Does Perceived Risk Influence the Effects of Message Framing? A New Investigation of a Widely Held Notion

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Abstract

Health-promoting messages can be framed in terms of the beneficial consequences of healthy behaviour (gain-framed messages) or the detrimental consequences of unhealthy behaviour (loss-framed messages). An influential notion holds that the perceived risk associated with the recommended behaviour determines the relative persuasiveness of gain- and loss-framed messages. This 'risk-framing hypothesis', as we call it, was derived from prospect theory, has been central to health message framing research for the last two decades, and does not cease to appeal to researchers. The present paper examines the validity of the risk-framing hypothesis. We performed six empirical studies on the interaction between perceived risk and message framing. These studies were conducted in two different countries and employed framed messages targeting skin cancer prevention and detection, physical activity, breast self-examination and vaccination behaviour. Behavioural intention served as the outcome measure. None of these studies found evidence in support of the risk-framing hypothesis. We conclude that the empirical evidence in favour of the hypothesis is weak and discuss the ramifications of this for future message framing research.

Keywords: message framing, persuasion, health behaviour, risk perceptions

Does Perceived Risk Influence the Effects of Message Framing? A New Investigation of a Widely Held Notion

Health-promoting messages can be framed in terms of the beneficial consequences of healthy behaviour (gain-framed) or the detrimental consequences of unhealthy behaviour (loss-framed). A large, and still growing, body of literature is dedicated to investigating which type of frame is more effective under which circumstances and why (for reviews see Covey, in press.; Gallagher & Updegraff, 2012; O'Keefe & Jensen, 2006, 2007; Rothman, Bartels, Wlaschin, & Salovey, 2006). Starting with Meyerowitz and Chaiken's (1987) first paper on health message framing, the concept of risk has been central to this field. The single most influential explanation of message framing effects has been the notion that the relative effectiveness of gain- versus loss-framed information is dependent on the risk associated with the advocated behaviour.

This focus on risk was inspired by the experiments that Kahneman and Tversky performed in their seminal prospect theory research (Kahneman & Tversky, 1984). Because this research showed that gain-framed information makes people risk-averse, Meyerowitz and Chaiken (1987) argued that gain-framed messages would be especially effective in promoting safe behaviours, like exercising, eating vegetables or indeed all behaviours that serve to preserve one's health. On the other hand, because it was shown that loss-framed information makes people willing to take risks, Meyerowitz and Chaiken argued that loss-framed information would be more effective to promote behaviours that are relatively risky. With 'risky' behaviour, they chiefly meant disease-detection behaviours, because these entail the possibility (i.e., risk) of finding out that one is ill. This line of reasoning, which we shall refer to as the 'risk-framing hypothesis', was adopted by Rothman and colleagues (1993; Rothman & Salovey, 1997) and has loomed large in message-framing research ever since.

Some authors have criticized the notion that the risk associated with the advocated behaviour determines the relative effectiveness of gain- and loss-framed health-promoting messages (Cox, Cox, & Zimet, 2006; Kuhberger, 1998; O'Keefe & Jensen, 2006). They have argued, for instance, that the uncertainty that is so central to prospect theory is very dissimilar from the risk as conceptualized in the risk-framing-hypothesis. However, the momentum of the risk-framing hypothesis does not seem to have been slowed by these few dissonant voices. Indeed, it is no exaggeration to say that the risk-framing-hypothesis 'has guided health message framing research over the last 15 years' (Gallagher & Updegraff, 2012, p112).

Given the dominance of the risk-framing hypothesis, it is important to investigate whether its tenets can withstand a rigorous investigation, and the present article aims to do just that. In particular, the paper investigates whether perceived risk reliably influences message framing effects, as the risk-framing hypothesis holds.

The Interaction Between Risk and Message Framing: Existing Evidence

Several studies have investigated the interaction between perceived risk and message framing. Studies that have followed the risk-framing hypothesis have generally hypothesized that gain-framed messages are more persuasive than loss-framed messages when perceived risk is low, while loss-framed messages are more persuasive than gain-framed messages when perceived risk is high. Some studies have indeed found support for these expectations (Ferguson & Gallagher, 2007), but other studies have found only partial support (Hwang, Cho, Sands, & Jeong, 2012; Toll et al., 2008), and yet other studies have found no support (Cohen, 2010; Gainforth & Latimer, 2012). Also, several studies have reported evidence for a significant effect

in the opposite direction, with a gain-framed advantage for high-risk participants or a loss-framed advantage for low-risk participants (Williams, Clarke, & Borland, 2001).

It is worth noting that researchers have used different operationalizations of risk in their tests of the risk-framing-hypothesis. Several studies have investigated whether perceptions of the recommended behaviour's downsides moderate the effects of message framing (e.g., Cohen, 2010; Gainforth & Latimer, 2012; Toll et al., 2008). In one such study, Ferguson and Gallagher (2007) asked their participants how risky they perceived a flu vaccination to be and provided them with framed messages advocating vaccination behaviour. Their results were in line with the risk-framing hypothesis, showing that loss-framed information was more persuasive than gain-framed information for participants who perceived the vaccination as risky. No effect was found for participants who perceived the vaccination as safe. Another study found only partial support for the hypothesis, however, revealing that women who perceived quitting smoking to entail little risk were more easily persuaded by gain- rather than loss-framed information advocating smoking cessation, but no effects were found in women who perceived smoking to entail a high risk and no effects were found for men (Toll et al., 2008). Moreover, three studies (Cohen, 2010; Gainforth & Latimer, 2012; Gallagher, Updegraff, Rothman, & Sims, 2011) found no evidence for the moderating role of the potential downsides of the recommended behaviour. Finally, Williams and colleagues (2001) found that a loss-framed brochure encouraged more positive change in breast self-examination than a gain-framed brochure, but only among women who were not anxious about performing breast self-examination. Considering that these women (as opposed to highly anxious participants) most likely perceived the behaviour as entailing little risk, these latter results are quite at odds with the risk-framing-hypothesis.

Several other studies have operationalized risk as the uncertainty surrounding the recommended behaviour's upsides. Bartels and colleagues (2010), for instance, provided participants with a description of a vaccine for the West Nile virus which was thought to be either effective for only 60% of the population (uncertain option) or for 90% of the population (certain option). The results were in line with the risk-framing hypothesis, revealing that people in the high-risk (uncertainty) condition had a greater interest in the vaccine when they received a loss-framed message, whereas people in the low-risk (certainty) condition had a greater interest in the vaccine when they received a gain-framed message. Similar results were found by Block and Keller (1995). However, another study, which did not manipulate but instead assessed participants perceptions of behavioural efficacy in the domain of skin cancer prevention, failed to find the hypothesized interaction for wearing long-sleeve shirts and long pants, although the hypothesis was confirmed for sunscreen use (Hwang et al., 2012). Another study found the hypothesized effects for men, but not for women (Latimer-Cheung et al., 2012), while two final studies found no interaction between certainty / uncertainty and the effects of framed messages (Abhyankar, O'Connor, & Lawton, 2008; Ferguson & Gallagher, 2007).

Lastly, several researchers (e.g., Gallagher et al., 2011; Hull, 2012; Hwang et al., 2012; Lalor & Hailey, 1989 –1990; Millar & Millar, 2000) have employed a third operationalization of risk, focusing on recipients' baseline perceptions of their chances of falling ill (i.e., recipients' perceived vulnerability before having received the framed information). Most of those have hypothesized that a high baseline perceived vulnerability would result in an advantage of loss-framed information. But does this hypothesis follow logically from the risk-framing hypothesis' original tenets?

On close inspection, this seems doubtful. After all, the risk-framing hypothesis holds that the effect of framing is influenced by the risk that is associated with the recommended behaviour. For prevention behaviours, particularly, a 'baseline' estimate of the risk of falling ill (a smoker's perception of his own risk of contracting lung cancer, for instance) has no direct bearing on the risk that is associated with the recommended behaviour (e.g., smoking cessation). If anything, a smoker who considers himself to be at risk of lung cancer should perceive noncompliance, thus continuing to smoke, as particularly risky. If information about the positive consequences of the healthy behaviour makes people risk averse, as the risk-framing hypothesis holds, than gain-framed, rather than loss-framed, information should be particularly likely to persuade a smoker with high perceived vulnerability to quit smoking.

In the case of detection behaviours, the argument is more equivocal. On the one hand, the risk of finding out that one is ill is greater for those with a high perceived vulnerability. Therefore, those with a high perceived vulnerability may be more easily persuaded by loss- as compared to gain-framed information. On the other hand, an equally valid argument would be that, for those with a high perceived vulnerability, *not* performing the detection behaviour is a particularly risky choice, because it entails the chance that they are seriously ill without knowing it. As with the smoker mentioned above, if gain-framed information makes people risk-averse, gain- rather than loss-framed information could trigger high perceived vulnerability recipients to take the low-risk option of performing detection behaviours (Cox et al., 2006; O'Keefe & Jensen, 2006).

In sum, even when one accepts the risk-framing hypothesis, it is not at all clear that perceived vulnerability can be expected to reliably influence message framing effects. In spite of this, however, many researchers have hypothesized that a high baseline perceived vulnerability

makes loss-framed messages more persuasive than gain-framed messages. Several studies have found evidence for this (Gallagher et al., 2011; Hull, 2012; Hwang et al., 2012), although several other studies have failed to find this effect (Lalor & Hailey, 1989 –1990; Millar & Millar, 2000). We argue, however, that an interaction between baseline perceived vulnerability and message framing does not necessarily follow from the risk-framing hypothesis. This begs the question whether an alternative explanation can account for these findings, an issue that we will revisit in the Discussion section. For now, it should be stressed that the present paper follows the original formulation of the risk-framing hypothesis and focuses on the potential downsides of the recommended behaviour and uncertainty concerning the upsides of the recommended behaviour as potential moderators of message framing effects.

With regards to these two operationalizations of risk, we can conclude from the studies reviewed above that the evidence for an interaction between perceived risk and message framing is mixed. A recent systematic review reaches the same conclusion (Covey, in press). Thus, there is great uncertainty as to whether the hypothesis is indeed convincingly supported by the empirical evidence. In the meantime, the popularity of the risk-framing-hypothesis seems to be undiminished by these inconsistent effects. It is still widely cited with approval (e.g., Bartels et al., 2010; Evangeli, Kafaar, Kagee, Swartz, & Bullemor-Day, 2013; Gainforth & Latimer, 2012; Garcia-Romero & Cokely, 2011; Hull, 2012; Kim, 2012; Ledford, 2012; McGregor, Ferguson, & O'Carroll, 2012), and in fact the hypothesis is even advertized on the website of the American Psychological Association (http://www.apa.org/research/action/motivate.aspx). In the present paper, we therefore take another critical look at the hypothesis that perceived risk moderates message framing effects.

We present the results of six studies, in different populations and using different operationalizations of risk, all of them investigating the interaction between perceived risk and message framing effects. Most of these studies present new data (Studies 3-6). However, Study 1 presents additional analyses on a dataset that has also formed the basis of a previous report (Cox et al., 2006, Study 1). Study 2 also made use of data that has previously been reported (Cox et al., 2006, Study 2), but included waves of data collection that were not yet available when Cox and colleagues wrote their original report. We first describe four studies (Studies 1-4) that focus on the downsides of the recommended behaviour. Next, we describe one study (Studies 5) that investigated the interaction between message framing and uncertainty concerning the upsides of the recommended behaviour. Study 6 combined a manipulation of downsides with a manipulation of the uncertainty of potential upsides.

Study 1

Method

In Study 1, which has previously been reported in Cox et al. (2006, Study 1), participants were exposed to gain- or loss-framed messages advocating the use of a skin lotion. The lotion was furthermore described as potentially resulting in side effects or as perfectly safe, and as serving either to prevent or to detect skin cancer. The study thus employed a 2 (framing: gain- vs. loss-frame) X 2 (risk: presence vs. absence of temporary side effects) X 2 (behavioural function: prevention or detection) between-subjects design. In total, 282 undergraduate students of a Midwestern university (41.1% female; Age: M(SD) = 23.3(4.55), range = 18-53) participated in the study. The outcome measure of the study was intention to use the lotion, which was assessed with three seven-point bipolar scales, asking participants to indicate the

extent to which they intended to ask their doctor about the product, purchase the product, and use the product. These items were combined to form a mean scale (Cronbach's α =.90), with higher scores indicating stronger intentions. For the present study, the risk-framing hypothesis would predict a gain-framed advantage for the low-risk lotion and a loss-framed advantage for the high-risk lotion.

Results

The analyses did not reveal a significant interaction between behavioural function and message frame, $F(1,274) = 1.92$, $p = .17$, $\eta_p^2 = .01$. There was an interaction between risk and framing, $F(1,274) = 4.80$, $p = .03$, $\eta_p^2 = .02$, but it was in the opposite direction from what one would expect following the risk-framing hypothesis. In the low risk condition loss-framed messages were more persuasive than gain-framed messages, $F(1,140) = 2.70$, $p = .10$, $\eta_p^2 = .02$, while in the high risk condition, gain-framed messages were more persuasive than loss-framed messages, $F(1,138) = 2.07$, $p = .15$, $\eta_p^2 = .02$, although neither of these differences were statistically significant. Table 1 shows the means for the high- and low-risk, and gain- and loss-frame groups, for Study 1 and for the other studies, as well as test statistics for the risk by framing interaction effects.

Study 2

Method

Study 2 has previously been reported in Cox et al. (2006, Study 2). However, while only the first wave of data collection was used in this previous report (n = 213), for the present paper all later waves of data collection were included (N = 542). These 542 adults were recruited from

the populations of three STD clinics (35.7% female; Age: M(SD) = 31.8(9.96), range 18 - 75) and were exposed to messages advocating vaccination for Hepatitis B that were tailored to participants' gender (i.e., men received a message which included a description of a male exemplar, whereas women received a message with a female exemplar). These messages were either gain- or loss-framed. After receiving these messages participants' intentions to obtain a vaccination were assessed with three items. These items were then converted to standardized scores to adjust for scaling differences between the items and combined to form a mean scale. Before exposure to the messages, four items assessed perceptions of short-term and non-serious risks by asking participants to indicate their agreement with the statements 'getting shots can be scary', 'shots are very painful', 'needles don't bother me at all' and 'I am not afraid of shots' on a 5-point scale (1 = *strongly disagree*; 5 = *strongly agree*). The last two items were reversed and the scores were averaged to form a short term risk score ($M_{\text{short-term risk}} = 2.94$, SD = 1.02, $\alpha = .79$). Also, six items assessed perceptions of long-term and serious risks by asking participants to indicate their agreement with the statements 'it is not safe to get the hepatitis vaccine shots', 'Hepatitis vaccine shots are dangerous', 'The vaccine shots for hepatitis can make people very sick', 'You can get infected with hepatitis from the hepatitis vaccine shots', 'It is safe to get vaccinated for hepatitis' and 'The hepatitis vaccine shots are generally very safe' on a 5-point scale (1 = *strongly disagree*; 5 = *strongly agree*). The last two items were reversed and the scores were averaged to form a long term risk score ($M_{\text{long-term risk}} = 2.42$, SD = 1.36, $\alpha = .77$). A median-split was performed on both of these variables, such that participants were classified as either high or low risk. This resulted in a 2 (framing: gain- vs. loss-frame) X 2 (short term risk: high vs. low) X 2 (long term risk: high vs. low) – design. For the present study, the risk-framing

hypothesis would predict a gain-framed advantage for low-risk participants and a loss-framed advantage for high-risk participants.

Results

The results showed that the three-way interaction between framing, short-term risk and long-term risk was not significant, $F(1,534) = 1.15$, $p = .28$, $\eta_p^2 = .00$. Also, there was no significant interaction between framing and long-term risk, F 1,534) = 0.29, $p = .59$, $\eta_p^2 = .00$. However, there were significant main effects of short-term risk, $F(1,534) = 4.37$, $p < .05$, $\eta_p^2 = .01$, and long-term risk, $F(1,534) = 59.51$, $p < .001$, $\eta_p^2 = .01$, and a significant two-way interaction between framing and short-term risk, $F(1,534) = 6.93$, $p < .01$, $\eta_p^2 = .01$. As in Study 1, loss-framed messages were more persuasive than gain-framed messages for low-risk participants, $F(1,256) = 5.21$, $p < .05$, $\eta_p^2 = .02$. Gain- and loss-framed messages were not differentially persuasive for high-risk participants, $F(1,282) = 0.85$, $p = .36$, $\eta_p^2 = .00$.

Studies 3 and 4

Method

Like, Study 2, Studies 3 and 4 assessed the extent to which participants' perceived the recommended behaviour as entailing potential downsides and investigated whether this measure of risk moderated the effects of gain- and loss-framed messages. In total, 1351 visitors of a 'Spring Fair' in a Dutch city agreed to participate. These participants were randomly presented with the materials for Study 3 or Study 4, which focused on physical activity and breast self-examination, respectively.

For Study 3, 672 participants (99.4% female; Age: M(SD) = 44.7(14.6), range = 15-82) were asked whether they agreed with the statement 'I think there are risks involved in being moderately physically active for 30 minutes each day' on a 7-point scale ranging from 1 (*completely disagree*) to 7 (*completely agree*) (M = 2.26; SD = 1.72) and were provided with gain- and loss-framed messages advocating being moderately physically active for 30 minutes each day. Next, they were asked *how likely* it was that they would engage in the recommended amount of daily physical activity, *whether they planned* on engaging in the recommended amount of daily physical activity and *whether they were contemplating* engaging in the recommended amount of daily physical activity, all on a 7-point scale. These three items were averaged to form a composite intention scale, with higher score indicating stronger intentions (M = 5.73; SD = 1.20; α = .79). Participants with a score of 1 on the risk perception measure were classified as low-risk participants (n = 312; 47.1%), whereas participants with a score of 2 or higher were classified as high-risk participants (n = 351; 52.9%; ten participants did not fill in the risk perception item and could not be included in the analysis). This resulted in a 2 (risk: low vs. high) X 2 (message frame: gain vs. loss) between-subjects design.

For Study 4, 679 visitors agreed to participate (all female; Age: M(SD) = 44.4(13.9), range = 18-79 [13 participants failed to indicate age – these were retained in the analyses]). Participants were asked whether they agreed with the statement 'I think there are risks involved in monthly performing breast self-examination' on a 7-point scale ranging from 1 (*completely disagree*) to 7 (*completely agree*) (M = 2.10; SD = 1.55) and were provided with gain- and loss-framed messages advocating performing breast self-examination at least once a month. Next, they were asked *how likely* it was that they would perform breast self-examination at least once a month and *whether they planned* on performing breast self-examination at least once a month,

both on a 7-point scale. These two items were averaged to form a composite intention scale, with higher scores indicating stronger intentions (M = 4.82; SD = 1.40; α = .81). Participants with a score of 1 on the risk perception measure were classified as low-risk participants (n = 344; 49.4%), and participants with a score of 2 or higher were classified as high-risk participants (n = 337; 49.5%; 8 participants did not fill in the risk perception item and could not be included in the analysis). This resulted in a 2 (risk: low vs. high) X 2 (message frame: gain vs. loss) between-subjects design. Following the risk-framing hypothesis, it could be expected that gain-framed information would be more persuasive than loss-framed information for low-risk participants, whereas loss-framed information would be more persuasive than gain-framed information for high-risk participants.

Results

The results of Study 3 showed that the risk by framing interaction effect was not statistically significant, $F(1,654) = 2.72$, $p = .10$, $\eta_p^2 = .00$. Instead, a main effect was found for perceived risk, $F(1,654) = 49.23$, $p < .001$, $\eta_p^2 = .07$, such that low-risk participants had stronger intentions than high-risk participants. No significant effect was found for framing, $F(1,654) = 0.07$, $p = .80$, $\eta_p^2 = .00$.

In these analyses, we classified participants with scores of 2-7 as high-risk participants in order to obtain equal numbers of participants in the low- and high-risk groups. It could be argued, however, that using the mid-point of the scale (4 on a 7-point scale) as a cut-off point results in a better classification of participants as high- or low-risk. We therefore performed t-tests to investigate the effect of framing in participants with scores ranging from 1-3 (n = 512), and in participants with scores ranging from 5-7 (n = 89). Using this classification, framing did

not have a significant effect in the low-risk group, $t(507) = 1.19$, $p = .24$, nor in the high-risk group, $t(86) = -1.13$, $p = .26$.

The results of Study 4 showed that the risk by framing interaction effect was not statistically significant, $F(1,681) = 2.68$, $p = .10$, $\eta_p^2 = .00$. Instead, low-risk participants had significantly stronger intentions than high-risk participants, $F(1,681) = 26.44$, $p < .001$, $\eta_p^2 = .04$. No significant effect was found for framing, $F(1,681) = 0.29$, $p = .59$, $\eta_p^2 = .00$. As with the analyses for Study 3, we performed additional analyses using the mid-point of the scale as a cut-off point, performing t-tests to investigate the effect of framing in participants with scores ranging from 1-3 (n = 551), and in participants with scores ranging from 5-7 (n = 68). Using this classification, framing did not have a significant effect in the low-risk group, $t(547) = 0.74$, $p = .46$, nor did it in the high-risk group, $t(65) = 0.41$, $p = .68$.[1]

Study 5

Method

Study 5 investigated whether uncertainty surrounding the upsides of the recommended behaviour could influence the effects of framed health messages, employing the same design as Bartels et al.'s (2010) study, which was discussed in the Introduction. Eighty undergraduate students and employees of a Dutch university (83.8% female; Age: M(SD) = 21.6(4.25), range = 18-49) received a persuasive text in the form of a fabricated news article, which included general information about the West Nile virus and the manipulation of perceived risk and message frame. To this end, the original material of the replicated study was translated into Dutch. The places of deadly infections were changed into European countries instead of American states. In the low-risk condition, the information stated that the vaccine was effective for 90% of the

population, whereas in the high-risk condition, it was stated that the vaccine was effective for 60% of the population. Next, participants received information recommending vaccination against the West Nile virus that was either gain- or loss-framed, resulting in a 2 (risk: low vs. high) X 2 (message frame: gain vs. loss) between-subjects design. The main dependent variable was intention to vaccinate, which was assessed with one item on a 9-point scale *(0* = weak intention; *8* = strong intention).[2] For Study 5, the risk-framing hypothesis would predict that gain-framed information would be more persuasive than loss-framed information in the low-risk condition, whereas loss-framed information would be more persuasive than gain-framed information in the high-risk condition.

Results

The results, unlike the results of Bartels et al. (2010), showed that the risk by framing interaction effect was not statistically significant, $F(1,76) = 1.72$, $p = .19$, $\eta_p^2 = .02$. Instead, main effects were found for both risk, $F(1,76) = 5.20$, $p = .03$, $\eta_p^2 = .06$, and framing, $F(1,76) = 5.20$, $p = .03$, $\eta_p^2 = .06$. Inspection of the means revealed that participants in the low-risk condition had significantly higher intentions to vaccinate than participants in the high-risk condition, and that participants in the loss-frame condition had significantly higher intentions to vaccinate than participants in the gain-frame condition (see Table 1).

Study 6

Method

Study 6 employed the same design as Study 5, only this time a manipulation of potential downsides was added to the manipulation of outcome uncertainty. Participants were presented

with a scenario describing the outbreak of a fictitious new strand of flu and were asked to imagine that a vaccine had been developed. In the low-risk condition it was stated that the vaccine was effective for 90% of the population and hardly caused any side-effects. In the high-risk condition it was stated that the vaccine was effective for 60% of the population and serious side-effects were mentioned, such as fever, vomiting and allergic reactions such as asthma. One hundred and twenty five undergraduate students and employees of a Dutch university (84.8% female; Age: M(SD) = 22.9(5.94), range = 18-58) participated in the study. One item assessed whether, given the scenario, participants would intend to get vaccinated on a 7-point scale (1 = *weak intention*; 7 = *strong intention*). For Study 6, the risk-framing hypothesis would predict that gain-framed information would be more persuasive than loss-framed information in the low-risk condition, whereas loss-framed information would be more persuasive than gain-framed information in the high-risk condition.

Results

The analyses did not reveal an interaction between message frame and perceived risk, $F(1,121) = 0.18$, $p = .68$, $\eta_p^2 = .00$. Instead, a main effect of perceived risk was found, $F(1,121) = 17.95$, $p < .01$, $\eta_p^2 = .13$, such that participants in the low-risk condition had significantly higher intentions to vaccinate than participants in the high-risk condition. Framing did not significantly affect intention, $F(1,121) = 0.02$, $p = .90$, $\eta_p^2 = .00$.

Discussion

One of the most influential notions in health psychology holds that gain-framed health-promoting information is more persuasive when recipients perceive the recommended behaviour

as safe, whereas loss-framed information is more persuasive when recipients perceive the recommended behaviour as risky. However, the results of the six studies reported in the present paper do not reveal support for this idea.

It should be noted that our studies had limitations. An important limitation was the fact that all of them employed behavioural intention as the primary outcome measure and did not include behavioural assessments. As Gallagher and Updegraff (2012) note, some studies have failed to identify the specific beliefs that mediate the effects of message framing on health behaviour. 'For these reasons' Gallagher and Updegraff (2012; p111) add, 'using attitudes and intentions as proxy measures for the effect of health message framing on behaviour may be misguided […].' There are two reasons, however, why the present results should not be discarded because of the absence of behavioural outcome measures. First, the evidence that framing affects behavioural outcomes differently than attitudinal/intentional outcomes is actually rather weak. Gallagher and Updegraff's meta-analysis identified message framing studies in twelve behavioural domains and found divergent effects on attitude and intention measures versus behavioural measures in only two (Gallagher & Updegraff, 2012, 2013). Second, many studies that have relied on attitudes or intentions as outcome measures have been presented as evidence in favour of the risk-framing hypothesis (e.g., Bartels et al., 2010; Gerend & Shepherd, 2007; Hull, 2012), including the early landmark publications by Rothman and colleagues (1993, 1999). It would be strange to accept these papers as support for the risk-framing hypothesis, but discard failed attempts at replication because of the supposed inadequacy of the employed outcome measure. To be sure, behaviour is a more relevant outcome than attitudes or intentions. However, discarding a specific outcome measure because it does not reveal the hypothesized

effects biases the literature against falsification and is not likely to foster our knowledge of message-framing effects.

A second limitation of our studies was the fact that the samples of Study 3 and 4 consisted solely of women. A balanced sample of men and women would have been preferable. On the other hand, we doubt that this has greatly influenced our findings, because Study 1 and 2 had a majority of male participants and did not show support for the risk-framing hypothesis either.

In spite of their limitations, the research community should take note that none of our six studies showed any evidence in favour of the risk-framing-hypothesis. Especially because, besides limitations, these six studies had important strengths between them, notably the use of non-student samples in Studies 2, 3, and 4.

So how do our findings reflect on the notion that perceived risk influences message framing effects? First, perhaps the risk-framing hypothesis can be salvaged by taking into account the extent to which recipients perceive a message as personally relevant. One early study showed a loss-framed advantage in the context of skin cancer detection, but only for women, who may be more involved in the issue of preventing skin cancer than men (Rothman et al., 1999). The authors argue that message framing effects are most likely when recipients perceive the issue as personally relevant. However, later studies have not always taken this variable into account, often testing the generic effects of framing without differentiating between recipients for whom the information may be of high- and low-relevance (e.g., Evangeli et al., 2013; Garcia-Romero & Cokely, 2011). In hindsight, not taking into account perceived personal relevance is also a limitation of the six studies presented in the present paper. Studies 5 and 6 dealt with fictitious diseases that participants may not have perceived as very relevant. Studies 1-4 dealt

with real health problems, but the extent to which participants perceived these issues as personally relevant was not assessed. Future research should investigate whether framing effects are more likely when recipients perceive the issue as highly personally relevant.

On the other hand, the absence of strong evidence in favour of the risk-framing hypothesis may come as no surprise to some. As mentioned in the Introduction, several authors have criticized the hypothesis on theoretical grounds (Cox et al., 2006; Kuhberger, 1998; O'Keefe & Jensen, 2006). It could very well be argued that inconsistent findings are simply a reflection of the hypothesis' theoretical weakness. We are therefore sceptical of the risk-framing hypothesis and call on message framing researchers to treat the risk-framing hypothesis with the scrutiny that is due to all unproven hypotheses. Especially because the current six studies not only failed to find evidence for an interaction between perceived risk and framing, but also did not yield any evidence for the moderating role of behavioural function (i.e., prevention versus detection) as specified by the original formulation of the risk-framing hypothesis (Meyerowitz & Chaiken, 1987; Rothman et al., 1993; Rothman & Salovey, 1997). In fact, there were no message-framing main effects in our studies, with the exception of Study 5. In this study, a loss-framed advantage was found for vaccination, which contradicts the traditional risk-framing hypothesis that a gain-frame is superior for prevention behaviours such as vaccination. Means and standard deviation for the gain- and loss-frame conditions in all studies can be seen in Table 2.

This leads us to a final question that arises from the present results: where does framing research go from here? In the present paper, we argue that two avenues seem particularly promising. First, it seems that framed messages are more likely to be persuasive when they are *congruent* with recipients' mindsets. According to Gray (1990), two basic systems control

human behavior. One system, the approach system, controls appetitive motivation and is sensitive to stimuli associated with reward or non punishment. The avoidance system, on the other hand, controls aversive motivation and is activated by stimuli of punishment or omission/termination of reward. Importantly, the strength of people's dispositional approach and avoidance system has been found to influence the effects of message framing. A study by Mann and colleagues (2004) has shown that gain-framed messages are generally more persuasive than loss-framed messages for recipients with a strong dispositional approach system, whereas loss-framed messages are more persuasive for recipients with a strong dispositional avoidance system (see also Gerend & Shepherd, 2007; Van 't Riet, Ruiter, & De Vries, 2012a; and see Covey, in press, for a review).

In addition, research shows that the approach and avoidance systems, besides showing stable differences in strength between individuals, can be activated by environmental stimuli (Gray, 1990). Recent work by Yan and colleagues (2012) has shown that emotional stimuli can activate the approach and avoidance system and that these changes in approach and avoidance activity in turn moderate the effects of framed messages. In fact, there may be several factors that can influence the effects of message framing through their effects on the approach and avoidance systems (Yan et al., 2012). As Rothman and colleagues (2006) have pointed out, investigating the extent to which factors external to the message can influence recipients' approach and avoidance systems and thereby the effectiveness of gain- and loss-framed messages is a particularly promising avenue for message framing research.

Perhaps these findings can also go some way to explaining the effects of perceived vulnerability on message framing effects. As mentioned in the Introduction, several studies have found evidence for an interaction between baseline perceived vulnerability and message framing,

but an explanation for this effect in terms of the risk-framing hypothesis is unsatisfactory. It is possible that involvement, elaboration and a negativity bias in information processing combine to produce this effect (Maheswaran & Meyers-Levy, 1995; Meyers-Levy & Maheswaran, 1995). It is also possible, however, that perceptions of baseline perceived vulnerability activate recipients' avoidance system, and thus make a loss-framed advantage more likely. Future research should address this issue. For now, an explanation for the interaction between perceived vulnerability and message framing in terms of recipients' approach and avoidance systems seems more promising than an explanation in terms of the risk-framing hypothesis.

Second, while most framing studies have investigated potential moderators of message framing effects, it may be equally worthwhile to investigate potential mediators. For instance, it is well established that gain-framed information elicits more positive affect than loss-framed information, whereas loss-framed information elicits more negative affect (Shen & Dillard, 2007). Because both positive affect (Brown, Homer, & Inman, 1998; Strick, van Baaren, Holland, & van Knippenberg, 2009) and negative affect (Mongeau, 1998; Witte & Allen, 2000) can contribute to persuasion, it seems worthwhile to investigate how positive and negative affect as a result of framed information influence persuasive outcome measures. Thus, besides looking for important moderators of message framing effects, future research should pay closer attention to the underlying processes of persuasion (Van 't Riet, Ruiter, Werrij, Candel, & De Vries, 2010; Shen & Dillard, 2007).

In conclusion, the notion that the persuasiveness of gain- and loss-framed health promoting messages is in large part determined by perceived risk has been central to message framing research for the past 15 years. The contribution of the present paper is firstly to signal to fellow-researchers that the empirical evidence in favour of the hypothesis is weak, and that

additional explanations of framing effects need to be investigated. The second contribution is to signal to practitioners that there is currently little basis for expecting reliable interactions between message framing and risk. Hopefully, this can prevent them from basing their decisions on incomplete evidence. As yet, recommending that practitioners use gain-framed messages for safe behaviours and loss-framed messages for risky behaviours does not amount to solid scientific advice.

Footnotes

[1] The wide age ranges in Study 3 and 4 prompted an anonymous reviewer to ask whether age moderated the message framing effects. Additional analyses revealed that in Study 3 (physical activity), age was not significantly correlated with risk perception, $r = .03$, $p = .48$, and did not significantly moderate the effects of message framing, $F(1, 647) = 0.57$, $p = .45$, $\eta_p^2 = .00$, nor was there a significant three-way interaction between framing, risk and age, $F(1, 639) = 1.07$, $p = .30$, $\eta_p^2 = .00$. In Study 4 (breast self-examination) the results of our analyses showed a significant correlation between age and risk perception, $r = .13$, $p = .001$. However, age did not moderate the effects of message framing, $F(1, 676) = 0.50$, $p = .48$, $\eta_p^2 = .00$, nor was there a significant three-way interaction between framing, risk and age, $F(1, 668) = 0.02$, $p = .89$, $\eta_p^2 = .00$.

[2] Across our six studies, we made use of outcome measures with different scale ranges (5-points-, 7-points, and 9-points scales). It is unlikely, however, that the differing scale ranges could have significantly affected the results of our statistical tests (see Nunally & Bernstein, 1978; Finstad, 2010 for comparisons of different scale ranges).

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Table 1 Overview of framing by risk interactions in six empirical message framing studies

Study	Health topic	Operationalization of risk	Low risk						High risk						Test statistics
			Gain-frame			Loss-frame			Gain-frame			Loss-frame			Frame*Risk
			M	*SD*	*n*	*M*	*SD*	*N*	*M*	*SD*	*n*	*M*	*SD*	*n*	
Study 1	Skin cancer protection	Possibility of negative outcomes	4.03	1.68	73	4.50	1.73	69	4.17	1.67	70	3.75	1.77	70	F (1,274)= 4.80, p = .03, η_p^2 = .02
Study 2	Hepatitis B Vaccination	Possibility of negative (short term) outcomes	0.01	1.04	136	0.28	0.91	122	-0.02	1.01	140	-0.13	0.98	144	F (1,534) = 6.93, p < .01, η_p^2 = .01
		Possibility of negative (long term) outcomes	0.28	0.93	156	0.35	0.82	144	-0.38	1.02	120	-0.28	1.02	122	F (1,534) = 0.29, p = .59, η_p^2 = .00
Study 3	Physical activity	Possibility of negative outcomes	6.08	0.08	151	6.05	0.08	159	5.44	0.08	181	5.41	0.08	167	F (1,654) = 2.72, p = .10, η_p^2 = .00
Study 4	Breast self-examination	Possibility of negative outcomes	5.15	1.26	165	5.03	1.38	179	4.44	1.40	185	4.66	1.43	156	F (1,681) = 2.68, p = .10, η_p^2 = .00
Study 5	Vaccination	Outcome uncertainty	1.60	1.43	20	2.90	2.29	20	1.25	1.07	20	1.60	1.43	20	F (1,76) = 1.72, p = .19, η_p^2 = .02
Study 6	Vaccination	Outcome uncertainty + Possibility of negative outcomes	5.29	1.18	31	5.15	1.31	31	4.06	1.68	31	4.14	1.64	32	F (1,121) = 0.18, p = .68, η_p^2 = .00

Table 2 Overview of framing main effects in six empirical message framing studies

Study	Health topic	Operationalization of risk	Gain frame			Loss frame			Test statistics
			M	SD	n	M	SD	N	
Study 1	Skin cancer protection	Possibility of negative outcomes	4.10	1.67	143	4.12	1.78	139	F (1,274) = 0.019, p = .89, η_p^2= .00
Study 2	Hepatitis B Vaccination	Possibility of negative outcomes	-0.01	1.02	276	0.06	0.97	266	F(1,534) = 1.83; p = .18, η_p^2 = .00
Study 3	Physical activity	Possibility of negative outcomes	5.76	0.06	332	5.73	0.06	326	F (1,654) = 0.07, p = .80, η_p^2 =.00
Study 4	Breast self-examination	Possibility of negative outcomes	4.77	1.38	350	4.86	1.41	335	F (1,681) = 0.29, p = .59, η_p^2 =.00
Study 5	Vaccination	Outcome uncertainty	2.43	1.26	40	3.25	2.00	40	F (1,76) = 5.20, p = .03, η_p^2 = .06
Study 6	Vaccination	Outcome uncertainty + Possibility of negative outcomes	4.68	1.57	62	4.63	1.56	63	F (1,121) = 0.02, p = .90, η_p^2 = .00