

# Consumers Prefer “Natural” More for Preventatives Than for Curatives

SYDNEY E. SCOTT  
PAUL ROZIN  
DEBORAH A. SMALL

We demonstrate that natural products are more strongly preferred when used to prevent a problem than when used to cure a problem (*the prevent/cure effect*). This organizing principle explains variation in the preference for natural across distinct product categories (e.g., food vs. medicine), within product categories (e.g., between different types of medicines), and for the same product depending on how it is used (to prevent or to cure ailments). The prevent/cure effect is driven by two factors: lay beliefs about product attributes and importance of product attributes. Specifically, (a) consumers hold lay beliefs that natural products are safer and less potent and (b) consumers care more about safety and less about potency when preventing as compared to when curing, which leads to a stronger preference for natural when preventing. Consistent with this explanation, when natural products are described as *more* risky and *more* potent, reversing the standard inferences about naturalness, then natural products become more preferred for curing than for preventing. This research sheds light on when the marketing of “natural” is most appealing to consumers.

**Keywords:** natural products, preference for natural, risk preferences, medical decision-making

Consumers often prefer natural versions of products, including foods, medicines, personal care products,

Sydney E. Scott (sydneyscott@wustl.edu) is an assistant professor of marketing at the Olin Business School, Washington University in St. Louis, One Brookings Drive, St. Louis, MO 63130, USA. Paul Rozin (rozin@psych.upenn.edu) is a professor of psychology at the University of Pennsylvania, 3720 Walnut Street, Philadelphia, PA 19104, USA. Deborah A. Small (deborahs@wharton.upenn.edu) is the Laura & John J. Pomerantz professor of marketing and psychology at the Wharton School, University of Pennsylvania, 3730 Walnut Street, Philadelphia, PA 19104, USA. Please address correspondence to Sydney E. Scott. The authors thank Rom Schrift, Robert Meyer, Jonathan Z. Berman, Yoel Inbar, and Keisha M. Cutright for their thoughtful feedback. All analyses, interpretations, and conclusions from the National Health Interview Survey, reported in study 3, do not reflect the views of the CDC/NCHS, which is only responsible for the initial data. This research was supported in part by the Ackoff Doctoral Student Fellowship Program. This article is based on the lead author’s dissertation. [Supplementary materials](#) are included in the [web appendix](#) accompanying the online version of this article.

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and home products. Though “natural” is not a legally defined and regulated term (FDA 2016; Levinovitz 2016), consumers’ central conception of naturalness is that it means that a product has not had any previous human intervention and has no additives (Rozin 2005; Rozin, Fischler, and Shields-Argelès 2012; Scott and Rozin 2017). Across several categories, this preference for natural is an increasingly important driver of consumers’ decisions. For example, in the food and beverage category, over two-thirds of shoppers seek foods with the “natural” label (Consumer Reports 2016). In the beauty and personal care category, nearly half of consumers say they are willing to pay more for a “natural” beauty product (Russo 2015). In the health and medicine category, about one-third of Americans have used an alternative medicine in the past year. Half of those who have used an alternative medicine did so because they preferred natural remedies (Levine 2018). However, in some cases, consumers are willing to abandon the preference for natural. For example, insulin, antibiotics, cortisone creams, and synthetic stain removers are widely accepted, though they are evidently unnatural. Thus, anecdotally, the preference for

natural products looms larger in some situations than in others.

In the present article, we present a unifying principle for understanding *when* people prefer natural most strongly and why that variance in preference for natural exists. We predict that people prefer natural products more strongly when they seek to prevent an ailment compared to when they seek to cure an ailment. This distinction in treatment purpose is relevant for categorizing many health and wellness products as well as home and personal care products. We test a theoretical account of why this prevent/cure effect occurs and its boundary conditions.

## THEORETICAL DEVELOPMENT

### Preference for Natural and Treatment Purpose

In the present research, we ask when consumers prefer natural products most strongly. One factor that unites many product categories where the preference for natural looms large (e.g., vitamins, supplements, skin care products) is that the products are usually consumed in the absence of an illness or a problem, so the purpose is primarily preventative. These examples highlight a critical variable that we predict will affect when the preference for natural is particularly strong: whether the treatment purpose is preventative or curative. We define these two purposes as the commonplace, objective goals of consumption. When the treatment purpose is to prevent a problem or illness, there is an objective “to keep from occurring; avert; hinder” ([Dictionary.com 2020b](#)) and, when the treatment purpose is to cure a problem or illness, there is an objective “to relieve or rid of something detrimental” ([Dictionary.com 2020a](#)). Specifically, we expect consumers prefer natural products more when the treatment purpose is primarily preventative as compared to when it is curative.

Why might consumers prefer natural products more for preventatives than for curatives? We theorize that two key psychological components together drive this prevent/cure effect: (a) consumers’ lay beliefs about natural products’ attributes and (b) the importance consumers place on the attributes of safety and potency, which depends on the treatment purpose. In brief, we propose that people hold lay beliefs, which guide them to view natural products as safer, but less potent than synthetic products. Second, the importance of safety and of potency change, such that consumers place more importance on safety and less importance on potency when preventing than when curing. This combination of lay beliefs about natural products and the importance of safety and potency that change as a function of the treatment purpose cause people to prefer natural more strongly for preventative versus curative treatment purposes.

### Lay Beliefs about Attributes of Natural Products

Because consumers lack perfect information, they regularly make inferences about unobservable product

attributes ([Broniarczyk and Alba 1994](#); [Chernev and Carpenter 2001](#); [Dick, Chakravarti, and Biehal 1990](#); [Sujan and Dekleva 1987](#)). To do so, they often rely on shared lay beliefs about product attributes, which guide their choices and consumption in predictable ways. For example, American consumers rely on the belief that healthy foods are less tasty ([Raghunathan, Naylor, and Hoyer 2006](#)) and also more expensive ([Haws, Reczek, and Sample 2017](#)); that products with higher prices or with better warranties are better quality ([Srivastava and Mitra 1998](#); [Tellis and Gaeth 1990](#)); and most relevantly to the current study, that ethical and green products are gentler and less effective ([Lin and Chang 2012](#); [Luchs et al. 2010](#)).

In the present article, we focus on lay beliefs about “natural” products. To be sure, “natural,” “ethical,” “sustainable,” and “green” are close cousins and often used to describe the same products. Yet natural is distinct in that it is a feature of the underlying product (i.e., has not had human processing; [Rozin 2005](#)) whereas “ethical,” “sustainable,” and “green” refer to the impact of the product on society and the earth (protecting standard of living, wages, and eco-system; [Grunert, Hieke, and Wills 2014](#)). We chose to focus on naturalness in this article because “natural” is used more broadly across different product domains than other sustainability labels. For example, in the domain of medicine, for which the prevent/cure distinction is especially relevant, “natural” is a common product descriptor and category (e.g., “natural medicine,” “natural remedies”).<sup>1</sup>

We focus on the relation between naturalness judgments and lay beliefs about two important attributes—safety and potency. Importantly, we make a descriptive claim about what consumers believe about these attributes, and not about whether their beliefs are accurate (for a discussion about the accuracy of participants’ beliefs, see General Discussion). These attributes are not directly observable and thus consumers must make inferences. We expect that people hold beliefs that “natural = safer” and “natural = less potent.” There is already much evidence suggesting that people generally associate naturalness with safety ([Li and Chapman 2012](#); [Rudski et al. 2011](#); [Slovic et al. 2007](#)).

Some anecdotal evidence and prior research suggest a “natural = less potent” lay belief may also exist. Natural products are often marketed as “gentler” alternatives (e.g., Johnson & Johnson’s Natural baby products as “*Natural Made Gentle*,” 2020), and gentleness may imply low potency. Moreover, ethical and green products are typically

1 We examined how many products appeared within several relevant categories using “natural,” “sustainable,” “green,” and “ethical” as search terms on Amazon.com. The categories were “household cleaning,” “grocery and gourmet food” (the broadest food category on Amazon), “beauty and personal care,” and “health care.” Compared to the other descriptors, a search for “natural” yielded the most results in every category, except that natural and green yielded the same number (over 10,000 results) in household cleaning. In the health care category, natural yielded four times more results than any other term.

perceived to be gentler and less powerful (Luchs et al. 2010). It seems plausible that a similar belief would hold for “natural.”<sup>2</sup> If natural is viewed as safer and less potent, then we can predict when natural is most preferred based on whether consumers prioritize safety more and potency less.

### Importance of Safety and Potency

The second part of our theory relies on the changing importance weights of safety and potency as a function of the treatment purpose. Specifically, we propose that curative (as opposed to preventative) contexts increase the importance of potency and decrease the importance of safety. This prediction is broadly consistent with the prediction from prospect theory (Kahneman and Tversky 1979) of risk seeking in the domain of losses. In other words, when a consumer is already afflicted (i.e., below the reference point and in the loss domain for health), safety becomes less important. For example, a consumer afflicted with cancer would become more risk seeking and thus would prefer a stronger, even if less safe, remedy to try to cure it. Yet a consumer trying to prevent cancer would be at or above the reference point and thus would prefer a safer, albeit less potent remedy. Consistent with this conceptualization, the prospect theory value function has been used to explain why terminally ill patients—who are in the loss domain for health—exhibit risk-seeking treatment preferences (Rasiel, Weinfurt, and Schulman 2005).

We expect that the combination of lay beliefs about naturalness and shifting importance of safety and potency cause the prevent/cure effect. Consumers prioritize safety more and potency less when they are preventing (vs. curing). They therefore prefer natural—which is believed to be safer and less potent than synthetic—more when preventing than when curing.

## RESEARCH OVERVIEW

We present seven studies, which examine when consumers prefer natural most strongly and why this variance in preference for natural occurs. Study 1 demonstrates the prevent/cure effect in a controlled test for both medicines and household products: natural products are more strongly preferred for preventing than for curing an ailment or problem. Study 2 finds consumers search for natural products more often and chose natural more often when preventing versus curing cold symptoms, in a design with a consequential choice of a product. Study 3 examines reports about actual health behaviors over a year and finds consumers prioritize naturalness more for preventatives than

for curatives. Studies 4–7 test the proposed psychological mechanism in different ways. Studies 4 and 5 examine the role of lay beliefs about natural, using moderation techniques. Study 4 shows that when the standard lay beliefs about natural and synthetic products are reversed, the prevent/cure effect also reverses. Specifically, when the natural product is described as the *more* risky and *more* potent product, consumers prefer natural more for curing than for preventing. Study 5 separately manipulates beliefs about the safety of natural versus synthetic (study 5A) and beliefs about the potency of natural versus synthetic (study 5B) and finds that manipulating either safety or potency beliefs moderates the prevent/cure effect. Study 6 examines the role of the importance of safety and potency, using mediation techniques. The increased preference for natural when preventing versus curing is mediated simultaneously by increased importance of safety and decreased importance of potency. Finally, study 7 shows that when consumers are focused on moral concerns, as opposed to consequence-based (safety/potency) concerns, the prevent/cure effect attenuates. Complete materials, data, and analysis code are available at <https://osf.io/ft3zp/>.

### STUDIES 1–3: CONSUMERS PREFER NATURAL MORE FOR PREVENTING THAN FOR CURING

Studies 1–3 test the prevent/cure effect, hypothesized formally as:

**H1:** Consumers prefer natural products more when the treatment goal is primarily preventative as compared to when it is primarily curative.

These studies test the hypothesis using different methods. Study 1 measures the relative preference for natural over synthetic products across a variety of ailments and product categories. Study 2 measures how people search for and how often they choose natural products in a design with consequential choice. Study 3 uses publicly available survey data from the Centers for Disease Control to examine how consumers prioritize naturalness over a year of preventative and curative health behaviors.

### Study 1: Methods

One thousand four US participants from Amazon’s Mechanical Turk completed an online survey in exchange for monetary compensation ( $M_{\text{age}} = 36.4$ ,  $SD = 12.1$ , 48.5% females and 51.5% males). Through random assignment, half of the participants viewed scenarios about preventing problems and half viewed scenarios about curing problems. All participants viewed a total of nine scenarios. Three scenarios were about medicines (vitamin B12 for vitamin B12 deficiency, vitamin C for vitamin C deficiency [scurvy], and allicin for the common cold), and six

<sup>2</sup> However, some prior research shows that alternative medicines are viewed as better at “treating the cause, not just the symptoms” (CDC/National Center for Health Statistics 2012; Wang, Keh, and Bolton 2010), which seems more aligned with a lay belief that natural is more potent.

scenarios were about household products (anti-mold solution for mold, caulk for pipe leaks, mouthwash for mouth bacteria, anti-stain solution for wood stains, anti-stain solution for metal stains and anti-stain solution for clothing stains). We selected these problems and products because, for each problem, the same product is used to prevent and to cure that problem.

Scenario presentation order was manipulated through random assignment. To simplify the task for participants, we separated the medicines and household products in two blocks. Half of participants viewed the three medicine scenarios first (in randomized order) followed by the six household product scenarios (in randomized order). The other half of participants viewed the six household product scenarios first (in randomized order) followed by the three medicine scenarios (in randomized order).

As an example of a scenario, preventing vitamin B12 deficiency read as follows (with curing version in brackets).

Imagine the following:

You are currently healthy [ill with hypcobalaminemia, a vitamin B12 deficiency].

You have absolutely none of the symptoms of hypcobalaminemia, a vitamin B12 deficiency (such as fatigue and numbness) [have symptoms of hypcobalaminemia (such as fatigue and numbness).]

You decide to take a treatment, vitamin B12, to prevent [cure] hypcobalaminemia. Suppose there are synthetic forms of vitamin B12 (generated in a lab) and natural forms of vitamin B12 (extracted from soybean plants). Assume the synthetic and natural forms are the same price and you plan to take vitamin B12 once a day for a month.

Participants indicated their preference for natural on a 7-point scale for each scenario (1 = strongly prefer synthetic, 2 = prefer synthetic, 3 = slightly prefer synthetic, 4 = indifferent, 5 = slightly prefer natural, 6 = prefer natural, and 7 = strongly prefer natural). After responding to questions about all scenarios, in a manipulation check, participants indicated what the previous scenarios were about (preventing illnesses and other problems, curing illnesses, and fixing other problems, or do not know/unsure). For exploratory purposes, participants completed the demographic measures (gender, age, income, political orientation, ethnicity, whether they grew up in a rural, suburban, or urban neighborhood, religion, and religiosity) and 15 items about general tendencies to prefer natural products (based on Rozin et al. 2004; Schultz 2001; for full list of items see pp. 12–13 of web appendix). None of these variables reliably moderated our key experimental manipulation, so we do not report analyses including them.

## Study 1: Results

The majority of participants (95.3%) passed the manipulation check. Patterns and statistical significance of results

are the same when participants who failed the manipulation check are excluded. In addition, order did not interact with treatment purpose (prevent vs. cure). Therefore, we collapse across order.

As predicted in hypothesis 1, in a 2 (treatment purpose: prevent, cure)  $\times$  9 (target problem: vitamin B deficiency, scurvy, common cold, house mold, mouth bacteria, metal stains, wood stains, clothing stains, pipe leaks) mixed ANOVA,<sup>3</sup> natural options were more strongly preferred for preventing than for curing ( $F(1, 1002) = 36.02, p < .001, \eta_p^2 = .04$ ). In addition, natural options were more strongly preferred for certain target problems ( $F(8, 8016) = 147.46, p < .001, \eta_p^2 = .13$ ) and there was a small interaction between treatment purpose and target problem ( $F(8, 8016) = 2.45, p = .012, \eta_p^2 = .002$ ). In pairwise comparisons, the natural product was significantly more preferred for preventing than for curing in all nine scenarios (see figure 1; across scenarios, effect sizes ranged from  $d = 0.20$  to  $d = 0.33$ ; average  $d = 0.27$ ).

We also find the prevent/cure effect in a fully between-subjects analysis of the first trial. Using a 2 (prevent vs. cure)  $\times$  9 (ailment) fully between-subjects ANOVA, there was a significant effect of treatment purpose ( $F(1, 986) = 20.08, p < .001, \eta_p^2 = .02$ ). Moreover, natural products were more strongly preferred for certain ailments ( $F(8, 986) = 12.81, p < .001, \eta_p^2 = .09$ ) and there was no reliable interaction between treatment purpose and ailment ( $F(8, 986) = 1.60, p = .121$ ).

## Study 2: Methods

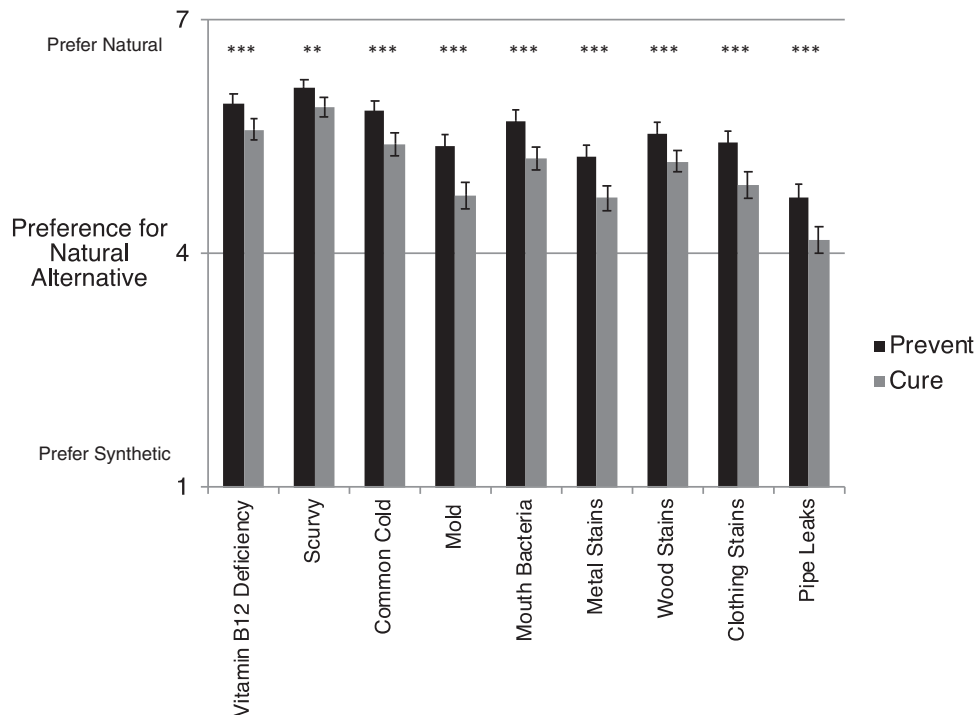
Study 2 was designed to fulfill two goals. First, it examines whether the prevent/cure effect replicates in a design involving consequential product choices. Second, it enhances external validity by mimicking how people often go about searching for and choosing products. Specifically, we modeled the study design on popular e-commerce user interfaces, where consumers can search for products and narrow their consideration set based on product attributes. For example, on Amazon.com in the cold and flu category, consumers can narrow the search results based on naturalness, format (e.g., liquid, capsule), average customer review, price, etc. We designed a similar product selection task, where participants had the option to narrow their consideration set based on different attributes (including naturalness) and then chose a product. We expected, consistent with hypothesis 1, that participants (a) would more often narrow their consideration set to natural products in the preventative (vs. curative) condition and (b) would more

3 We also assessed these effects in two separate mixed ANOVAs, one on medicines and one on household products. The direction and significance of effects were the same as the overall ANOVA, except that there was no reliable interaction between treatment purpose and target problem.



FIGURE 1

PREFERENCE FOR NATURAL WHEN PREVENTING VERSUS CURING IN STUDY 1



NOTE. The gridline at four represents indifference between natural and synthetic products. Error bars represent 95% confidence intervals of the mean. \*\*\* $p < .001$ , \*\* $p < .01$ .

often choose natural products in the preventative (vs. curative) condition.

**Selection of Product Stimuli.** We selected 50 cold prevention products (25 natural and 25 synthetic) and 50 cold curative products (25 natural and 25 synthetic) from search results on popular e-commerce websites (Amazon.com, RiteAid.com, Walgreens.com, CVS.com, iherb.com). The criteria we used to determine which products qualified as natural were: had natural in the brand name, label claimed to help or heal naturally, label claimed all natural or organic ingredients, or label claimed to offer natural relief. The criterion we used to determine which products qualified as synthetic was: did not have any natural claims on the label or in the brand name. Finally, we excluded any products that were over \$20 and further excluded masks and hand sanitizer (which sometimes were listed as cold preventative products).

**Participants and Procedures.** We recruited 800 participants on Amazon's Mechanical Turk to complete a survey in exchange for monetary compensation (46.1% females, 53.7% males, 0.3% others;  $M_{\text{age}} = 37.1$ ,  $SD = 11.6$ ). Participants were randomly assigned to choose a product

that prevents colds (a preventative) or a product that treats cold symptoms (a curative). To ensure that participants would treat the task seriously, they were told that some participants would be randomly selected at the end of the study to receive the product they chose for free.

In the first part of the task, participants read that there were 50 products available and that, if they wanted to, they could narrow their consideration set by checking different boxes. Specifically, they could elect to only view products above a particular average customer rating (e.g., products with at least 4 out of 5 stars) and/or to only view natural products. Participants made these determinations before seeing the names of the products.

Then, participants saw the entire consideration set of products displayed on one page (which ranged from 19 to 50 options, depending on whether and how they had limited their consideration set). For each product, participants viewed a picture of the product in its standard package, the product's name, and its average customer rating. To ensure that the customer ratings were independent from product type, we randomly assigned each product to an average customer rating between 3.8 and 5.0 (with 10 products below 4 stars). Participants selected one product. Finally,

participants indicated their age and gender and exited the survey. One out of 100 winners of a random drawing received additional compensation equivalent to the most expensive item.

## Study 2: Results

We predicted that participants would be more prone to narrow their search of options to all-natural products when choosing a preventative product. Consistent with this prediction, more participants limited their consideration set to natural products when choosing a preventative product (46.0%) than when choosing a curative product (36.8%,  $\chi^2(1) = 6.94, p = .008$ ). Participants were also given the opportunity to limit their consideration set on average customer rating. In contrast to limiting on naturalness, there was no difference in limiting based on average customer rating across experimental conditions (preventative: 84.8% limited to 4+ stars, 9.5% limited to 3+ stars, 0.7% limited to 2+ stars, 1.2% limited to 1+ stars, and 3.8% did not limit based on ratings; curative: 83.6% limited to 4+ stars, 10.6% limited to 3+ stars, 1.1% limited to 2+ stars, 0.3% limited to 1+ stars, and 4.5% did not limit based on ratings;  $\chi^2(4) = 3.05, p = .550$ ).

We also predicted that participants would be more likely to choose a natural product for a preventative versus a curative. This prediction was supported. When choosing a preventative product, 73.0% chose a natural product, whereas when choosing a curative product, 55.0% chose a natural product ( $\chi^2(1) = 28.08, p < .001$ ).

## Study 3: Methods

Study 3 builds on study 2's goal to test the prevent/cure effect (hypothesis 1) in externally valid settings. Specifically, this study draws on publicly available data from the 2012 National Health Interview Survey, conducted by the Centers for Disease Control. Fortuitously, the 2012 survey included a section on complementary and alternative medicine. Participants were asked about their health and use of complementary and alternative medicines over the past year. Some items enabled us to examine if there is a relationship between the preference for a natural treatment and whether consumers are using it for a preventative or a curative purpose. (for more information on the survey, see CDC/National Health Interview Survey 2012).

Adults in the United States ( $N = 34,525$ ) answered a series of questions through face-to-face interviews. Much of the sample (71%) reported that they had not used any alternative therapies in the past year, which meant that they skipped the questions relevant to our analysis herein. Our analysis focuses on the remaining  $N = 9,972$  participants.

Participants first selected the most important complementary or alternative medicine treatment they had used in the past year, from a list of 18 different types of alternative

therapies (e.g., acupuncture, naturopathy, herbal and non-vitamin supplements). Next, participants were asked a series of questions about this alternative therapy. We drew on two key survey questions to examine the relationship between treatment purpose and the preference for natural. The *treatment purpose question* was "Did you [use this treatment] ... for general wellness or general disease prevention?" [yes/no]. We code a "yes" to this question as *preventative use* and a "no" to this question as *curative use*.<sup>4</sup> The *preference for natural question* was "Did you [use this treatment because] ... it is natural?" [yes/no]. We code "yes" as *preference for natural* and "no" as *no preference for natural*.

After answering these questions regarding the most important treatment that they had used in the past year, participants responded to the same questions regarding the second most important treatment they had used. Only  $N = 4,611$  people responded to this query, because only 4,611 people had used at least two alternative therapy treatments in the past year. Finally, after answering questions about the second most important treatment, they responded to the same questions regarding the third most important treatment. Only  $N = 2,045$  people responded to this query, because only 2,045 people had used at least three alternative therapy treatments in the past year. We coded the treatment purpose and preference for natural questions for their second and third most important alternative treatments in the same way as we did for the most important alternative treatment.

## Study 3: Results

We examined whether the treatment purpose was associated with preference for natural. Indeed, participants were more likely to report a preference for natural when using a treatment as a preventative as compared to a curative (most important treatment:  $M_{\text{preventative}} = 65.3\%$ ,  $M_{\text{curative}} = 39.8\%$ ,  $\chi^2(1) = 598.62, p < .001$ ; second most important treatment:  $M_{\text{preventative}} = 72.4\%$ ,  $M_{\text{curative}} = 45.2\%$ ,  $\chi^2(1) = 291.78, p < .001$ ; third most important treatment:  $M_{\text{preventative}} = 77.4\%$ ,  $M_{\text{curative}} = 59.5\%$ ,  $\chi^2(1) = 60.42, p < .001$ ). In addition, there is a trend where the proportion of individuals with a preference for a natural treatment increases from first to second and second to third most important treatment. We expect that this trend occurs because participants who more strongly prefer natural treatments are also likely to use more alternative therapy treatments.

Because treatment purpose (prevent vs. cure) was not experimentally manipulated, it is possible that some third variable causes both a preference for natural treatments and tendency toward preventative treatment. We conducted

4 We assume that the vast majority of people who are not using something for general wellness and disease prevention are treating an existing ailment.

two robustness checks, reported in full in the [web appendix](#) (pp. 3–5), to address this possibility. First, we assessed whether the prevent/cure effect emerged in a within-subjects comparison (where each individual is their own control). It did ( $p < .001$ ). Second, we assessed whether the prevent/cure effect emerged in between-subjects analyses that included demographic variables in the models. It did (all  $ps < .001$ ).

Discussion

Together, studies 1–3 triangulate on support for hypothesis 1 that natural is preferred more for preventatives than for curatives, using different methods and operationalizations that each have unique advantages. The prevent/cure effect occurred across multiple ailments and multiple treatments (study 1). Moreover, it occurred for multiple outcomes, including self-reported preferences (study 1), search behavior (study 2), consequential choice (study 2), and self-reports about actual health behaviors over a year (study 3). Finally, the prevent/cure effect occurred for very tightly controlled scenarios (study 1) and for more ecologically valid situations, such as choosing from a variety of everyday products (study 2) and a survey of everyday health behaviors (study 3). In studies 4–7, we examine when and why the prevent/cure effect occurs.

STUDY 4: REVERSING SAFETY AND POTENCY LAY BELIEFS REVERSES THE PREVENT/CURE EFFECT

We have proposed that the prevent/cure effect has two underpinnings: (a) consumers hold lay beliefs that natural products are safer and less potent and (b) consumers place more importance on safety and less importance on potency when preventing versus curing. Studies 4 and 5 test the role of lay beliefs about natural, and study 6 tests the role of importance of safety and potency.

According to our theory, the stronger preference for natural when preventing is contingent on lay beliefs that natural products are safer and less potent. If the beliefs about a natural product’s safety and potency reverse, we predict a reversal of the prevent/cure effect. Formally:

**H2:** When natural is believed to be more risky and more potent (the reverse of the usual lay beliefs), consumers prefer natural more for curing than for preventing.

Methods

One thousand five hundred five US participants from Amazon’s Mechanical Turk completed an online survey in exchange for monetary compensation ( $M_{age} = 34.8$ ,  $SD = 11.6$ , 50.4% females and 49.6% males).

Participants were randomly assigned to one of the six conditions in a 2 (treatment purpose: prevent, cure)  $\times$  3 (attribute information: natural more potent/risky, unspecified, natural less potent/risky) between-subjects design. All participants viewed one scenario about an infectious disease with symptoms of fever, fatigue, and diarrhea. Half of participants were randomly assigned to consider preventing this disease, and half considered curing it.

In the unspecified condition, the scenario followed the same format as previous studies where the risk and potency of the medicines were left unspecified. In the natural more potent/risky scenarios, the following table of risk/potency information was appended to each scenario.

Natural drug	Synthetic drug
Stronger	Less strong
More side effects/more risk (e.g., more chance of nausea and allergic reactions)	Fewer side effects/less risk (e.g., less chance of nausea and allergic reactions)

In the natural less potent/risky scenario, participants saw the same table but the information was reversed for the two drugs: the natural drug was described as less strong and with fewer side effects/less risk and the synthetic drug was described as stronger and with more side effects/more risk. After reading the scenario, participants indicated whether they preferred the natural or synthetic drug on a 7-point scale adapted from study 1.

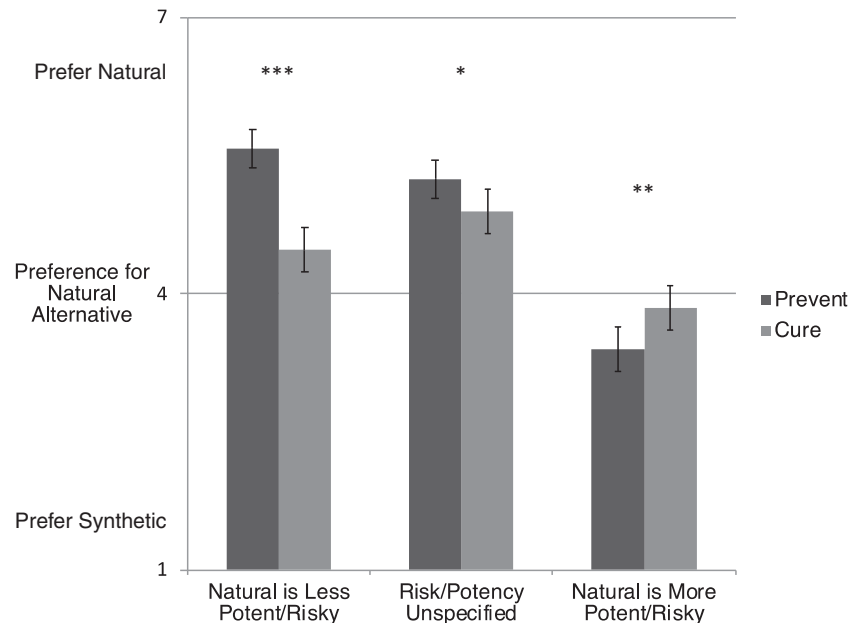
After indicating their preference for the natural versus synthetic drug, participants completed three manipulation checks. As a multiple-choice manipulation check of treatment purpose, participants indicated if the scenario was about preventing a disease, curing a disease, or they did not know/were unsure. Then, as manipulation checks on attribute information, participants indicated on two 7-point scales the relative strength and the relative risk of the natural (vs. synthetic) drugs, where the midpoint of 4 indicated that natural and synthetic drugs were equally strong/risky, and higher scores indicated that natural drugs were stronger/riskier. Finally, participants completed the same trait preference for natural measures and demographic measures from study 1.

Results

The majority of participants (96.0%) passed the manipulation check about treatment purpose. We examined the manipulation checks of attribute information by using one-sample *t*-tests that compare mean ratings of risk and of potency to the midpoint of 4 (which indicated natural and synthetic equally risky/potent). In the natural more potent/risky condition, natural medicines were rated as riskier

FIGURE 2

IN STUDY 4, PREFERENCE FOR NATURAL AS A FUNCTION OF (A) PREVENTING/CURING AND (B) INFORMATION ABOUT RISK AND POTENCY



NOTE. The gridline at four represents indifference between natural and synthetic products. Error bars represent 95% confidence intervals of the mean. \*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$ .

( $M = 5.86$ ,  $SD = 1.49$ ,  $t(501) = 28.03$ ,  $p < .001$ ,  $d = 1.25$ ) and more potent ( $M = 5.86$ ,  $SD = 1.53$ ,  $t(501) = 27.23$ ,  $p < .001$ ,  $d = 1.21$ ). In the unspecified condition, natural medicines were rated less risky ( $M = 3.88$ ,  $SD = 0.66$ ,  $t(496) = -4.03$ ,  $p < .001$ ,  $d = -0.18$ ) and unexpectedly, they were rated as equally potent as synthetic medicines ( $M = 4.00$ ,  $SD = 0.59$ ,  $t(496) = 0.15$ ,  $p > .25$ ). In the natural less potent/risky condition, natural medicines were rated as less risky ( $M = 1.99$ ,  $SD = 1.15$ ,  $t(505) = -39.28$ ,  $p < .001$ ,  $d = -1.75$ ) and less potent ( $M = 1.99$ ,  $SD = 1.36$ ,  $t(505) = -33.32$ ,  $p < .001$ ,  $d = -1.48$ ).

In a 2 (treatment purpose: prevent, cure)  $\times$  3 (attribute information: natural more potent/risky, unspecified, natural less potent/risky) ANOVA on the preference for the natural drug, there was a main effect of treatment purpose such that consumers preferred natural more, on average, when preventing than when curing ( $F(1, 1499) = 13.01$ ,  $p < .001$ ,  $\eta_p^2 = .01$ ). There was also a main effect of attribute information, such that whichever medicine was described as less potent/less risky was more preferred ( $F(2, 1499) = 102.46$ ,  $p < .001$ ,  $\eta_p^2 = .12$ ). As predicted, the main effect of treatment purpose was qualified by an interaction between treatment purpose and attribute information ( $F(2, 1499) = 22.61$ ,  $p < .001$ ,  $\eta_p^2 = .03$ ).

Independent sample  $t$ -tests comparing prevent and cure conditions at each level of attribute information revealed the nature of this interaction (see figure 2). In the unspecified condition, the prevent/cure effect from studies 1–3 replicates: the natural product is more preferred for preventing than for curing ( $M_{\text{prevent}} = 5.27$ ,  $SD = 1.65$ ,  $M_{\text{cure}} = 4.89$ ,  $SD = 1.88$ ,  $t(495) = 2.40$ ,  $p = .017$ ,  $d = 0.22$ ). Similarly, in the natural less potent/risky condition, natural is more preferred for preventing than for curing ( $M_{\text{prevent}} = 5.58$ ,  $SD = 1.66$ ,  $M_{\text{cure}} = 4.48$ ,  $SD = 1.95$ ,  $t(504) = 6.80$ ,  $p < .001$ ,  $d = 0.61$ ). However, consistent with hypothesis 2, when natural is specified as more risky and more potent, the effect of treatment purpose reverses: natural medicines are more preferred for curing than for preventing ( $M_{\text{prevent}} = 3.39$ ,  $SD = 1.90$ ,  $M_{\text{cure}} = 3.85$ ,  $SD = 1.92$ ,  $t(500) = -2.67$ ,  $p = .008$ ,  $d = -0.24$ ).

The condition for which natural is specified as more risky and more potent demonstrates a rare case where the synthetic product is preferred to the natural product. When natural products are made to look like synthetic products in terms of the risk/potency profile (in the natural more potent/risky condition), natural products are no longer preferred overall (in one-sample  $t$ -tests comparing means to midpoint of 4/indifference,  $M_{\text{prevent}} = 3.39$ ,  $SD = 1.90$ ,



$t(255) = -5.14, p < .001, d = -0.32; M_{\text{cure}} = 3.85, SD = 1.92, t(245) = -1.26, p = .206$ ). (For more on the overall strength of the preference for natural, see the General Discussion.)

## Discussion

In study 4, we reverse the prevent/cure effect when we reverse consumers' lay beliefs about natural products (making natural more potent and more risky), thereby providing experimental evidence for our proposed psychological mechanism. One limitation of study 4 is that we manipulated safety and potency simultaneously. We chose this manipulation because it preserves the trade-off between safety and potency that consumers believe they face when deciding whether to choose natural products. Nonetheless, it is possible that the moderation in study 4 was driven completely by safety beliefs or completely by potency beliefs. We address this limitation in study 5 and examine how variation in only one of these attributes influences the preference for natural.

## STUDY 5: MANIPULATING SAFETY BELIEFS (5A) OR POTENCY BELIEFS (5B) MODERATES THE PREVENT/CURE EFFECT

In study 5, we again test the roles of lay beliefs about safety and potency, using a different approach. In these studies, we manipulate information about one of these two attributes while holding the other attribute constant.

In study 5A, we target natural = safer beliefs. We hold potency beliefs constant, by describing natural as less potent (consistent with the usual inference) in all conditions. We manipulate the degree to which people believe natural = safer, by describing a small natural safety advantage (natural is a little safer) or a large safety advantage (natural is much safer). If one reason the prevent/cure effect occurs is because of the lay belief natural = safer, then increasing the degree of that belief (i.e., increasing the natural safety advantage) should increase the prevent/cure effect. Formally:

**H3A:** Holding potency of natural versus synthetic constant across conditions, increasing the degree to which natural = safer (i.e., the natural safety advantage) will increase the prevent/cure effect.

In study 5B, we use the same approach, but we instead target natural = less potent beliefs. We hold safety beliefs constant, by describing natural as safer (consistent with the usual inference) in all conditions. We manipulate the degree to which people believe natural = less potent, by describing a small natural potency disadvantage (natural is a little less potent) or a large potency disadvantage (natural is much less potent). If one reason the prevent/cure effect

occurs is because of the lay belief natural = less potent, then increasing the degree of that belief (increasing the natural potency disadvantage) should increase the prevent/cure effect.

**H3B:** Holding safety of natural versus synthetic constant across conditions, increasing the degree to which natural = less potent (i.e., the natural potency disadvantage) will increase the prevent/cure effect.

We have chosen in both studies to manipulate the magnitude of the safety advantages/potency disadvantages instead of manipulating whether those advantages/disadvantages exist. We do this to avoid confounding our manipulation with the presence/absence of a dominant option. For example, in study 5B, if we manipulated potency such that natural is equally potent in one condition and less potent in the other, then natural would be weakly dominant in one condition (i.e., equal potency, better safety, equal on all else) but not in the other (i.e., worse on potency, better on safety, equal on all else). To avoid this confound, we vary only the magnitude of advantages and disadvantages, instead of the presence versus absence of an advantage. Not only does this allow us to avoid this potential confound, but it is also a more conservative manipulation and test.

## Study 5A: Methods

Eight hundred two US participants from Amazon's Mechanical Turk completed an online survey in exchange for monetary compensation ( $M_{\text{age}} = 35.3, SD = 10.2; 43.1\%$  females and  $56.9\%$  males).

Participants were randomly assigned to one of the four conditions in a  $2$  (treatment purpose: prevent, cure)  $\times 2$  (safety advantage of natural: small [i.e., natural little safer], large [i.e., natural much safer]) between-subjects design.

All participants viewed the scenario about an infectious disease from study 4. Half of participants were randomly assigned to consider preventing this disease, and half considered curing it. After learning about the disease and its symptoms, participants were told that each of these attributes was rated by the Food and Drug Administration on a scale of 0–100.

On potency, the FDA rates the natural drug as a 10/100 and the synthetic drug as a 90/100. On safety, the FDA rates the natural drug as a 90/100 and the synthetic drug as a 80/100 [10/100]. In other words, the natural drug is much less potent and a little bit safer [much safer] than the synthetic drug.

In a separate sample, we confirmed that this manipulation reliably affects safety beliefs ( $d = 1.16$ ) but does not reliably affect potency beliefs ( $d = -0.10, p = .144$ , see pp. 14–17 of the [web appendix](#)). After reading the scenario, participants indicated whether they preferred the natural or

synthetic drug on the 7-point scale adapted from study 1. Then, participants indicated their age and gender and exited the survey.

### Study 5A: Results

A 2 (treatment purpose: prevent, cure)  $\times$  2 (safety advantage of natural: small [i.e., natural a little safer], large [i.e., natural much safer]) ANOVA revealed effects consistent with our theoretical account. The natural product was more preferred for preventing than for curing ( $F(1, 798) = 24.11, p < .001, \eta_p^2 = .03$ ). Unsurprisingly, the natural product was more preferred when there was a large safety advantage (where natural was much safer;  $F(1, 798) = 74.03, p < .001, \eta_p^2 = .09$ ). Most importantly and as predicted in hypothesis 3A, when the safety advantage increased (natural was much safer), the prevent/cure effect increased ( $F(1, 798) = 4.68, p = .031, \eta_p^2 = .01$ ). The prevent/cure effect was marginally significant when the safety advantage was small ( $M_{\text{prevent}} = 4.02, SD = 2.10, M_{\text{cure}} = 3.65, SD = 2.11, t(396) = 1.74, p = .083, d = 0.18$ ) and highly significant when the safety advantage was large ( $M_{\text{prevent}} = 5.46, SD = 1.62, M_{\text{cure}} = 4.51, SD = 1.69, t(402) = 5.74, p < .001, d = 0.57$ ). In other words, increasing the natural safety advantage approximately tripled the size of the prevent/cure effect ( $[d = 0.57 - d = 0.18]/d = 0.18$  is a 217% increase in Cohen's  $d$  effect size). This pattern of results is displayed in [figure 3A](#).

### Study 5B: Methods

Eight hundred seven US participants from Amazon's Mechanical Turk completed an online survey in exchange for monetary compensation ( $M_{\text{age}} = 37.4, SD = 12.1$ ; 52.2% females and 47.8% males). Participants were randomly assigned to one of the four conditions in a 2 (treatment purpose: prevent, cure)  $\times$  2 (potency disadvantage of natural: small [i.e., natural a little less potent], large [i.e., natural much less potent]) between-subjects design. The scenarios were the same as study 5A, except that we always told participants that natural was much safer and we manipulated potency information. Specifically, participants in the small potency disadvantage (large potency disadvantage) condition were told "On potency, the FDA rates the natural drug as 80/100 [10/100] and the synthetic drug as 90/100. On safety, the FDA rates the natural drug as a 90/100 and the synthetic drug as a 10/100. In other words, the natural drug is a little less potent [much less potent] and much safer than the synthetic drug."

In a separate sample, we confirmed that this manipulation reliably affects potency beliefs ( $d = 1.31, p < .001$ ) but does not reliably affect safety beliefs ( $d = 0.07, p = .340$ , see pp. 14–17 of the [web appendix](#)). After viewing the scenario, participants completed the same preference

for natural measures as in study 5A. Then, participants indicated their age and gender and exited the survey.

### Study 5B: Results

A 2 (treatment purpose: prevent, cure)  $\times$  2 (potency disadvantage of natural: small [i.e., natural a little less potent], large [i.e., natural much less potent]) ANOVA revealed effects consistent with our theoretical account. The natural product was more preferred when preventing than when curing ( $F(1, 803) = 19.65, p < .001, \eta_p^2 = .02$ ). Unsurprisingly, natural products were less preferred when there was a large potency disadvantage ( $F(1, 803) = 125.90, p < .001, \eta_p^2 = .14$ ). Most importantly and consistent with hypothesis 3B, when the potency disadvantage of natural increased, so too did the prevent/cure effect ( $F(1, 803) = 5.88, p = .016, \eta_p^2 = .01$ ). In follow-up  $t$ -tests, there was a directional, albeit nonsignificant, difference between preventing and curing in the small potency disadvantage condition ( $M_{\text{prevent}} = 6.22, SD = 1.41, M_{\text{cure}} = 5.99, SD = 1.49, t(401) = 1.61, p = .109, d = 0.16$ ) and a highly significant difference between preventing and curing in the large potency disadvantage condition ( $M_{\text{prevent}} = 5.20, SD = 1.69, M_{\text{cure}} = 4.41, SD = 1.91, t(402) = 4.39, p < .001, d = 0.44$ ). In other words, increasing the natural potency disadvantage nearly tripled the size of the prevent/cure effect ( $[d = 0.44 - d = 0.16]/d = 0.16$  is a 175% increase in Cohen's  $d$  effect size). This pattern of results is displayed in [figure 3B](#).

### Discussion

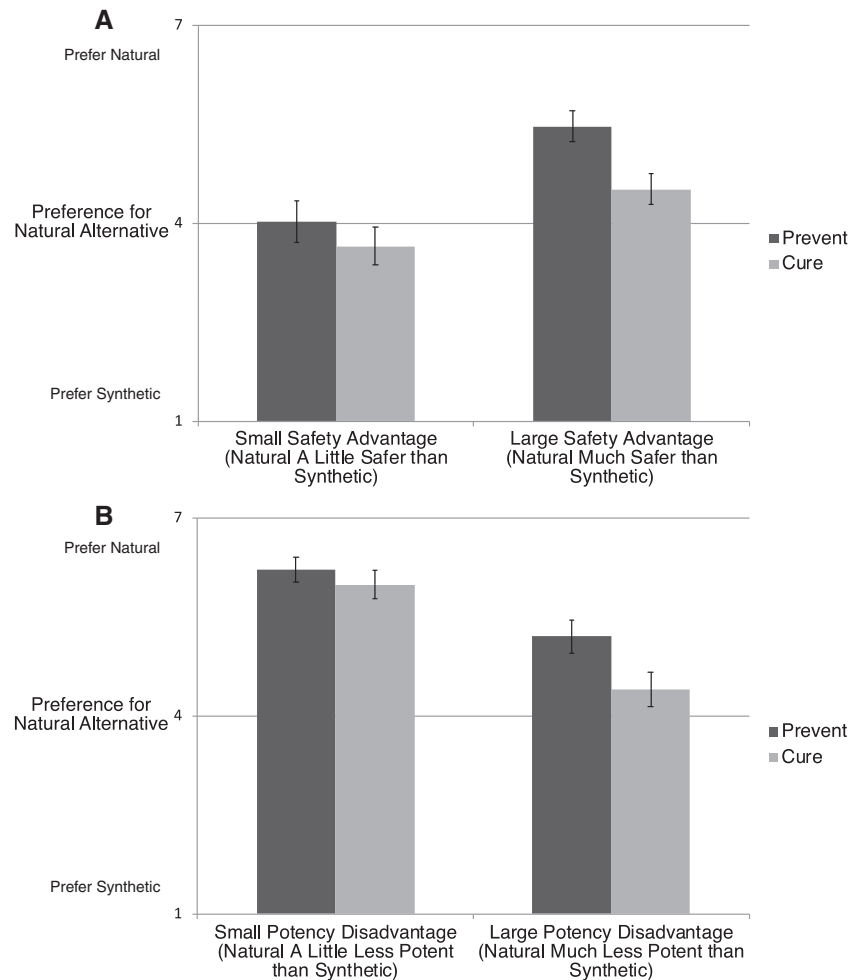
Studies 5A and 5B provide evidence that lay beliefs about both safety and potency are important and separate components of the psychological mechanism. Increasing the degree to which people believe natural = safer by increasing the safety advantage of natural (holding potency constant) increases the prevent/cure effect. Similarly, increasing the degree to which people believe natural = less potent by increasing the potency disadvantage of natural (holding safety constant) increases the prevent/cure effect.

## STUDY 6: IMPORTANCE OF SAFETY AND POTENCY AS MEDIATORS

Studies 4 and 5 examined the first component of the psychological mechanism—lay beliefs—and study 6 examines the second component of the psychological mechanism—importance of safety and potency. We theorize that preventative treatment purpose (vs. curative treatment purpose) increases the importance of safety and decreases the importance of potency, which causes a stronger preference for natural products. Next, we test whether the importance of safety and the importance of potency independently and simultaneously mediate the prevent/cure effect. Formally:

FIGURE 3

THE PREVENT/CURE EFFECT INCREASES WHEN THE SAFETY ADVANTAGE OF NATURAL INCREASES (HOLDING POTENCY DISADVANTAGE CONSTANT, STUDY 5A) OR WHEN THE POTENCY DISADVANTAGE INCREASES (HOLDING THE SAFETY ADVANTAGE CONSTANT, STUDY 5B)



NOTE: The gridline at four represents indifference between natural and synthetic alternatives. Error bars represent 95% confidence intervals of the mean.

**H4A:** Increased preference for natural when preventing is partly mediated by increased importance of safety when preventing.

**H4B:** Increased preference for natural when preventing is partly mediated by decreased importance of potency when preventing.

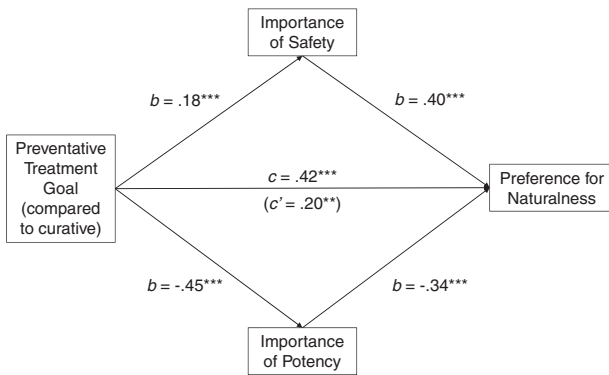
## Methods

Four hundred two US participants from Amazon's Mechanical Turk completed an online survey in exchange for monetary compensation ( $M_{age} = 35.8$ ,  $SD = 11.6$ ,

54.0% females, 46.0% males). Each participant viewed one scenario, and in each scenario, participants considered a case where they were preventing a target problem and a case where they were curing the same target problem. We chose to use this within-subjects manipulation of treatment purpose for two reasons. First, it provides better statistical power, which is critical because we attempt to assess the indirect effects of two partial mediators on an estimated medium-to-small total effect (e.g., in study 1,  $d = 0.27$ ). Second, a within-subjects design helps rule out that subjects interpret the preventative and curative context differently (e.g., the disease, symptoms, or severity).

FIGURE 4

MEDIATION MODEL TESTING INDIRECT PATHS OF THE IMPORTANCE OF SAFETY AND THE IMPORTANCE OF POTENCY IN STUDY 6



NOTE. \*\*\* $p < .001$ , \*\* $p < .01$ .

Through random assignment, participants saw one of the nine target problems from study 1. For example, for the target problem of vitamin B12 deficiency, participants read:

*Imagine the following two cases.*

*In case A, you are susceptible to hypcobalaminemia, a vitamin B12 deficiency, and your doctor prescribes a medicine, vitamin B12.*

*In case B, you already have hypcobalaminemia, and your doctor prescribes the exact same medicine, vitamin B12, in the exact same dose.*

*In both case A and case B, you will take vitamin B12 once a day for 3 weeks.*

*Suppose there are synthetic forms of vitamin B12 (generated in a lab) and natural forms of vitamin B12 (extracted from soybean plants). Assume the synthetic and natural forms are the same price.*

Participants indicated their preferences for the natural product when preventing and when curing the target problem, on a 7-point scale adapted from study 1. In addition, they completed four measures of attribute importance: potency when preventing, safety when preventing, potency when curing, and safety when curing. These importance scales ranged from 1 = not at all important to 7 = extremely important.

We counterbalanced three aspects of the design. Through random assignment, half of the participants completed importance questions before preference questions and half completed them after preference questions. Furthermore, through random assignment, half of the participants considered curing before preventing and half considered preventing before curing. Finally, through random assignment, half of the participants indicated the

importance of potency before indicating the importance of safety and half considered safety before potency. After completing these measures, participants completed the same trait preference for natural measures and demographic measures from study 1.

## Results

In the present study, we asked each participant to consider only one of the nine scenarios (e.g., vitamin B12 deficiency). For ease of exposition, and because results were consistent across scenarios (for all scenarios, on all dependent measures, effects never trended opposite of our predictions), we collapse across scenarios. In addition, because counterbalancing the order of presentation (order of prevent vs. cure, order of potency vs. safety, order of measuring mediators vs. measuring preferences for natural) did not have any main effects or interactions with treatment purpose, we collapse across order.

As predicted by hypothesis 1, there was a significant increase in preference for natural when preventing versus curing ( $M_{\text{prevent}} = 5.45$ ,  $SD = 1.52$ ,  $M_{\text{cure}} = 5.03$ ,  $SD = 1.77$ ,  $t(401) = 6.04$ ,  $p < .001$ ,  $d = 0.30$ ). In addition, as expected, preventing increased the importance of safety ( $M_{\text{prevent}} = 6.27$ ,  $SD = 1.11$ ,  $M_{\text{cure}} = 6.08$ ,  $SD = 1.20$ ,  $t(401) = 4.43$ ,  $p < .001$ ,  $d = 0.22$ ) and reduced the importance of potency ( $M_{\text{prevent}} = 5.70$ ,  $SD = 1.23$ ,  $M_{\text{cure}} = 6.15$ ,  $SD = 0.99$ ,  $t(401) = -8.28$ ,  $p < .001$ ,  $d = -0.41$ ).

To test hypothesis 4, which posits that the prevent/cure effect is mediated by both the increased importance of safety (hypothesis 4A) and the decreased importance of potency (hypothesis 4B), we fit a mediation model. This mediation model is displayed in figure 4. Because our experimental design was within-subjects, we used MEMORE in SPSS (Montoya and Hayes 2017). MEMORE uses a path-analytic framework to estimate indirect and direct effects with bootstrap confidence intervals. The analysis revealed significant indirect effects of the importance of safety (indirect effect = 0.07, 95% CI [0.03, 0.14]) and the importance of potency (indirect effect = 0.15, 95% CI [0.07, 0.24]). Preventing (vs. curing) an ailment increased the importance of safety ( $a_{\text{safety}} = 0.18$ ), and increasing the importance of safety increased the preference for natural ( $b_{\text{safety}} = 0.40$ ). Preventing (vs. curing) an ailment reduced the importance of potency ( $a_{\text{potency}} = -0.45$ ), and reducing the importance of potency increased the preference for natural ( $b_{\text{potency}} = -0.34$ ). The importance of safety and potency accounted for 53% of the effect of treatment purpose on preference for natural ( $c = 0.42$ ,  $p < .001$ ;  $c' = 0.20$ ,  $p = .006$ ).

## Discussion

Study 6 tests the second part of the psychological mechanism—the importance of safety and potency. The results

conform with predictions of hypotheses 4A and 4B—the prevent/cure effect is simultaneously mediated by both an increased importance of safety and a decreased importance of potency. Furthermore, it replicates the prevent/cure effect in a within-subjects design and offers evidence for a similar effect size within-subjects ( $d = 0.30$ ) and between-subjects (from study 1, average  $d = 0.27$ ).

In this study, participants rated safety as more important than potency when preventing an ailment ( $M_{\text{safety}} = 6.27$  vs.  $M_{\text{potency}} = 5.70$ ), and participants rated the two attributes as about equally important when curing ( $M_{\text{safety}} = 6.08$  vs.  $M_{\text{potency}} = 6.15$ ). In spite of rating the two attributes about equally when curing, it was still the case that going from preventative to a curative treatment purpose changed the importance of both attributes. Consistent with our predictions, switching from a curative to a preventative treatment purpose increases the importance of safety and decreases the importance of potency.

## STUDY 7: THE PREVENT/CURE EFFECT ATTENUATES WHEN CONSUMERS PRIORITIZE MORAL CONCERNS

In studies 4–6, we focused on how safety and potency attributes affected the preference for natural. These attributes represent consequences of consuming products. However, prior research indicates that part of the preference for natural comes from other considerations. Specifically, many consumers claim natural products are intrinsically morally superior (because naturalness is viewed as inherently morally good) independent of the consequences of consuming them (Rozin et al. 2004; Scott, Inbar, and Rozin 2016).

In study 7, we examine whether emphasizing moral versus consequence-based aspects of consumption will moderate the prevent/cure effect. Specifically, if the prevent/cure effect occurs because of consequence-based considerations, then the prevent/cure effect should be mitigated when consumers are focused more on moral aspects of consumption. Formally:

**H6:** The prevent/cure effect will be reduced when consumers make decisions based on moral considerations rather than consequence-based considerations.

## Methods

Six hundred four US participants from Amazon's Mechanical Turk completed an online survey in exchange for monetary compensation ( $M_{\text{age}} = 38.3$ ,  $SD = 11.4$ , 54.0% females, 45.5% males, 0.5% others). This study was preregistered at <https://aspredicted.org/gv4qq.pdf>.

Participants viewed four different scenarios in a 2 (treatment purpose: prevent vs. cure)  $\times$  2 (priority: consequences vs. morality) within-subjects design. We chose to use a

fully within-subjects design, because we expected an attenuated interaction, which requires a great deal of statistical power to reliably detect (Simonsohn 2014).

Participants considered preventing or treating a cold. We adapted the materials from study 1. However, participants were also given a priority to focus on. To stress morality, participants read (in bold font) “Suppose your top priority is to get the most ethical product. That is to say, above all else you want a product that is consistent with your moral values.” To stress consequences, participants read (in bold font) “Suppose your top priority is to get the best treatment available for your needs. That is to say, above all else you want a product that best fits your needs in terms of its risks and benefits.” Participants then indicated their preference for natural on the same 7-point rating scale as in study 1. After completing the scenarios, participants indicated their gender and age and exited the survey.

## Results

In a 2 (treatment purpose: prevent vs. cure)  $\times$  2 (priority: moral vs. consequences) repeated measures ANOVA, there was a main effect of treatment purpose where in general consumers preferred natural more when preventing versus curing ( $F(1, 603) = 113.22$ ,  $p < .001$ ,  $\eta_p^2 = .16$ ). There was also a main effect of priority, such that the preference for natural was stronger for consumers focusing on moral principles ( $F(1, 603) = 102.55$ ,  $p < .001$ ,  $\eta_p^2 = .15$ ). Most importantly, as predicted, there was an interaction between treatment purpose and priority ( $F(1, 603) = 19.23$ ,  $p < .001$ ,  $\eta_p^2 = .03$ , see figure 5). Although there was a significant prevent/cure effect in both priority conditions, the effect was reduced in the moral priority condition ( $M_{\text{prevent}} = 5.71$ ,  $SD = 1.46$ ,  $M_{\text{cure}} = 5.33$ ,  $SD = 1.68$ ,  $t(603) = 7.51$ ,  $p < .001$ ,  $d = 0.31$ ) compared to the consequences condition ( $M_{\text{prevent}} = 5.29$ ,  $SD = 1.73$ ,  $M_{\text{cure}} = 4.65$ ,  $SD = 1.98$ ,  $t(603) = 10.27$ ,  $p < .001$ ,  $d = 0.42$ ).

## Discussion

Study 7 offers further support for our theory that beliefs about consequences drive the prevent/cure effect. When these consequences (safety/potency) are de-emphasized in favor of moral concerns, the prevent/cure effect is diminished. These findings imply that the prevent/cure principle will be most predictive in situations for which moral concerns are less salient, or where the consumers are less ideologically driven in their purchasing behaviors.

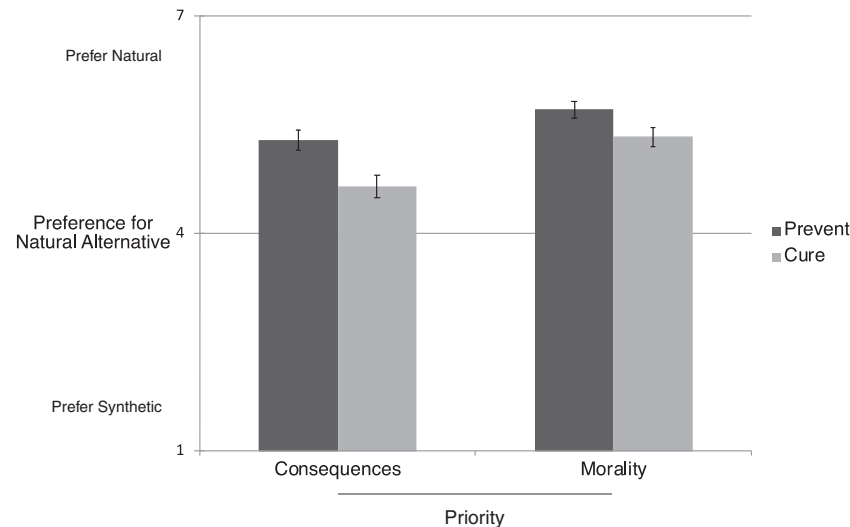
## GENERAL DISCUSSION

Consumers widely desire natural products, but not always to the same degree. In this article, we demonstrate that the preference for natural is particularly strong when consumers are preventing problems or illnesses compared



FIGURE 5

IN STUDY 7, THE PREVENT/CURE EFFECT IS SMALLER WHEN CONSUMERS ARE FOCUSED ON MORAL CONSIDERATIONS AS COMPARED TO WHEN CONSUMERS ARE FOCUSED ON CONSEQUENCE-BASED CONSIDERATIONS (E.G., SAFETY, POTENCY)



NOTE: The gridline at four represents indifference between natural and synthetic alternatives. Error bars represent 95% confidence intervals of the mean.

to when they are curing the same problems or illnesses. Study 1 shows that the exact same natural product is more strongly preferred when preventing an ailment than when curing it. This prevent/cure effect replicates across many products, both for medical and household needs. Study 2 finds consumers search for natural products more often and chose natural more often when preventing versus curing cold symptoms. Study 3 examines consumers' reports about their health choices over a year and finds consumers prioritize naturalness in their preventative treatments more than in their curative treatments. Studies 4–7 examine the proposed psychological mechanism and the boundary conditions. Studies 4 and 5 provide evidence for the roles of lay beliefs about natural. Study 4 shows that when natural products are believed to be riskier and more potent than synthetic products (the opposite of the usual lay belief), the prevent/cure effect reverses: natural is more preferred for curing than for preventing. Study 5 shows that orthogonally manipulating beliefs about safety (study 5A) or beliefs about potency (study 5B) moderates the prevent/cure effect. Study 6 provides evidence for the role of importance of safety and potency and shows that the importance of safety and the importance of potency simultaneously mediate the prevent/cure effect. Finally, study 7 examines a theoretically and pragmatically important moderator. When consumers are focused on moral concerns, as opposed to consequence-based (e.g., safety, potency) concerns, the prevent/cure effect is smaller.

## Contributions

This article offers several unique contributions. First, from a theoretical perspective, although natural products are widely preferred and purchased by consumers, we do not know when and why systematic variation in the preference for natural occurs. Our primary contribution is to provide an organizing principle for explaining when consumers prefer natural products. The prevent/cure distinction explains variation in the preference for natural across distinct product categories (e.g., food vs. medicine), within product categories (e.g., different types of medicines), and for the same product depending on how it is used (to prevent or to cure ailments). In doing so, our research not only generates new predictions but also helps unify past descriptive findings under one theoretical framework. For example, some prior research has noted that the preference for natural is stronger for food than for medicine (Gaskell et al. 1999; Rozin et al. 2004). Although there is legitimate overlap between food and medicine, laypeople may typically conceive of medicine in more curative terms and food in more preventative (general wellness) terms. Similarly, prior research has noted that, within the category of medicine, people with a stronger preference for natural are less likely to vaccinate (DiBonaventura and Chapman 2008; Lombrozo 2015). Preference for natural might figure prominently in vaccination decisions because vaccination is a preventative measure.

Second, we provide a nuanced theory of consumers' lay beliefs about natural products. Prior literature has focused on the positive lay beliefs about natural products (e.g., safety, healthfulness, moral superiority; Roman, Sánchez-Siles, and Siegrist 2017; Siegrist and Hartmann 2020; Sunstein 2005). In contrast, we hypothesize that, similar to beliefs about sustainable products (Luchs et al. 2010), natural is believed to be less potent. Therefore, considering trade-offs between safety and potency sheds light on when naturalness is most appealing. Moreover, consumers' attitudes toward using natural products depend not only on their beliefs about the consequences of consumption but also on their moral beliefs. Thus, the extent to which preferences for natural products vary between preventing and curing further depends on whether moral concerns or consequence-based concerns are paramount.

Third, from an applied perspective, the identified organizing principle can help marketers predict when and where the preference for natural is likely to loom large. Marketers and managers often need to make decisions about when to invest in a natural brand or product line. Our research suggests that, all else equal, natural products are most popular when they are used for preventative purposes. In addition, for products that have both preventative and curative functions, our findings shed light on which functions to emphasize. Our research suggests that natural is best paired with a preventative function.

## External Validity and Generality

We find robust evidence for the prevent/cure effect across many products and many ailments. Our studies include a number of experiments, where we manipulate treatment purpose and measure preference for natural. Complementing the experimental evidence, we also find evidence of the prevent/cure effect in survey reports of everyday health behaviors (study 3) as well as measured preferences for a wide range of common drug and convenience store product categories (see study S1 in [web appendix](#)).

Our studies also use a variety of dependent measures, including relative preference measures, search behavior, and product choice. However, one limitation is that the majority of the experiments rely on a relative preference measure. We do this because it reflects a common choice that consumers face in the marketplace between a natural or a synthetic product. We have not examined whether the present findings would generalize to a context where the natural and synthetic products are evaluated in isolation—where there is only one product available, which could make the attribute of naturalness less salient. It is possible that such cases differ from our investigation and could be explored in future research.

We expect that the association between treatment purpose (prevent vs. cure) and preference for natural is general, but we also speculate that it might vary in magnitude

in predictable ways. Methodologically, the experiments herein control for potential confounds that may covary with preventing versus curing in the real world. Prevention often involves a more abstract purpose (cf. Trope and Liberman 2003), such as overall wellness as opposed to targeting a specific illness. Preventatives are often used for longer periods of time or in smaller doses than curatives, and doctors might be less likely to prescribe preventatives. In our experiments, these other factors are held constant, allowing us to more conclusively demonstrate the effect of treatment purpose (i.e., preventing or curing) on preference for natural. We expect that these confounds will often increase the association between prevent/cure and the preference for natural in the real world. For example, if doctors are less likely to prescribe a preventative treatment and less likely to recommend a natural, alternative medicine, then we would expect an even larger association between prevent versus cure and choosing natural alternatives. Our data support this speculation. The effect size of the prevent/cure effect is large to medium in observational data (e.g., study 3,  $d = 0.58^5$ ) and medium to small in our tightly controlled experiments (e.g., study 1, average  $d = 0.27$ ; Cohen 1992).

Throughout our studies, we also find that consumers almost always prefer natural products, all else equal, albeit more so when preventing. We believe that this overall preference for natural is due to a few factors. First, some people hold ideological beliefs that natural is morally superior and therefore preferred for reasons independent of its risks and benefits (Rozin et al. 2004; Scott et al. 2016). These moral beliefs produce a main effect where natural is preferred across situations, as is observed in the present studies. Second, to ensure internal validity in our experiments, we equate natural and synthetic on many factors and often vary them only in terms of processing history (e.g., extracted from plants or generated in a laboratory). This manipulation eliminates certain trade-offs consumers negotiate in the real world, such as between naturalness and price. Therefore, in the real world, there are likely more cases for which people choose to purchase and use synthetic treatments (even if they would prefer their treatment to be natural, holding all other attributes constant).

## Relation to Common Theoretical Frameworks

Prevent/cure goals are objective situations consumers face, which may intrinsically differ from each other in more than one respect. Specifically, prevent/cure situations differ intrinsically in temporal distance and uncertainty. Prevention is about the future, which is inherently uncertain. Indeed, Frederick, Loewenstein, and O'Donoghue

5 We converted the effect size from the percentage of people who said they valued natural in the survey when preventing (65.3%) versus when curing (39.8%) into a Cohen's  $d$  effect size (Borenstein et al. 2009).

(2002, 382) argue that “it is unclear whether subjects do (or can) accept [the assumption that delayed rewards will be delivered with certainty], because delay is ordinarily—and perhaps unavoidably—associated with uncertainty.” We expect that temporal distance and uncertainty are important differences between preventing and curing, which generate changes in the preference for natural. We leave the relative importance of these components of preventing and curing as a question for future research.

The prevent/cure situations affect preferences for natural in a pattern that is generally consistent with a prospect theory framework (Kahneman and Tversky 1979). When consumers have an existing ailment and are curing, they are in the loss domain and therefore risk seeking (lower priority on safety vs. potency); when consumers are healthy and preventing, they are at or above the reference point and therefore more risk averse (higher priority on safety vs. potency). Another theory that may at first seem relevant to the present findings is regulatory focus (Bullard and Manchanda 2013; Crowe and Higgins 1997). A “prevention focus,” which is “concerned with security, safety and responsibility,” naturally maps on to preventing an ailment (Crowe and Higgins 1997, 117). However, it is not obvious that a promotion focus, which is “concerned with advancement, growth, and accomplishment,” would map onto curing an ailment (Crowe and Higgins 1997, 117). Moreover, if regulatory focus were the appropriate framework, then a prevention focus would be associated with a stronger preference for natural. We sought to test this empirically. Specifically, in study S2 presented in the web appendix, we examined the relationship between preference for natural and regulatory focus with 203 participants on Amazon’s Mechanical Turk. The correlation between predominant regulatory focus (higher scores corresponding to a predominant promotion focus) and trait preference for natural was not significant ( $r = 0.095$ ,  $t(201) = 1.35$ ,  $p = .178$ ). Thus, we do not find logical or empirical support for a regulatory focus account.

### On the Optimality of Choice between Natural and Synthetic Options

One remaining question is the degree to which these consumers’ choices are sub-optimal. We argue that the most likely violation of rationality occurs in consumers’ lay beliefs (Scott and Rozin 2020). Consumers hold a heuristic lay belief that natural products are safer. While this lay belief may be correct in certain cases, we suspect it is sometimes inaccurate in the current regulatory environment in the United States. Specifically, natural products are often categorized as “dietary supplements” as opposed to “medicines.” Unlike medicines, dietary supplements do not need to demonstrate safety and efficacy to the FDA to go to market and thus may paradoxically be unsafe (Bent 2008). The FDA estimates that consumption of “natural”

supplements cause 50,000 adverse health events each year (GAO 2009). Similarly, 99.99% of dietary pesticides are natural (i.e., chemicals produced by plants to defend themselves), and these are just as deadly as synthetic pesticides, but largely unregulated (Ames, Profet, and Gold 1990). In short, natural is not always safer. However, marketers might exploit these heuristic beliefs about natural’s superiority (Akerlof and Shiller 2015), thus exacerbating sub-optimal consumer decision-making.

### Implications and Future Directions in the Context of COVID-19

The present research was conceived of and developed with a focus on individual consumers making decisions for themselves between multiple treatment options (some natural, some synthetic). The emergence of the COVID-19 (novel coronavirus) pandemic raises important questions about the implications and future directions of our research. How do people conceive of preventing a highly contagious threat with heterogeneous risk to self, but massive risk to others and to society as whole? How will people respond to novel treatment options when little is known about the safety/potency trade-offs? We outline key questions below.

First, do pandemics induce a macro-level version of a curative mindset? In other words, society may conclude that there already exists a problem (a widespread ailment) that needs to be cured, thereby placing more importance on potency relative to safety. Relatedly, pandemics and epidemics might covary with other aspects of a health threat—contagiousness of a disease, severity of a disease, scarcity of treatment options, and novelty of and lack of knowledge about the threat—which each might have downstream consequences on safety/potency trade-offs.

Second, as researchers are racing to develop a vaccine, how will consumers respond to it? Vaccines are technically a treatment to *prevent* an ailment. Moreover, vaccines are unnatural insofar as they are altered/created by humans. Some people refuse vaccines as a preventative measure, preferring not to “interfere with nature” (Lombrozo 2015). However, in the case of COVID-19, because society is currently anxiously awaiting a vaccine as a solution to a chronic epidemic, it could instead be evaluated as a “curative” for a societal problem. Will consumers who view it that way be less reactant? Our research suggests that if vaccine is viewed more like a curative to the epidemic than a preventative for the self, consumers will be more receptive toward it.

Finally, how does consumer psychology around selecting treatments shift when partisan divides emerge? As we write in the United States, in spring 2020, actions to remedy the epidemic are politicized: Democrats are, on average, more concerned about its threat to health than Republicans (Van Bavel 2020; Van Green and Tyson

2020). When a topic becomes politically polarized, the resulting in-group/out-group mentality can dramatically influence decision-making (Cohen 2003; Kahan 2013; Van Bavel and Pereira 2018). Beliefs about the effectiveness of treatment options and adherence to expert recommendations will no doubt be shaped by these group loyalties. Currently, political liberals are more supportive of preventative measures, including social distancing and wearing masks, than political conservatives (Van Bavel 2020; Van Green and Tyson 2020). These actions may become moralized by the political left, who shame those that fail to adopt them, which could further deepen political divides.

## Conclusion

This article highlights three important distinctions: natural/unnatural, prevent/cure, and safety/potency, and, for the first time, establishes a clear relation among them. Consumers prefer natural products more when they are preventing than when they are curing because natural products are viewed as safer and less potent.

## DATA COLLECTION INFORMATION

All data were collected on Amazon Mechanical Turk, except study 3 that uses publicly available data. The data collection timeline was as follows: study 1 data collected in May 2016; study 2 data collected in June 2019; study 4 data collected in May 2016; studies 5A and 5B data collected in May 2018; study 6 data collected in September 2016; and study 7 data collected in September 2019. The first author collected and analyzed the data under the supervision of the second and third authors. The OSF link to data, syntax, and materials is: <https://osf.io/ft3zp/>.

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