female). The experiment was approved by the Institutional Review Board at Princeton University.

Stimulus materials. We used a set of 8 politically charged statements (Appendix 2), half accurate and half inaccurate as determined by published scientific papers or other official sources. These statements had been pretested in prior work by Vlasceanu, Morais, and Coman (2021) to ensure that half of them were endorsed more by Democrats than by Republicans (e.g., "*Millions of children in the US have witnessed a shooting in the past year")* and vice-versa (e.g., *"Hundreds of thousands of abortions in the US are paid for with public funds each year")*.

For each statement we constructed a corresponding piece of evidence, in favor of the accurate statements and against the inaccurate ones. An example of a piece of evidence is: "*Millions of children in the US have witnessed a shooting in the past year. Studies/reports show that 4% of children in the US (or 2.96 million children) have witnessed a shooting in the past year."* Moreover, for each statement we constructed a corresponding campaign (e.g., "*Gun Control Campaign for raising awareness that millions of children in the US have witnessed a shooting in the past year"*).

Design and procedure. Data collection occurred between September and November 2020. The design and procedure were the same as in experiment 1 (i.e., five phases: belief pretest, behavior pretest, evidence, belief posttest, behavior posttest), with one exception - participants were now given the option of keeping the monetary donation allocated by our team for themselves, instead of donating it to one or more campaigns (*"For each person completing this survey, we will donate $10. You will decide where this donation will end up. You can allocate this donation to one or more of the following campaigns. You can also decide to keep part or all of it for yourself*

(in which case we will ask for your Venmo information to complete the transfer). In this phase, you will choose how to allocate the $10"). After completing the experiment, we sent participants the funds corresponding to their choice if they decided to keep part of or the entire amount. This addition to the design was made to increase the ecological validity of the donation behavior, which, in real life comes at a monetary cost to the individual.

Results

To replicate the results of experiment 1, we conducted a linear mixed model with behavior at pre-test as the dependent variable and belief at pre-test as the fixed effect, including by-participant and by-item random intercepts. Just like in experiment 1, we found a significant effect of belief at pre-test β=0.009, SE=0.003, t(661)=2.87, p=0.004 on behavior at pre-test (Fig. 2A). Thus, we successfully replicated the first finding in experiment 1.

Moreover, we ran a linear mixed model with behavior change as the dependent variable, belief change and behavior at pre-test as fixed effects, including by-participant and by-item random intercepts, and again found a significant effect of belief change β=0.005, SE=0.002, t(622)=2.49, p=0.013 on behavioral change (Fig. 2B). Thus, we also successfully replicated the second finding in experiment 1.

We did not conduct ideological exploratory analyses given that our sample of Princeton University students only included 6 Republican participants.

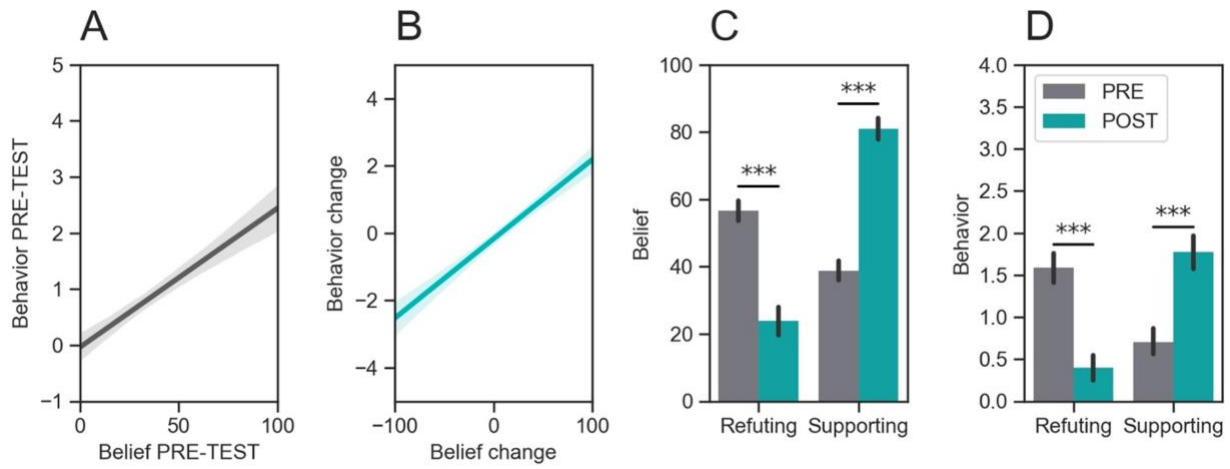

Figure 3. Behavior at pre-test as a function of belief at pre-test (**Panel A**). Behavior change as a function of belief change (**Panel B**). Belief (**Panel C**) and behavior (**Panel D)** data split by the evidence manipulation (refuting vs. supporting belief evidence) and by time point (pre-test in grey vs. post-test in green). These results replicate the findings in experiment 1.

Discussion

In experiment 2, we replicated the two main results we found in experiment 1: (1) that belief predicts behavior, and (2) that belief change predicts behavioral change, in a sample drawn from

a different population, this time with politically charged beliefs, and a more ecologically valid behavioral paradigm. Thus, we extended both the generalizability and the validity of our findings. Next, we were interested in how these effects interact with people's ideological leaning. Given that over 90% of the sample in experiment 2 identified as Democratic, we could not investigate such interactions in this dataset. Thus, in experiment 3, we recruited enough participants on both sides of the partisan divide to conduct these analyses.

Experiment 3

Methods

Participants. Given our interest in exploring partisan differences in the effects reported in the previous two studies, we preregistered our intent to collect a sample of 400 participants to detect an effect size of 0.09 in a within-between interaction of a Repeated Measures ANOVA with 80% power at a significance level of 0.05 (two-tailed). We recruited a total of 421 Americans from Amazon Mechanical Turk (MTurk; an online recruiting source that is not nationally representative but produces similar results to nationally representative samples in various experiments related to politics; Coppock, 2018). Of them, 393 (256 Democrats and 137 Republicans) passed the pre-established attention checks (M_{age}=37.8; SD_{age}=11.15; 59% female). The experiment was approved by the Institutional Review Board at Princeton University.

Stimulus materials. We used the same set of 8 politically charged statements from experiment 2 (Appendix 2), the same corresponding pieces of evidence, and the same corresponding campaigns.

Design and procedure. Data collection occurred in January 2021. The design and procedure were the same as in experiment 1, with two exceptions. First, similar to experiment 2, participants were now given the option of keeping the monetary donation allocated by our team for themselves, instead of donating it to one or more campaigns (*"For each person completing this survey, we will donate $1. You will decide where this donation will end up. You can allocate this donation to one or more of the following campaigns. You can also decide to keep part or all of it for yourself, in which case you will receive the amount as a bonus"*). After completing the experiment, we sent participants the funds corresponding to their choice. Again, this addition to the design was made to increase the ecological validity of the donation behavior, which, in real life comes at a monetary cost to the individual.

Results

To again replicate the results of experiment 1, we conducted a linear mixed model with behavior at pre-test as the dependent variable and belief at pre-test as the fixed effect, including by-participant and by-item random intercepts. Just like in experiment 1 and experiment 2, we found

a significant effect of belief at pre-test β=0.05 SE=0.007, t(2440)=7.95, p<0.001 on behavior at pre-test (Fig. 4A), successfully replicating the first finding again.

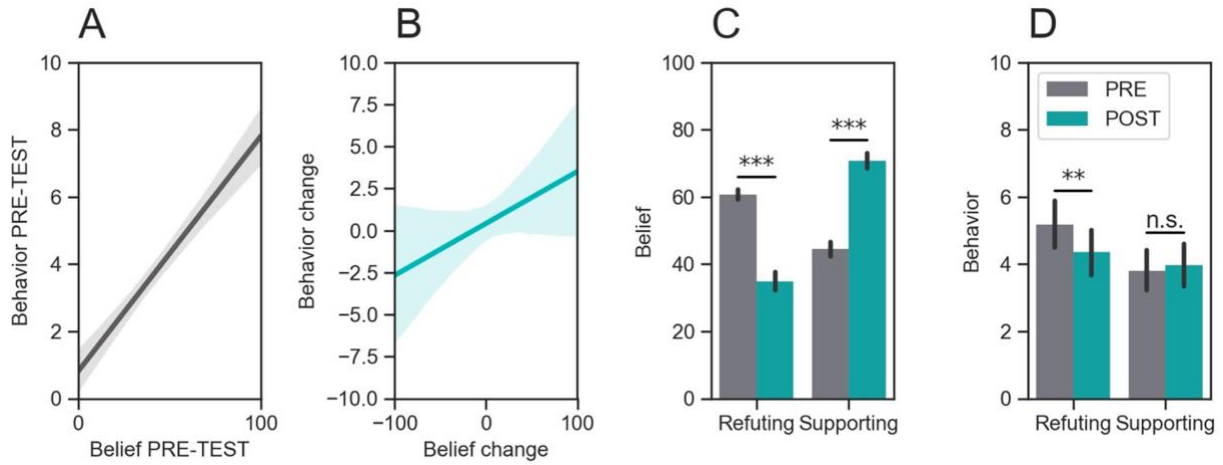

Figure 4. Behavior at pre-test as a function of belief at pre-test (**Panel A**). Behavior change as a function of belief change (**Panel B**). Belief (**Panel C**) and behavior (**Panel D)** data split by the evidence manipulation (refuting vs. supporting belief evidence) and by time point (pre-test in grey vs. post-test in green).

Moreover, we ran a linear mixed model with behavior change as the dependent variable, belief change and behavior at pre-test as fixed effects, including by-participant and by-item random intercepts, and found a significant effect of belief change β=0.01, SE=0.004, t(396)=3.36, p<0.001, on behavioral change (Fig. 4B), also successfully replicating the second finding again.

In exploratory analyses, we investigated the relationship between belief and behavior as it interacts with item and participant partisan identity. First, for belief at pretest and behavior at pretest, we conducted a linear mixed model with behavior at pretest as the dependent variable, belief at pretest as it interacts with item type (Democratic, Republican) and participant type (Democratic, Republican) as the fixed effect, including by-participant random intercepts. We found a significant main effect of belief at pretest on behavior at pretest β=0.04, SE=0.01, t(3103)=3.84, p<0.001, but no participant or item type interactions with this effect (Fig. 6A, 6B). The results show that belief at pretest linearly predicts behavior at pretest in all of the four ideological conditions crossing participant identity and item identity (i.e., Democrats on Democratic and Republican items, as well as Republicans on Democratic and Republican items).

Second, for belief change and behavior change, we conducted a linear mixed model with behavior change as the dependent variable, belief change as it interacts with item identity type (Democratic, Republican) and participant identity type (Democratic, Republican) as the fixed effect, including by-participant random intercepts. We found a significant main effect of belief change β=0.02, SE=0.005, t(3136)=4.73, p<0.001 on behavioral change, and an interaction between the effect in Democratic participants on Democratic items with the effect in Democratic participants on Republican items β=0.02, SE=0.009, t(3136)=2.74, p=0.006, such that

Democratic participants changed their behaviors as a function of belief change more for Democratic compared to Republican items (Fig. 6C). The results also show that belief change linearly predicts behavior change only for the Democratic participants on Democratic items, and not for the other three ideological conditions crossing participant ideology and item ideology (i.e., Democrats on Republican items, Republicans on Democratic and Republican items; Fig. 6C, 6D).

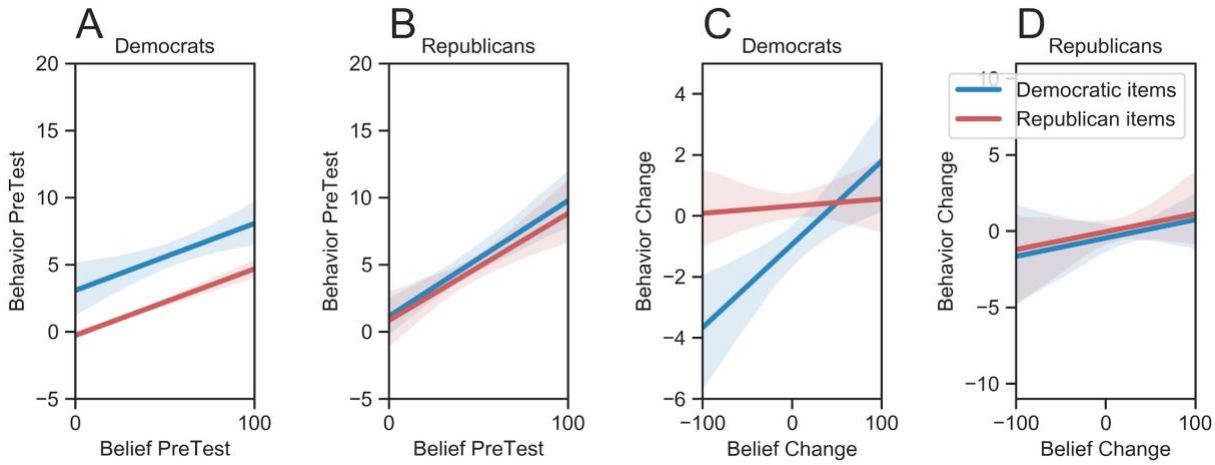

Figure 6 (N=393). Democratic participants'(**Panel A**) and Republican participants' (**Panel B**) behavior at pre-test as a function of belief at pre-test of Democratic statements (in blue) and Republican statements (in red). Democratic participants'(**Panel C**) and Republican participants' (**Panel D**) behavior change as a function of belief change of Democratic statements (in blue) and Republican statements (in red).

Discussion

In experiment 3, we again replicated the main findings that belief predicts behavior and that belief change causes behavioral change. When investigating these effects' interactions with partisan identity, we found that beliefs' predictive power of behaviors universally holds across identity boundaries. However, belief change caused behavioral change only for Democratic participants on Democratic topics. We also found that Democrats changed their behaviors as a function of belief change more for Democratic compared to Republican topics, but Republicans did not exhibit such a difference between Democratic and Republican topics, pointing to an asymmetric partisan bias in the effect of belief change on behavioral change.

General Discussion

In a series of 3 experiments, we found that both health-related and politically charged beliefs predict people's donation behaviors in an incentivized choice task. More importantly from an applied, policy intervention perspective, we also found that changing these beliefs through evidence exposure causes behavioral change. These findings are consistent with and further

advance the literature on behavioral nudges (Thaler & Sunstein, 2009), as well as prior theoretical accounts of behavior (Ajzen, 1991; Hochbaum, 1958). Our results extend this literature by analyzing the connection between beliefs and behaviors in an experimental context, offering the ability to infer causal relations between the two constructs. Moreover, our results go beyond the health domain, classically prioritized in past accounts of behavioral influences by way of beliefs (e.g., theory of planned behavior, Ajzen, 1991; the health belief model, Hochbaum, 1958). Furthermore, our results hold in online (i.e., Could Research, MTurk) and lab samples (i.e., Princeton students) pointing to the generalizability of the effects. To reduce the possibility of experimenter demands playing a role in triggering the observed effects, we ensured the donation behavior came at a personal cost to the participants.

When testing interactions with identity, we found that beliefs' predictive power of behaviors universally holds across identity boundaries, consistent with prior work on belief change mechanisms (Vlasceanu, Morais, & Coman, 2021). However, belief change caused behavioral change only for Democratic participants on Democratic topics, and not for Democratic participants on Republican topics or for Republican participants on either topic. This finding points to an asymmetric partisan bias in the effect of belief change on behavioral change, and it is consistent with prior work showing that partisan identities can impair belief updating (Van Bavel & Periera, 2018). This asymmetry may reflect the sociopolitical context at the time of data collection (i.e., January 2021, days before the inauguration of a Democratic president), consistent with existing work on the impact of threat and uncertainty on political beliefs (Haas & Cunningham, 2014). While difficult to programmatically explore in a dynamic real-world situation (e.g., COVID-19 pandemic, nationwide anti-racism protests, pro-Trump rallies), further research clarifying how consequential events affect belief and behavioral change is worth pursuing.

In the present work, we use a controlled, experimental approach to studying the causal link between beliefs and behaviors. Constraining the investigation to these minimal conditions allows us to isolate the effect of belief change on behavioral change. It is important to note, however, that in real world situations, additional factors such as conversational interactions following exposure to evidence would likely affect the degree to which the people integrate evidence into their beliefs and adjust their behaviors. Therefore, while exploring the relation between beliefs and behavior at the individual level is essential from a theoretical perspective, understanding how communities of individuals synchronize their behaviors is urgent from an applied point of view, as these dynamics might reveal how to better promote desirable behaviors in the population, of particular interest to policy makers interested in impacting communities (Dovidio & Esses, 2007). Indeed, the dynamic information flow between community members has been shown to exert a strong influence on people, impacting their individual memories (Cuc, et al., 2007), their beliefs (Vlasceanu & Coman, 2020a), and their behaviors (Frankel & Swanson, 2002). It has also been found to affect collective-level phenomena, leading to the formation of collective memory (Coman, Momennejad, Drach, & Geana, 2016) and collective beliefs (Vlasceanu et al., 2020; Vlasceanu & Coman, 2020a). However, little is known about the

impact of network structure on the formation of collective behavior, a construct of vital social importance. A growing body of work has been focusing on the cognitive and social processes involved in these collective phenomena (Vlasceanu et al., 2018; Borge, et al., 2018), revealing how individual level effects are amplified at the network level (Vlasceanu, et al., 2020), as well as the importance of network structure in their emergence (Vlasceanu & Coman, 2020a). Therefore, future work should consider investigating the effects of beliefs on behaviors at a collective level, focusing on the impact of conversational interactions on the effect, as well as on the role of network structure in the formation of collective behaviors.

Other future directions prompted by the current research include the investigation of the effect of beliefs on behaviors as it interacts with other variables. Of particular importance is the interaction between the hereby unveiled effect and social norms (Cialdini & Goldstein, 2004). One hypothesis in this context is that beliefs might impact behaviors more when the behaviors are perceived as normative rather than non-normative. This hypothesis follows from seminal work showing that changing beliefs regarding outgroup members does not impact non-normative behaviors towards them (Paluck, 2009). Moreover, recent work shows that beliefs change more in line with normative compared to non-normative evidence, providing further insights into the mechanism of interest.

Another variable worth investigating as it interacts with the effect of beliefs on behavior is cultural tightness/looseness (Harrington & Gelfand, 2014). Such an exploration has the potential to reveal the effect's strength and boundary conditions across different groups and cultures, enhancing the generalizability to the wider human population. It would also add to the efforts to overcome one of the main shortcomings of psychological research to date, that most effects are based on a "small corner of the human population," an impediment to identifying universal principles of human psychology (Henrich et al., 2010; Arnett, 2016).

A third variable that might interact with the hereby explored effect is the source identity (Chung, Fink, Kaplowitz, 2008; Slater & Rouner, 1996; Vlasceanu & Coman, 2020c). Prior work found that people are most influenced by others whom they share a common identity (Abrams, Wetherell, Cochrane, Hogg, & Turner, 1990; Centola 2011). Therefore, identifying with the source sharing the evidence might increase the likelihood of incorporating that evidence in changing beliefs and behaviors. For example, a Democrat receiving evidence against a Democratic belief from CNN might change their belief and their behavior more readily compared to when receiving evidence from Fox News. Conversely, a Republican may be more receptive to evidence incorporation when watching Fox News compared to CNN (Haidt, Graham, & Joseph, 2009). However, recent work has shown that belief change by way of evidence incorporation from various sources along the ideological spectrum does not interact with individuals' own political ideology (Vlasceanu & Coman, 2020c). Thus, empirically establishing whether the source identity interacts with the effect of beliefs on behavior is a future direction of high interest.

Beyond their theoretical importance, these findings are of particular relevance for interventions aimed at promoting constructive behaviors in the population, such as recycling,

donating, or employing preventative health measures. To enact real change in these crucial societal problems, policy makers must act in ways that are guided by recommendations supported by empirical research (Oxman et al., 2010; Snilstveit et al., 2013; Reimers & McGinn, 1997). Understanding the mechanisms by which behaviors can be changed is a crucial first step in informing such policies.

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Appendix 1. **Health-related statements**

	Accuracy	*Statement*
1	Accurate	Exposure to cockroach-infested buildings is a major cause of asthma in children.
2	Accurate	A child's untreated wandering eye can lead to permanent vision loss in that eye.
3	Accurate	Corporal punishment is associated with lower Intelligence Quotient in children.
4	Accurate	Herbal cold remedies are unsafe treatments for infants.
5	Inaccurate	Sitting too close to the TV damages children's vision.
6	Inaccurate	Reading in dim light can damage the eyes.
7	Inaccurate	Listening to classical music raises babies' Intelligence Quotient (IQ).
8	Inaccurate	Allergy shots are helpful for food allergies.

Appendix 2. **Politically charged statements**

	Accuracy	*Ideology*	*Statement*
1	Accurate	Democratic	Millions of children in the US have witnessed a shooting in the past year.
2	Accurate	Democratic	The Affordable Care Act saved the US trillions of dollars.
3	Inaccurate	Democratic	All US cities experience more extremely hot days compared to 5 decades ago.
4	Inaccurate	Democratic	Children raised by same-sex parents are just as likely to experience emotional problems compared to children raised by opposite-sex parents.
5	Accurate	Republican	Most non-citizen households in the US access welfare programs.
6	Accurate	Republican	Hundreds of thousands of abortions in the US are paid for with public funds each year.
7	Inaccurate	Republican	Hundreds of Americans in the US are killed by foreign born terrorists each year.
8	Inaccurate	Republican	Government regulations cost the US billions of dollars each year.