Risk perception researchers have observed a “negativity bias” for hazard-related information. Messages indicating the presence of risk seem to be trusted more than messages indicating the absence of risk, and risk perceptions seem more affected by negative than positive information. Two experiments were conducted to examine alternative explanations of this finding within the area of food additives. Study 1 (N = 235) extended earlier work by (a) unconfounding message valence (positive or negative) from message extremity (definite or null finding) and (b) exploring the role of prior attitudes. Results suggested that negative/risky messages were indeed trusted more even when extremity was taken into account. However, prior attitudes significantly moderated the effect of message valence on trust. Positive messages were distrusted only by those with negative prior attitudes. Study 2 (N = 252), further explored the role of prior attitudes and extended the work by examining reactions to risky messages about a positively viewed additive—a vitamin. The results again found a moderating effect of prior attitudes on message valence. Participants had greater confidence in messages that were more congruent with their prior attitudes, irrespective of valence. Furthermore, positive messages had a greater impact on risk perception than negative messages. These findings suggest that greater trust in negative messages about hazards may be a product of a “confirmatory” rather than a “negativity” bias.

1. INTRODUCTION

Recent research in the field of risk perception has reported a “negativity bias” for risk-related information. Specifically, “negative” messages suggesting the presence of risk are said to be trusted more and to have a greater impact upon risk perceptions than “positive” messages suggesting the absence of risk.\(^{1,2}\) These findings appear related to observations of a “negativity bias”\(^{3,4}\) in a range of other psychological processes including attention,\(^5\) learning,\(^6\) decision making,\(^7\) and impression formation.\(^8\) Explanations for such a bias have included the relative preferences of avoiding losses compared to achieving gains,\(^9\) the greater category diagnosticity of negatively valued information for survival purposes,\(^10\) and the possibility that negative entities are more “contagious” than positive ones.\(^3\)

However, despite strong evidence for a negativity bias in many areas, findings reported in the domain of risk perception\(^{1,2}\) remain open to a number of alternative explanations. The present article reports results from two studies designed to replicate previous approaches but at the same time extend them in order to explore these alternative possibilities. Since the current research builds largely on work reported by Siegrist and Cvetkovich,\(^2\) we begin with an overview of their earlier research.
1.1. An Overview of Siegrist and Cvetkovich’s (2001) Research

The Siegrist and Cvetkovich paper reports three separate experiments. The basic procedure, common across all three studies, was to present participants with an experimentally manipulated questionnaire with a short (about 70 words) vignette about research findings relating to a particular hazard. The hazard for Studies 1 and 3 was food colorants; the main difference being that Study 3 concerned the results of animal tests. The hazard for Study 2 was electromagnetic fields from high-tension power lines. The source was manipulated in two of the studies, with the message being attributed to a laboratory with either a “Bad” or “Excellent” reputation (Study 1), or a “University” or “Manufacturer” (Study 3). The source of the messages in Study 2 was the same across all conditions (i.e., “power companies”). Message valence varied between “harmful” and “harmless” (Study 1), “no impact on health,” “some effects on organisms but no effects on humans” and “weak effects on human health” (Study 2), and “can cause cancer” and “harmless” (Study 3). After reading the vignettes, participants were asked how much trust they had in the results of the study (on a bipolar scale from “high trust” to “high distrust”) and how dangerous they thought the hazard was (on a unipolar scale from “very dangerous” to “not at all dangerous”). Results found greater confidence in the “harmful” or “negative” messages than the “not harmful” or “positive” messages. Although the authors interpreted these findings as being broadly consistent with a negativity bias hypothesis, we believe that there are at least two alternative explanations for their, and perhaps even earlier data.

1.2. Alternative Explanations

The first alternative explanation concerns message extremity. Specifically, “negative” messages may have been trusted more than “positive” messages in these particular studies due to message extremity rather than message valence. Put simply, a “harmful” message may be more negative than a “not harmful” message is positive, and extremity biases have been found to be at least as important in impression formation as valence biases. Extremity is related to the degree of ambiguity or diagnosticity. While the presence of risk is a fairly unambiguous negative message, reports of an absence of risk cannot, by contrast, said to be an unambiguously positive message. Whilst findings of no risk could indeed mean that no risk is present, they could, alternatively, mean that the investigators were unable (or unwilling) to find a risk—a possibility made greater by the scientific tendency to place the burden of proof on positive results. Thus participants may have had lower trust in “not harmful” messages, not because of their more positive valence, but because they were more ambiguous. Attempts to counterbalance message extremity across valence are therefore needed to investigate this possibility.

The second alternative relates to the importance of prior attitudes. Despite the wealth of concordant evidence from other fields, the main effect of message valence remains surprising given the prediction of rather complex interactions between message content, source, and audience for risk perception and trust. For example, trust in the source of risk-related messages tends to be higher when the source is perceived to be knowledgeable and to have little vested interest, an example being doctors. However, as Earle and Cvetkovich point out, trust may remain high even when there is an obvious vested interest as long as this interest coincides with that of the audience. In a similar vein, the effects of message content on trust are also likely to be moderated by the prior attitudes of the audience. For example, Hovland, Janis, and Kelley suggested that “Individuals who are in favor of the opinion advocated will consider the communication fair and unbiased, but those with an opposed stand will regard the identical communication as propagandistic and unfair” (p. 155). Furthermore, these processes are just as likely to influence supposedly “objective” scientists as members of the lay public. This is potentially important because research in this area tends to focus on risk messages about potential hazards, such as nuclear power, colorants, and electromagnetic fields, that many people may already perceive to be risky. In such a situation, it becomes problematic to differentiate between a “negativity” and a “confirmatory” bias explanation where trust is simply higher when a message is congruent with one’s prior attitudes.

A more recent study by Cvetkovich, Siegrist, Murray, and Tragesser (Study 1) addressed some aspects of this issue. In an extended replication of a Slovic study into trust in the nuclear industry, “Bad” news was again found to have a larger effect on trust than “Good” news. However, “individuals distrustful of the nuclear power industry judged both good and bad news as more negative than did those who were more trustful” (p. 364), suggesting an important role...
for the “perseverance” of prior attitudes. Nevertheless, this study continued to focus on a source of great potential risk, and examined prior trust rather than prior risk attitudes. Negative messages may, therefore, have had a greater overall impact because most people believed nuclear power to be hazardous in the first place.

1.3. The Present Research

The present research investigated trust in risky messages as a function of message extremity and prior attitudes. In Study 1, this was achieved by first adding conditions where message extremity was balanced for both positive and negative valence (i.e., by adding “beneficial” and “not beneficial” messages), and secondly by asking participants about their prior attitudes toward the hazard before the message was presented. In Study 2, we continued to look at prior attitudes but extended the paradigm by looking at messages concerning a more positively viewed hazard, an added vitamin.

Support for the “negativity bias” hypothesis would be found if message valence is more important than message extremity. If trust is higher for the negatively valenced messages of “harmful” and “not beneficial” than for the positively valenced messages of “not harmful” and “beneficial” then this suggests a negativity bias. However, if trust is higher for the more extreme (less ambiguous) messages of “harmful” and “beneficial” than the less extreme (more ambiguous) messages of “not harmful” and “not beneficial,” then an “extremity bias” explanation could be offered for the earlier findings. Similarly, if negatively valenced messages are trusted more, regardless of prior attitudes, then again this would support a “negativity bias” explanation. However, if negative messages are trusted more by those with negative prior attitudes, and positive messages are trusted more by those with positive prior attitudes, a “confirmatory bias” explanation of the results seems more plausible.

2. STUDY 1: MESSAGE EXTREMITY AND PRIOR ATTITUDES

2.1. Pilot Study: Message Valence and Ambiguity

We carried out a small pilot study in order to test perceived extremity of messages. Specifically, we presented 60 people with one of the four messages that could be made about a new product, though we were careful not to mention any product specifically. The four messages were, “This product is [beneficial/not beneficial/harmful/not harmful] to health.” We then asked them “How positive or negative do you believe this message is?” on a seven-point scale from “very negative” to “very positive.”

To analyze the results we carried out a one-way analysis of variance entering message as the independent variable and perceived valence as the dependent variable. There was a significant main effect of message $F(3,56) = 83.78, p < 0.001$. The order of means from most positive to most negative was, as predicted, “beneficial” ($M = 1.93, SD = 0.70$), “not harmful” ($M = 0.93, SD = 1.23$), “not beneficial” ($M = -1.60, SD = 0.91$), and “harmful” ($M = -2.60, SD = 0.51$). Planned repeated contrasts (i.e., comparisons of messages with those next in the hypothesized order of valence) found that “beneficial” was significantly more positive than “not harmful,” “not harmful” was significantly more positive than “not beneficial,” and “not beneficial” was significantly less negative than “harmful.” In other words, our predicted order of valence was confirmed, supporting the need to explore potential extremity effects.

2.2. Method

2.2.1. Overview

Although we largely maintained the method of the earlier studies,$^2$ our data collection method was different. Rather than using paper and pencil techniques, we posted the experiment on the Internet so that the participants could take part from distal locations with minimal effort. (For reviews on the use of these techniques, see References 21 and 22.)

In terms of design, there were eight different conditions, reflecting four different messages, attributed to one of the two sources. Following Siegrist and Cvetkovich (Study 3), the “high credibility” source was a team of researchers from an Independent University and the “low credibility” source was the Manufacturer of the additive.$^2$ The four messages included the original two, “harmful” and “not harmful,” as well as the two aimed at counterbalancing extremity, “beneficial” and “not beneficial.” Following the results of the pilot study, the order of message valence from most positive to most negative was “beneficial,” “not harmful,” “not beneficial,” and “harmful.”
2.2.2. Participants

Requests for participants were posted on a number of mailing lists familiar to the authors. None of these lists were specifically concerned with issues of risk, risk perception, or food technology. Potential participants were simply asked if they would like to take part in a study looking at food additives that would take about 4–5 minutes. Two-hundred-thirty-five people visited the website and took part in the experiment. Reported ages ranged from 16 to 70 years ($M = 28.53, SD = 10.16$) and there were 85 males and 149 females. One person did not declare age or gender.

2.2.3. Procedure

On clicking the hyperlink in the original e-mail request, participants were taken first to an introductory page, then to a second screen, which asked the following question: “Generally speaking, how beneficial/harmful do you think adding preservatives to food is?” Responses ranged on a seven-point scale from “very beneficial” (+3) to “very harmful” (−3). On proceeding to the next page, participants were randomly assigned to one of the eight conditions. The following introduction was the same for all four message valences with text in brackets reflecting the alternative source.

A lot of foods contain preservatives. There are speculations that an often-added preservative may actually be linked to cancer. To date there are no definite results showing whether this substance is harmful to health or not. An independent university research laboratory [A research laboratory funded by the preservative’s manufacturer] has published new results. The message then continued in one of the four ways depending on condition: (A) “harmful”: “The study showed that the preservative does seem to be linked to certain types of cancer. The conclusion of the study suggests that the addition of this preservative into foods is harmful.”; (B) “not harmful”: “The study showed that the preservative does not seem to be linked to certain types of cancer. The conclusion of the study suggests that the addition of this preservative into foods is not harmful.”; (C) “beneficial”: “The study showed that the preservative does seem to help prevent certain types of cancer. The conclusion of this study suggests that the addition of this preservative into foods is beneficial.”; (D) “not beneficial”: “The study showed that the preservative does not seem to help prevent certain types of cancer. The conclusion of this study suggests that the addition of this preservative into food is not beneficial.”

After reading the statement, participants proceeded to the next page where they were asked to answer the following questions: (1) How harmful [beneficial] do you think the preservative is? (“very harmful [beneficial]” to “not harmful [beneficial] at all”); (2) How much trust do you have in the results of the study? (“high trust” to “high distrust”). Once participants had answered the questions, they were debriefed, thanked, and provided with further contact details.

2.3. Study 1 Results

2.3.1. Manipulation Check

As predicted, “beneficial” messages ($M = 3.28, SD = 1.08$) were seen to be more beneficial than “not beneficial” messages ($M = 1.83, SD = 1.66$), $t(114) = 5.55, p < 0.001$, and “harmful” messages ($M = 4.06, SD = 1.38$) were seen to be more harmful than “not harmful” messages ($M = 2.96, SD = 1.38$), $t(117) = 4.78, p < 0.001$.

2.3.2. The Extremity Bias Hypothesis

Results of the trust judgments were submitted to a 4 (messages) by 2 (sources) between-subjects analysis of variance. There were significant main effects of source $F(1,227) = 5.59, p < 0.001$, and message

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3 Overall, females ($M = −0.43, SD = 1.15$) had significantly more negative prior attitudes toward preservatives than males ($M = −0.07, SD = 1.35$; $t(230) = 2.14, p < 0.04$). However, since there were no main effects of gender on either of the main dependent variables of postmessage risk perception or trust or any significant interactions (notably with message valence), we do not consider this variable any further in the main body of the text.

4 The introduction for Study 1 was as follows: “Most of the processed foods we now eat contain some kind of ‘artificial additives.” These include added vitamins, minerals, colorants, stabilizers, and preservatives. There has been much recent discussion and research into whether these additives are necessary and what effect they can have on people’s health. We are interested in how people interpret new scientific findings about food safety, as communicated in the media. This study presents a hypothetical ‘Press Release’ outlining recent research into the effect of adding a particular preservative to food. Your task is to read this short paragraph and answer four questions about it. The study takes less than five minutes. If you would like to take part please click the ‘Next’ button below.”

5 Both studies were part of a larger research project. Other questions not related to the current article are not discussed here.
Trust in Risky Messages: The Role of Prior Attitudes

2.3.3. The Confirmatory Bias Hypothesis

Overall, prior attitudes toward food preservatives were significantly negative from the neutral midpoint of the scale ($M = -0.30$, $SD = 1.24$, $t(232) = 3.66$, $p < 0.001$). However, although 108 (46%) participants thought preservatives were negative to begin with (i.e., responses ranging from $-1$ to $-3$), a sizeable minority, 48 (21%), thought that they were a positive thing (i.e., responses ranging from $+1$ to $+3$), with a further 77 (33%) choosing a neutral reply.

To test the confirmatory bias hypothesis we dichotomized prior attitudes into “pro” (i.e., those with positive prior attitudes) and “anti” (i.e., those with negative prior attitudes) and carried out a 2 (prior attitude) × 4 (message) analysis of variance. Evidence of moderation would be reflected in a significant effect of the interaction term.\footnote{To test the confirmatory bias hypothesis we dichotomized prior attitudes into “pro” (i.e., those with positive prior attitudes) and “anti” (i.e., those with negative prior attitudes) and carried out a 2 (prior attitude) × 4 (message) analysis of variance. Evidence of moderation would be reflected in a significant effect of the interaction term.}$^2$ Means can be seen in Table II.

We found a significant main effect of prior attitude, $F(1,148) = 8.07$, $p < 0.006$, but no main effect of message valence, $F(3,148) = 1.60$, $ns$. Of most importance for the moderation hypothesis, there was also a significant interaction, $F(3,148) = 3.08$, $p < 0.03$. Follow up $t$-tests showed that while the means for the “harmful” and “not beneficial” messages were not significantly different as a function of prior attitudes ($t(35) = 0.65$ $ns$; $t(42) = 0.58$ $ns$, respectively), the difference between the means for “beneficial” and “not harmful” were a function of prior attitudes ($t(35) = 2.54$, $p < 0.02$; $t(36) = 2.84$, $p < 0.007$, respectively). In other words, while prior attitudes did not seem to affect the negatively valenced messages of “harmful” and “not beneficial,” positive messages of “beneficial” and “not harmful” were trusted by those with positive prior attitudes but actively distrusted by those with negative prior attitudes. These findings therefore offer support for the “confirmatory bias” hypothesis.

2.4. Study 1 Discussion

Study 1 set out to replicate the research of Siegrist and Cvetkovich\cite{Cvetkovich} and at the same time explore two alternative hypotheses for their findings. Since trust was higher for “harmful” than “not harmful” messages, a successful replication was achieved. Furthermore, since the more positive “beneficial” message was trusted even less than the “not harmful” message, it seems that a “negativity bias” explanation of the results is more feasible than an “extremity bias” explanation.

### Table I. Means of Trust as a Function of Source and Message:

<table>
<thead>
<tr>
<th>Source</th>
<th>Beneficial</th>
<th>Not Harmful</th>
<th>Not Beneficial</th>
<th>Harmful</th>
</tr>
</thead>
<tbody>
<tr>
<td>University</td>
<td>−0.17 (1.46)</td>
<td>0.36 (1.44)</td>
<td>0.10 (1.32)</td>
<td>0.56 (1.13)</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>−1.09 (1.44)</td>
<td>−1.00 (1.30)</td>
<td>−0.50 (1.55)</td>
<td>0.23 (1.50)</td>
</tr>
<tr>
<td>N = 24</td>
<td>N = 36</td>
<td>N = 29</td>
<td>N = 32</td>
<td></td>
</tr>
<tr>
<td>N = 33</td>
<td>N = 21</td>
<td>N = 30</td>
<td>N = 30</td>
<td></td>
</tr>
</tbody>
</table>

$^a$Ratings are on a seven-point scale: −3 = high distrust to +3 = high trust.

Note: Standard deviations are given in parentheses.

### Table II. Means for Trust as a Function of Message and Prior Attitudes: Study 1

<table>
<thead>
<tr>
<th>Prior Attitude</th>
<th>Beneficial</th>
<th>Not Harmful</th>
<th>Not Beneficial</th>
<th>Harmful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pro (+1 to +3)</td>
<td>0.44 (1.46)</td>
<td>0.70 (1.16)</td>
<td>&lt;0.01 (1.59)</td>
<td>0.29 (1.16)</td>
</tr>
<tr>
<td>N = 9</td>
<td>N = 10</td>
<td>N = 12</td>
<td>N = 17</td>
<td></td>
</tr>
<tr>
<td>Anti (−1 to −3)</td>
<td>−0.96 (1.37)</td>
<td>−0.82 (1.54)</td>
<td>−0.28 (1.37)</td>
<td>0.60 (1.60)</td>
</tr>
<tr>
<td>N = 28</td>
<td>N = 28</td>
<td>N = 32</td>
<td>N = 20</td>
<td></td>
</tr>
</tbody>
</table>

$^a$Ratings are on a seven-point scale: −3 = high distrust to +3 = high trust.

Note: Standard deviations are given in parentheses.
However, we also found support for the “confirmatory bias” hypothesis. First, more participants held negative attitudes than positive attitudes before message presentation. Second, prior attitudes significantly moderated the effect of message valence on trust. While negative messages were more or less equally trusted, regardless of prior attitudes, positive messages were trusted by participants with positive prior attitudes and distrust by those with negative prior attitudes. The fact that there was no main effect of message valence in this analysis also appears to weaken the case for a negativity bias interpretation.

Nevertheless, the results should be treated with caution given the relatively small number of participants with positive prior attitudes. It could be, as with any small sample, that measurement error explains the results. A fuller test of this hypothesis should use a scenario where many participants have positive prior attitudes.

In summary, results from Study 1 suggest that greater trust in negative than positive messages about hazards may be more a product of prior attitudes, reflecting a “confirmatory bias” than an underlying “negativity bias.” However, a second study is needed to address a number of methodological issues and reduce the likelihood that these results were simply a function of measurement error.

3. STUDY 2: RISKY MESSAGES ABOUT A PERCEIVED BENEFIT

3.1. Introduction

In order to increase the number of participants with positive prior attitudes in Study 2, we selected a food additive that, we assumed, most people would be more favorable toward than preservatives—a vitamin. The vitamin we chose was vitamin B4 (or folic acid) because we believed that unlike some of the more commonly discussed vitamins such as A and C, our sample would be less familiar with it and have lower knowledge about its potential effects on health. Presenting risky or negative messages about a vitamin is not an unrealistic scenario. Concerns have already been expressed about the toxicity of a number of vitamins, for example vitamins B6 and D, especially when consumed in high quantities through the use of dietary supplements. (24,25)

In addition to this change of topic, there were a number of methodological changes. First, in addition to assessing prior attitudes toward added vitamins, we also assessed prior attitudes to a range of other food additives. In this way we could check whether vitamins were seen as significantly more positive than preservatives, as used in Study 1 above, and food colorants, as used in the original Siegrist and Cvetkovich paper. (2) Second, in order to reduce the study complexity, and given the fact that we have already addressed the issue of extremity in Study 1, only “beneficial” and “harmful” messages were examined. Third, by using the same bipolar response scale for positive and negative messages, we could now test more directly the hypothesis that negative messages would have a greater impact on risk perception than positive messages. Fourth, in an effort to extend our understanding of perceptions of different sources, we added a third source, “Doctors.” Finally, we changed the wording of the “trust” question so that it directly measured “confidence in findings,” thus reducing any ambiguity between trust in specific findings compared to trust in the source more generally. These changes resulted in a 2 (message valence) by 3 (source) experimental design.

3.2. Method

3.2.1. Participants

Although Study 2 was also run “on-line,” the difference this time was that the participants were final year high school students visiting the department during a series of open days. Groups of 10–15 participants were introduced to the experiment as an example of research conducted within the field of social psychology with actual participation being voluntary. The mean age was 20 (SD = 8.59, range 17–62), and there were 205 females and 46 males (one person did not declare age or gender). Since there were no significant effects of gender (even on prior attitudes), this variable is not considered further below. It is perhaps worth noting that Siegrist and Cvetkovich also used high school students as participants. (2)

3.2.2. Procedure

The introductory page was very similar to that used in Study 1. (2) On clicking “Next,” participants

(24) Seventeen participants were actually parents accompanying the visiting students. Since there were no significant differences between the parents and the students on any of our key dependent variables, their responses were retained.
(25) The introduction for Study 2 had the following two parts: Part 1. “Many of the processed foods we eat today contain an assortment of added ingredients. Manufacturers add preservatives to...
proceeded to a second page, which asked them “Generally speaking, how beneficial/harmful do you think these added ingredients are: Flavourings, Preservatives, Colourants, Vitamins and Minerals?” Responses for each of the five additives were made on seven-point scales from “very beneficial” (+3) to “very harmful” (−3). On proceeding to the next page, they were randomly assigned to one of the six conditions and shown the following (bracketed text reflects the different messages according to condition):

A recent study by a team of doctors at a leading research hospital/researchers at a leading university/researchers at a leading manufacturer of vitamin supplements has looked at the role of vitamin B4. A link between this vitamin and the immune system has long been suspected but not understood. Last month, the team used a new biochemical analysis to investigate the supposed link by examining the impact of vitamin B4 on the development of T3 cells. (T3 cells are already known to be important in boosting the immune system.) The research team found that the vitamin aids [harms] the production of these important cells. They, therefore, recommend including more [less] vitamin B4 in the average diet, either by encouraging people to eat more [avoid] foods containing it naturally or by adding [no longer adding] it to some foods such as breakfast cereals.

After reading the passage, they were asked to respond to the following questions: (1) “How much CONFIDENCE do you have in the findings reported in the press release?” (“high confidence” (+6) to “no confidence” (0)); (2) “How BENEFICIAL/HARMFUL do you think this particular vitamin is?” (“very beneficial” (+3) to “very harmful” (−3)). Finally, the participants were thanked and debriefed.

help food stay fresher, longer. They add colorings and flavorings to try to make food look and taste better. They also often add vitamins and mineral supplements because doctors believe they are important for a healthy balanced diet. However, people’s attitudes towards these added ingredients, is often mixed. This study asks you to report your attitudes towards them and to assess some relevant means are reported in the two left columns of Table III. Therefore, while the main effect of message valence, with greater confidence in findings and perceived risk/benefit as a Function of Message Valence and Source:

<table>
<thead>
<tr>
<th>Source</th>
<th>Beneficial</th>
<th>Harmful</th>
<th>Beneficial</th>
<th>Harmful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors</td>
<td>3.16 (1.33)</td>
<td>3.15 (0.55)</td>
<td>1.01 (0.89)</td>
<td>−0.27 (0.83)</td>
</tr>
<tr>
<td>University</td>
<td>3.53 (1.13)</td>
<td>3.11 (1.17)</td>
<td>1.05 (0.87)</td>
<td>−0.28 (1.00)</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>3.25 (1.12)</td>
<td>3.19 (1.23)</td>
<td>0.87 (0.91)</td>
<td>−0.32 (1.02)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>Beneficial</th>
<th>Harmful</th>
<th>Beneficial</th>
<th>Harmful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors</td>
<td>N = 55</td>
<td>N = 26</td>
<td>N = 53</td>
<td>N = 26</td>
</tr>
<tr>
<td>University</td>
<td>N = 40</td>
<td>N = 36</td>
<td>N = 38</td>
<td>N = 36</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>N = 48</td>
<td>N = 47</td>
<td>N = 46</td>
<td>N = 47</td>
</tr>
</tbody>
</table>

Ratings are on a seven-point scale: 0 = no confidence to +6 = high confidence.

Ratings are on a seven-point scale: −3 = very harmful to +3 very beneficial.

Note: Standard deviations are given in parentheses.
prediction of greater overall confidence in the “beneficial” messages was not supported either.

A second 3 (source) by 2 (message) between-subjects analysis of variance with perceived risk/benefit as the dependent variable was also carried out. While there was a main effect of message valence, $F(1,240) = 109.01$, $p < 0.001$, there was no significant effect of source or a significant interaction. This suggests that the experimental manipulation worked. Of greater interest were the differential effects of message valence on perceptions of risk/benefit. In order to compare the effects directly, we eliminated the signs by calculating the absolute scores and then carried out a simple $t$-test on the perceptions comparing message valence. The results were significant, $t(243) = 3.67$, $p < 0.001$, suggesting that positive messages had a greater impact on perceptions than did negative messages. This is reflected in Table III by the means for “beneficial” messages being further from the midpoint of zero than those for “harmful” messages and is in direct contrast to what would be expected from a negativity bias perspective.

3.3.3. Confidence, Prior Attitudes, and Message Valence

Given that only one person reported a negative prior attitude toward added vitamins, a comparison between “pros” and “antis” was no longer feasible. In order to dichotomize the group this time, we therefore carried out a median split (Mdn = 2) to produce two groups: “high pros,” who reported very positive (+3) prior attitudes ($N = 125$) and “low pros” whose scores ranged from +2 downward ($N = 127$).

In order to test the hypothesis that prior attitudes would moderate the effects of message valence on confidence in the findings, we conducted a further 2 (attitude) $\times$ 2 (valence) analysis of variance with confidence in the findings as the dependent variable. There were no significant main effects of either message valence $F(1,248) = 0.84$, $ns$, or prior attitude, $F(1,248) = 0.91$, $ns$. However, as predicted, there was a significant interaction between the two, $F(1,248) = 7.05$, $p < 0.008$.8

The means in Table IV show that participants with highly positive prior attitudes had greater confidence in positive messages than negative messages and that this pattern was reversed for participants with less positive attitudes. Therefore, while the interaction in Study 1 was largely a product of the differences between trust in the positive messages, the interaction here resulted from both message valences and as such provides even stronger evidence of the role of prior attitudes.

4. GENERAL DISCUSSION

Previous research has suggested that negative or “risky” messages about a range of potential hazards have a greater impact on trust and risk perceptions than positive or “beneficial” messages.1,2,20 The present studies investigated two alternative explanations for these findings, message extremity and the role of prior attitudes. Study 1 found no evidence of message extremity. In fact, trust was lowest for the most positive message. However, both Study 1, using a negatively viewed food additive, and Study 2, using a positively viewed food additive, showed that trust was greatest for messages congruent with people’s prior attitudes. Furthermore, in Study 2, where nearly all participants had positive prior attitudes, the impact of positive messages was stronger than that of negative messages.

These findings may be important for understanding risk attenuation.26 One reason why risks such as radon and the aflatoxins in peanut butter might be attenuated is that they are not perceived as being particularly risky to begin with, and thus risky messages tend to be trusted less because they are incongruent with the prior attitudes. How people arrive at these prior attitudes in the first place is beyond the scope of

<table>
<thead>
<tr>
<th>Prior Attitude</th>
<th>Message Valence</th>
<th>$N$</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Pro (+3)</td>
<td>Positive</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>50</td>
</tr>
<tr>
<td>Low Pro ($\leq +2$)</td>
<td>Positive</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>59</td>
</tr>
</tbody>
</table>

8 Confidence ratings are on a seven-point scale: 0 = no confidence to +6 = high confidence.
Note: Standard deviations are given in parentheses.
the current article, but it is likely that the factors explored within the psychometric paradigm such as perceived controllability and voluntariness of the risks and perceptions of benefit play an important part.

A number of issues remain with regard to the current findings. First, while our measure of prior attitudes was quite broad, concerning adding preservatives and vitamins in general, the subsequent measures were related to specific examples of these additives. This meant we were unable to make direct assessments of the impact of message valence on risk/benefit perceptions that could be made if both response scales reflected judgments at the same level of specificity. We acknowledge that further exploration of the confirmatory bias hypothesis in this area would benefit from a more direct comparison between prior and subsequent attitudes. Second, the relative unimportance of source, especially for Study 2, is inconsistent with previous research. Further research in this area might continue to explore prior perceptions about the source, as well as the hazard, as interactions between perceptions of source and message valence have been reported elsewhere.

Our findings are not entirely inconsistent with the “negativity bias” literature. However, we have shown that it is important to consider the context and background of people’s risk judgments. Furthermore, our findings are entirely consistent with the persuasion literature. From this perspective, interactions between audience, source, and message valence are to be expected. While Cvetkovich et al. have shown that prior trust is important for subsequent trust, we have shown that prior attitudes about the substance in question are also important. While much previous research has found strong correlations between trust and risk perceptions, establishing causality has been a problem. We believe that further experimental manipulation of the relevant factors would help unpack these associations further.

To conclude, the research presented here suggests that findings of greater trust in “risky” messages are a reflection of two factors. Most people tend to have negative prior attitudes toward many hazards, and people tend to have greater trust in messages that are consistent with their prior attitudes. This is not to say that message valence, or the power of negative messages, are unimportant. The weight of evidence for a “negativity bias” in a range of areas of psychology is substantial, and it is likely that some aspects of this will emerge in issues of persuasion and risk communication. However, in exploring these possibilities we should not forget factors such as prior attitudes, which have already been well researched and that may be equally, if not more, important in understanding trust and the effects of message valence on risk perception.

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