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Breast cancer communications that make women's gender identity salient can trigger defense mechanisms and thereby interfere with key objectives of breast cancer campaigns. In a series of experiments, the authors demonstrate that increased gender identity salience lowered women's perceived vulnerability to breast cancer (Experiments 1a, 3a, and 3b), reduced their donations to ovarian cancer research (Experiment 1b), made breast cancer advertisements more difficult to process (Experiment 2a), and decreased ad memory (Experiment 2b). These results are contrary to the predictions of several prominent theoretical perspectives and a convenience sample of practitioners. The reduction in perceived vulnerability to breast cancer following gender identity primes can be eliminated by self-affirmation (Experiment 3a) and fear voicing (Experiment 3b), corroborating the hypothesis that these effects are driven by unconscious defense mechanisms.

Keywords: breast cancer, perceived risk, self-identity, defense mechanisms, self-affirmation

Gender Identity Salience and Perceived Vulnerability to Breast Cancer

Breast cancer is one of the world's leading causes of death. As with many diseases, early detection can significantly improve chances of survival. Because judgments of vulnerability are regarded as a necessary condition for precautionary behavior in general (e.g., Brewer et al. 2007), breast cancer awareness campaigns typically aim to increase women's perceived risk to promote early screening behavior. They often do so by making a woman's gender identity salient through text (e.g., "If you are a woman, what you're about to read could save your life..."), symbols (e.g., the pink ribbon), and images (e.g., a woman covering her removed breast).

Personal risk perceptions are closely tied to people's sense of self because aspects of the self-concept can help predict

medical risk. For example, gender predicts susceptibility to breast cancer, being a smoker to lung cancer, and being a tennis player to tennis elbow. People hold multiple identities, and the salience of a certain identity can influence the perceived personal relevance of risks that are tied to this identity (Mandel 2003). However, little is currently known about the influence of identity salience on perceived vulnerability to identity-specific risks. We investigate how the situational salience of a woman's gender affects her perceived risk of contracting breast cancer.

Several prominent theoretical perspectives suggest a positive effect of heightened gender identity salience on breast cancer risk perceptions. This belief also seems to be common among practitioners. For example, of a convenience sample of 16 British advertising executives to whom we described a gender-priming procedure (see Web Appendix A at <http://www.marketingpower.com/jmrjune11>), 9 believed that heightened gender identity salience would increase women's perceived risk for breast cancer, 6 did not expect it to make a difference, and only 1 predicted a deleterious effect. The last prediction can be made on the basis of a defense mechanism account, and it is the only one that finds consistent support in all six of our studies.

THEORETICAL BACKGROUND

The self-concept consists of multiple identities, such as gender, ethnic, and class identities. For any person, the rela-

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tive salience of different identities fluctuates over time, with both motivational and cognitive consequences (Markus and Wurf 1987). Situational factors (e.g., identity cues, social context) can influence which identities are salient and affect information processing and decision making (Markus and Wurf 1987; Reed 2004). We examine the consequences that the heightened salience of a certain identity may have on likelihood estimates for risks tied to this identity. Several theories in the area of risk perception suggest that heightened gender identity salience should result in greater risk estimates for breast cancer.

Predicting an Increase in Breast Cancer Risk Estimates

Cognitive accessibility. Contextual factors that heighten the salience of an identity increase the accessibility of knowledge structures associated with this identity by spreading activation (Collins and Loftus 1975). This increased accessibility should then result in greater likelihood estimates for risks that are associated with this activated identity through the operation of judgmental heuristics. According to the availability heuristic, the likelihood of an event can be estimated according to the ease with which operations of retrieval, construction, or association can be performed (Hertwig, Pachur, and Kurzenhauser 2005; Tversky and Kahneman 1973). The availability heuristic is a cornerstone of literature on judgment and decision making, and its importance has not escaped researchers in the area of risk perception. For example, increased accessibility of AIDS-related information had a positive effect on associated risk perceptions (Raghubir and Menon 1998). Therefore, a cognitive accessibility account predicts that greater gender identity salience should increase accessibility of gender-related knowledge structures and, in turn, likelihood estimates for gender-specific risks.

Personal relevance. Priming a social identity increases the likelihood that information relevant to this identity will receive attention (Markus and Wurf 1987). For example, describing a disease as affecting young, not just old, people led students to pay more attention to the message and increased their intention to engage in precautionary behavior (Maheswaran and Meyers-Levy 1990). Directly establishing a link between personal relevance and risk in an identity context, Mandel (2003) shows that participants whose interdependent self had been primed were more concerned about threats to their social standing and more averse to taking social risks. The literature on personal relevance thus also predicts that women who are primed with their gender should be more concerned about potential threats to this identity and report a higher perceived likelihood of developing breast cancer.

Perceived similarity. The perceived similarity to people who suffer from a disease is one of the most important drivers of risk perception (Gerend et al. 2004; Tversky and Kahneman 1974). For example, greater similarity to the victims of a bus accident described in a newspaper article increased participants' perceived likelihood of being involved in a similar accident in the future (Stapel, Reicher, and Spears 1994). Because breast cancer mainly affects women, increased attention to a woman's femininity should increase perceived similarity to other breast cancer patients and thereby increase personal risk perceptions.

Although the processes vary, these theoretical accounts concur that increasing a woman's gender identity salience should increase her breast cancer risk estimates. In the next section, we describe a different theoretical perspective that makes precisely the opposite prediction.

Predicting a Decrease in Breast Cancer Risk Estimates

People have long been known to exert considerable effort to deny negative characteristics associated with themselves (Jung 1959). Threats to a central aspect of the self are particularly likely to trigger defense mechanisms, which can manifest themselves in different forms. The unifying characteristic of defense mechanisms is that a person cannot be aware of their operation, or they lose their ability to shield the person from the ego threat (Cramer 2000).

For example, at the input stages of processing, research has shown that female moderately heavy drinkers automatically divert their attention away from words featured in a text linking alcohol consumption to breast cancer (Klein and Harris 2009). Defense mechanisms can also result in the denial of personal vulnerability or the minimization of threats. For example, participants who were made to believe that they suffered from a fictitious enzyme deficiency evaluated this deficiency as less serious than those in a control condition (Jemmott, Ditto, and Croyle 1986). Similarly, when a health message is of high personal relevance (Kunda 1987; Liberman and Chaiken 1992) or especially threatening (Agrawal and Duhachek 2010), people are more likely to scrutinize the message for faults. For example, after reading a text linking caffeine consumption to breast cancer, coffee-drinking women tended to discount the message (Kunda 1987; Sherman, Nelson, and Steele 2000). Such defensive processing can be avoided by self-affirmation in unrelated domains, corroborating the link between defense mechanisms and ego threat (Klein and Harris 2009; Sherman, Nelson, and Steele 2000).

For cultural, developmental, and sexual reasons, breasts play a central role in female identity formation (Hall 1997). Therefore, it is not surprising that breast cancer is especially threatening to women's gender identity (Fallowfield and Hall 1991). Threats to central aspects of the self can result in well-documented defense mechanisms such as minimizing threat, building perceptual defenses, and using personal fantasies and ridicule (Baumeister, Dale, and Sommer 1998). Under conditions of heightened gender identity salience, the thought of contracting breast cancer should be more threatening to the self and, thus, more likely to trigger defense mechanisms such as risk minimization. In other words, situational factors that heighten gender identity salience may result in lower breast cancer risk estimates because of a threat to the self.

Overview of Studies

We organize the empirical part of this article around three themes. First, Experiments 1a and 1b pit the competing predictions reviewed here against each other and document negative effects of gender identity salience on perceived vulnerability to breast cancer (Experiment 1a) and donations to ovarian cancer research (Experiment 1b). Second, we investigate the information-processing components of defensive reactions with input (Experiment 2a) and output (Experiment 2b) measures. We find that the presence of

gender cues increases the perceived processing difficulty of breast cancer advertisements (Experiment 2a) and interferes with respondents' memory for the advertisement's sponsor (Experiment 2b). Third, we investigate ways to neutralize defensive reactions. We show that self-affirmation (Experiment 3a) and fear-voicing procedures (Experiment 3b) can eliminate defensive denial of vulnerability. The second and third studies confirm the defensive nature of the effects and provide health campaign managers with means to minimize defensive reactions to breast cancer communications.

EXPERIMENTS 1A AND 1B: ADVERSE GENDER SALIENCE EFFECTS ON RISK PERCEPTIONS AND DONATIONS TO CANCER RESEARCH

We designed Experiments 1a and 1b to test the competing predictions regarding the influence of gender identity salience. The goal of Experiment 1a is to assess the influence of gender identity cues in breast cancer advertisements on women's perceived risk for breast cancer (and other control risks). In Experiment 1b, we investigate the effects of gender identity salience on a behavioral measure, namely, donations to ovarian cancer research.

Experiment 1a: Gender Cues in Advertising and Risk Perceptions

Breast cancer campaigns often include elements highlighting women's gender identity. Therefore, we examined women's personal breast cancer risk estimates following exposure to a breast cancer advertisement that either contained gender cues (taken from actual breast cancer advertisements; e.g., pink ribbon) or minimized them. As a control, we also assessed risk perceptions for several gender-neutral diseases. For these, none of the theoretical accounts we reviewed predicts differences in risk estimates across ad types.

Method. Thirty-seven female undergraduate students at a Dutch university ($M_{\text{age}} = 20$ years, $SD = 1.77$) participated in Experiment 1a as part of a series of studies for extra course credit. We used a mixed 2 (ad type: gender prime vs. control) \times 2 (risk type: breast cancer vs. gender neutral) design, assessing the latter within subject. Participants were asked to study a fictitious breast cancer advertisement that communicated some basic facts about the disease. In the gender prime condition, the advertisement contained several gender cues from real breast cancer advertisements that were absent in the control condition: pink ad background, pink ribbons, female faces and contours, and a difference in the main header (see Figure 1). Immediately after viewing the advertisement, participants provided their personal risk estimates for breast cancer and several gender-neutral diseases (diabetes, kidney failure, food poisoning, heart attack, and hepatitis) on seven-point scales (1 = "This is extremely unlikely for me," and 7 = "This is extremely likely for me"). We averaged participants' estimates for the gender-neutral risks. Risk assessment occurred in randomized order, though breast cancer was never first.

Results and discussion. We excluded data from one participant from further analysis because of the extremely short time taken to complete the experimental session (studentized deleted residual, $z = -2.66$, $p < .01$). A repeated measures analysis of variance (ANOVA) showed a significant main effect of risk type ($F(1, 34) = 23.42$, $p < .001$), indicating

that women had higher risk perceptions for breast cancer ($M = 4.25$, $SE = .26$) than for the average of the gender-neutral risks ($M = 3.15$, $SE = .17$). The main effect of ad type was not significant ($p > .13$). Crucially, the ad type \times risk type interaction was significant ($F(1, 34) = 5.15$, $p < .03$). Women exposed to the gender prime breast cancer advertisement reported lower breast cancer risk estimates ($M = 3.74$, $SE = .31$) than women exposed to the control advertisement ($M = 4.82$, $SE = .39$; $F(1, 34) = 4.73$, $p < .05$). The risk perceptions for the gender-neutral diseases did not differ between the gender prime condition ($M = 3.14$, $SE = .24$) and the control condition ($M = 3.16$, $SE = .25$, $p > .90$; p s $> .60$ for individual risks).

In Experiment 1a, the presence of gender cues taken from real breast cancer advertisements lowered women's breast cancer risk estimates. The results are consistent with the notion that heightened gender identity salience triggers defense mechanisms but are inconsistent with the predictions of several prominent theoretical perspectives in the area of health risk perception—cognitive accessibility, personal relevance, and perceived similarity—raising the possibility that many breast cancer awareness campaigns may inadvertently reduce women's perceived risk estimates.

Experiment 1b: Gender Identity Salience and Donations to Ovarian Cancer Research

Experiment 1b extends the findings of Experiment 1a in several ways. First, we use a gender identity salience manipulation with higher internal validity. Second, we explore whether gender identity salience also has negative behavioral effects. Third, for generalizability, we focus on a different gender-specific disease. Specifically, we manipulate gender identity salience using an essay-writing task and investigate actual donations to ovarian cancer research. Ovarian cancer should be threatening to female participants because of the central role of the reproductive system in women's gender identity (Hallowell 1998). We also include other types of cancer with both higher and lower incidence among the target population.

Method. Twenty-six female students at a U.K. university (median and modal age: 21–25 years) participated in exchange for an actual contribution to Cancer Research UK, the United Kingdom's leading cancer charity. The study was conducted online. There was one between-subjects factor: gender identity salience. To heighten women's gender identity salience, we developed and pretested an essay-writing task (for the validation of this manipulation, see Web Appendix A at <http://www.marketingpower.com/jmrjune11>). Participants in the gender prime (control) condition wrote two essays about the influence of their gender (education) on decision making and interpersonal relationships. They were informed that, in return for their help, £5 would be donated to Cancer Research UK. At the end of the study, participants were asked to select the type of cancer research that they wanted to sponsor: leukemia or gallbladder, larynx, lung, ovarian, or prostate cancer.¹ Participants were

¹Cancer Research UK (www.cancerresearchuk.org) reports that, among women in the United Kingdom, breast cancer is the most common form of cancer (31%), lung cancer is third (11%), ovarian cancer is fifth (5%), and leukemia is ninth (2%). Gall bladder cancer is very rare; its incidence is only 5% of that of ovarian cancer.

Figure 1

EXPERIMENT 1A: BREAST CANCER ADVERTISEMENTS WITH AND WITHOUT (CONTROL) GENDER CUES



Hey, woman! Yes, you:

Please, pay attention



Breast cancer, enemy number 1

Breast cancer is a common disease. Worldwide, breast cancer is the second most common type of cancer after lung cancer (10.4% of all cancer incidence, both sexes counted) and the fifth most common cause of cancer death. A number of important discoveries have greatly increased chances of survival but early detection is still key.

Women's enemy, your enemy

Knowledge = Life





breastcancer.org

Your lifeline to the best medical information about breast cancer.

Hey you!

Please, pay attention

Breast cancer, enemy number 1

Breast cancer is a common disease. Worldwide, breast cancer is the second most common type of cancer after lung cancer (10.4% of all cancer incidence, both sexes counted) and the fifth most common cause of cancer death. A number of important discoveries have greatly increased chances of survival but early detection is still key.

Know your enemy

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Your lifeline to the best medical information about breast cancer.

then asked to indicate their age and whether they were interrupted while completing the study (four were) and to guess the purpose of the study.

Results and discussion. One participant guessed the purpose of the study and was omitted from the analysis. The majority (60%) of participants donated to research on ovarian cancer (illustrating the basic identity congruency effect on donations; Shang, Reed, and Croson 2008), so we dichotomized the response into donating to ovarian cancer research versus not donating. When gender identity was more salient, we observed lower donations to ovarian cancer. Fewer participants in the gender-priming condition donated to ovarian cancer (42%) than in the control condition (77%). A logistic regression modeling the probability of donating to ovarian cancer research as a function of the experimental condition and the interruption covariate shows a significant effect of condition ($\chi^2(1) = 4.13, p < .05$).

Experiment 1b shows that the operation of defense mechanisms in response to gender priming has behavioral consequences. Heightened gender identity salience leads to a decrease in the number of people who decide to donate to ovarian cancer research. This result has substantive implications for fund-raising campaigns. Previous research has demonstrated positive effects on donations to a radio station—a nonthreatening domain—of congruence between the respondent's identity and that of other donors to the station (Shang, Reed, and Croson 2008). In contrast, we find that heightened gender identity can have a detrimental effect on charitable giving to a gender-specific cause. Thus, the study adds to the identity literature by suggesting ego threat as a moderator of identity congruence effects on donations.

EXPERIMENTS 2A AND 2B: ADVERSE GENDER SALIENCE EFFECTS ON ADVERTISING PROCESSING

Defense mechanisms take many shapes (Baumeister, Dale, and Sommer 1998); risk minimization or denial of susceptibility is only one of the possible ways women may protect themselves from the threat a breast cancer advertisement poses. In particular, ego threat can result in a range of mechanisms interfering with the processing of threatening material at early information processing stages, collectively known as “perceptual defense” (Erdelyi 1974). Experiments 2a and 2b test the effects of gender identity salience on breast cancer advertisement processing using input (Experiment 2a) and output (Experiment 2b) measures of information processing. In Experiment 2a, we investigate whether women perceive breast cancer advertisements containing gender cues as more difficult to process. In Experiment 2b, we investigate whether memory is impaired for breast cancer advertisements encountered in gender identity-activating contexts.

Experiment 2a: Introspective Processing Difficulty

In Experiment 2a, we presented male and female participants with slightly modified versions of the advertisement we used in Experiment 1a and assessed their experienced processing difficulty for these advertisements. We modified the advertisements because the advertisement in the gender prime condition of Experiment 1a contained social cues, whereas the one in the control condition did not (picture of women in social occasion). It cannot be excluded that this difference caused the effect on risk estimates; therefore, we

avoided including social cues in this study (for the advertisement, see Web Appendix B at <http://www.marketingpower.com/jmrjune11>). To minimize the possibility that a different, nondefensive mechanism could account for the results, we included a control group of people who should not feel threatened by the message: men.

Method. The experimental design was a 2 (ad type: gender prime vs. control) \times 2 (sex: male vs. female) between-subjects design. Eighty-nine students at a Dutch university (41 women; $M_{\text{age}} = 21.57, SD = 2.37$) participated in return for the opportunity to win a cash prize. We used an introspective processing difficulty measure by asking participants to rate the advertisement on a six-point scale (1 = “easy,” and 6 = “difficult”). To check for potential differences in attitudes toward the advertisement, we also asked participants to rate it on a six-point scale (1 = “bad,” and 6 = “good”).

Results and discussion. An ANOVA on perceived difficulty with gender and ad type as between-subjects factors showed no main effects ($ps > .28$), but there was a significant ad type \times gender interaction ($F(1, 85) = 5.15, p < .03$). Table 1 shows means and standard errors. Critically, women in the gender prime condition ($M = 3.09$) rated the advertisement as more difficult than women in the control condition ($M = 2.21; F(1, 85) = 4.11, p < .05$). In contrast, men's ad ratings did not differ in the gender prime ($M = 3.20$) and control conditions ($M = 2.74; F(1, 85) = 1.32, p > .25$). None of the effects in a separate ANOVA on attitudes toward the ad were significant ($ps > .37$).

In summary, Experiment 2a provides further evidence that gender cues in breast cancer advertisements can trigger defensive responses in women. Female participants rated the same advertisement as more difficult to process when simple gender cues, such as a pink background, were present in the advertisement. We did not observe this effect among men, thus ruling out alternative explanations based on differences in content across ad type conditions.

Experiment 2b: Advertising Memory

One limitation of Experiment 2a is that it relies on a self-report of processing difficulty. Therefore, the first goal of Experiment 2b is to provide an objective measure of processing interference by investigating participants' memory for breast cancer advertisements encountered in a gender-priming or neutral environment.

Table 1
MEANS (AND STANDARD ERRORS) IN EXPERIMENT 2A

	Ad Type	
	Gender Prime	Control
<i>Women</i>		
Perceived difficulty	3.09 (.30)	2.21 (.31)
Attitudes	3.41 (.29)	3.37 (.37)
<i>Men</i>		
Perceived difficulty	2.74 (.27)	3.20 (.29)
Attitudes	3.43 (.29)	3.88 (.26)

The second goal is to manipulate the presence of gender cues separately from the ad content to separate the gender identity primes from the ego-threatening message. We do so by manipulating the media context. This is of practical interest because breast cancer awareness campaigns are likely to focus on media placement with a primarily female audience. However, a media context that gives prominence to women's topics and issues is also likely to make gender identity more salient and increase the likelihood of defense mechanisms interfering with advertising processing.

The third goal is to provide initial evidence for the role of ego threat in line with the proposed defense mechanism. To this end, we also included a gender-specific advertisement for mascara, which should not be susceptible to defensive processing. If the effect of gender identity salience in the previous studies stems from the operation of defense mechanisms, memory for an advertisement targeted at women but not threatening to their gender identity should not be negatively affected by gender cues in the media context. If anything, such an advertisement could be more likely to attract attention based on identity congruence (Reed 2004).

Method. The study used a 2 (media context: gender prime vs. control) \times 2 (ad type: breast cancer vs. mascara) mixed design. Media context was randomly assigned between subjects and ad type was a within-subject factor. Forty-four female students and staff members from a U.K. university (modal age: 21–25 years) participated in return for a monetary reward. Participants were exposed to several web pages. These were fictitious screen shots for either the women's portal iVillage.com (gender prime condition) or the general knowledge portal Discovery.com (control condition). Each web page featured a vertical banner advertisement on the right side of the screen. In addition to the two target advertisements (breast cancer and mascara), the study featured three gender-neutral filler advertisements (for

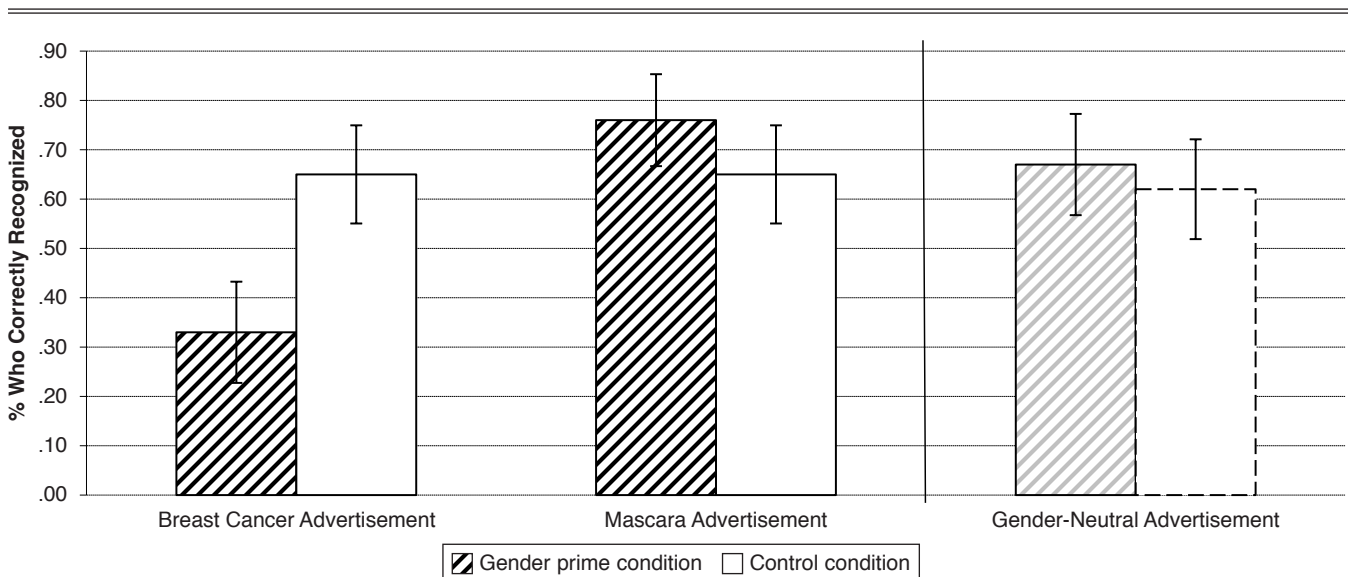
banking, mobile phones, and business communication services). The breast cancer banner underscored the importance of early detection and regular screening, featured a woman undergoing a mammography, and was sponsored by ProjectPink.com. The five advertisements were always shown in the same order (HSBC banking, Orange mobile telephony, ProjectPink.com, Max Factor mascara, and Avaya business communications), but the web pages were rotated in a Latin square design. The instructions stated, "Please rate how inspirational (important) you judge a set of stories about women (scientific discoveries) to be." As part of the cover story, after each of the five screens, participants rated how inspirational (important) the story was for them. After completing a filler task involving a set of demographic questions, participants completed an unexpected forced-choice recognition task about the banner advertisement featured in the stories. As a measure of ad memory, we relied on recognition of the advertisement's sponsor. We probed a specific feature of the advertisement instead of the general ad category (e.g., the cause) because we deemed the latter more amenable to guesswork. Therefore, in the sponsor recognition task, participants chose between the actual sponsors (HSBC, Orange, ProjectPink.com, Max Factor, and Avaya) and matched distracters (ING, T-Mobile, Breastmatters.com, Cover Girl, and Cisco).

Results. The order of the web pages had no effect, and we do not discuss this factor further. To test whether memory for the breast cancer and mascara banner advertisement varied across media contexts, we estimated a model for mixed designs with dichotomous dependent variables using weighted least squares. Recognition scores for the breast cancer and mascara advertisement were entered as repeated measures and media context as a between-subjects factor. Figure 2 indicates the proportions of correct recognition.

The main effect of ad type was significant ($\chi^2(1) = 5.12$, $p < .05$), due to the low recognition performance for the

Figure 2

EXPERIMENT 2B: A GENDER-PRIMING MEDIA CONTEXT LEADS TO LOWER MEMORY FOR A BREAST CANCER ADVERTISEMENT BUT NOT A MASCARA ADVERTISEMENT OR GENDER-NEUTRAL ADVERTISEMENTS



breast cancer ad in the gender prime condition (for a more details, see the “Discussion” subsection). The main effect of media context was not significant ($\chi^2(1) = 1.04, p > .30$). As an additional check, we averaged recognition scores across the three gender-neutral advertisements and compared this variable across media context conditions. We observed no effect of media context on memory for these filler advertisements ($p > .57$; we found similar results when comparing each filler advertisement separately across conditions). This is encouraging because the Discovery.com context might have primed “smartness” and encouraged greater cognitive effort (e.g., Dijksterhuis and Van Knippenberg 1998).

Most important, the ad type \times media context interaction was significant ($\chi^2(1) = 5.12, p < .05$). Consistent with the findings of the previous studies, memory for the breast cancer advertisement was significantly lower in the gender prime than the control condition ($\chi^2(1) = 4.46, p < .05$). Recognition memory for the breast cancer advertisement in the control condition was 65%, compared with 33% in the gender prime condition. In contrast, for the mascara advertisement, we observed no differences in recognition performance between media contexts ($\chi^2(1) = .63, p > .42$). Correct recognition rates were 65% and 76% in the control and gender prime conditions, respectively.

Discussion. In Experiment 2b, female participants browsed a website that was designed to heighten gender identity salience (women’s portal) or not (general knowledge portal). Manipulating the ad context enabled us to avoid the possibility that idiosyncrasies in the ad design explained differences between conditions. Again consistent with a defensive processing account, participants’ memory for a breast cancer advertisement was lower in a gender-priming media context than a gender-neutral control condition. Underscoring the role of ego threat, there was no such difference in the case of the gender-specific but nonthreatening mascara advertisement. Competing explanations (e.g., women’s higher involvement or self-awareness when reading the gender-relevant text) would predict impaired performance for both ad types.

The findings also have important substantive implications. First, Experiment 2b replicates the negative consequences of gender identity salience for breast cancer campaigns using a common measure of advertising effectiveness (recognition). Second, the results show that, in addition to ad copy, managers of breast cancer awareness campaigns must carefully consider the media context of their advertisements. Specifically, the findings highlight a trade-off in media planning between reach and effectiveness for breast cancer campaigns.

EXPERIMENTS 3A AND 3B: PREVENTING ADVERSE GENDER SALIENCE EFFECTS

The final two experiments serve a dual purpose. First, they aim to provide more direct process evidence for the involvement of defensive mechanisms by investigating moderating factors: self-affirmation (Experiment 3a) and voicing one’s fear for the disease (Experiment 3b). Second, by establishing the ability of these factors to attenuate defensive reactions, we provide policy makers and advertisers with means to design more effective messages.

Experiment 3a: Self-Affirmation Eliminates the Defensive Effect

A hallmark property of defensive reactions is their potential to be offset by self-affirmation. It has been shown that defensive processing of threatening health messages is eliminated when people are self-affirmed in unrelated ways—for example, by thinking about values important to them (e.g., Klein and Harris 2009; Reed and Aspinwall 1998; Sherman and Cohen 2002). Therefore, first, we test whether an established self-affirmation manipulation (Reed and Aspinwall 1998) reduces the effect of heightened gender identity salience on breast cancer risk estimates, as would be expected if the effect is self-defensive.

The second goal of Experiment 3a is to rule out an alternative account for our findings on risk perceptions. Specifically, it is possible that the gender cues primed a more general reference group (e.g., “all women”), which can lead to more comparative optimism regarding a person’s risk level compared with other people (Helweg-Larsen and Shepperd 2001). However, a comparative optimism account does not predict moderation by self-affirmation. Furthermore, a comparative optimism account based on the activation of a more general reference group predicts differences mainly on other-person risk estimates (Helweg-Larsen and Shepperd 2001), whereas a defensive account predicts that risk minimization should be most pronounced for self-risk estimates (Agrawal and Duhachek 2010). Therefore, in this study we measure both self-risk estimates and participants’ risk estimates for comparison others. Finally, to add external validity to our findings, we tested members of the general population instead of undergraduate students.

Method. Ninety-two women, aged 18–61 years ($M_{\text{age}} = 30.6, SD = 10.3$), were recruited through a U.S. online panel in return for a small reward. The study used a mixed 3 (priming condition: control vs. gender prime without self-affirmation vs. gender prime with self-affirmation) \times 2 (risk type: breast cancer vs. gender-neutral risks) \times 2 (risk target: own risk vs. other person risk) design, with the first factor manipulated between subjects and the latter two within subject.

The experiment consisted of two priming phases followed by risk assessment. During the first priming phase, participants in the gender prime with self-affirmation condition were self-affirmed using a manipulation Reed and Aspinwall (1998) devised. Participants answered three questions designed to increase their self-definition as a good person: “Have you ever tried to help a friend even at the expense of your own happiness?” “Have you ever forgiven another person when they have hurt you?” and “Have you ever found ways to help another person who is less fortunate than yourself?” Participants were also asked to provide a short example of such a situation if they answered yes to any of the questions. Participants in the other two conditions received three control questions, also derived from Reed and Aspinwall (1998)—for example, “I think chocolate is the best flavor ice cream.”

In the second priming phase, we used the same essay-writing task as in Experiment 1b to manipulate gender identity salience. The final part of Experiment 3a contained own and other person risk measures. Participants first provided their self-risk estimates for breast cancer and four control

risks (diabetes, Mexican flu, food poisoning, and hepatitis) and then for the average person of their age and gender.

Results. We estimated a repeated measures ANOVA with one between-subjects factor (priming condition) and two within-subject factors (risk target and risk type; we averaged the four control diseases to form a gender-neutral risk index). The three-way interaction between risk type, risk target, and priming condition was significant ($F(2, 89) = 3.40, p < .04$). This three-way interaction was driven by self-risk estimates. The two-way interaction between priming condition and risk type (breast vs. others) was significant for self-risk estimates ($F(2, 89) = 3.54, p = .03$) but not for other person risk estimates ($F(2, 89) = 0.25, p > .78$).

The simple effects were consistent with the findings of Experiment 1a and with a defensive processing account. Women's personal breast cancer risk perceptions were significantly lower in the gender prime without self-affirmation condition ($M = 3.33$) than in the control condition ($M = 4.23; F(1, 89) = 5.85, p < .02$). It is crucial to note that self-affirmation before the gender-priming task eliminated this effect. Personal breast cancer risk estimates in the gender prime with self-affirmation condition ($M = 3.97$) were not lower than in the control condition ($F(1, 89) = .52, p > .47$). There were no differences across priming conditions in the own risk estimates for the control diseases or the other person risk estimates (all $ps > .17$). Figure 3 presents means and standard errors.

As predicted in the comparative optimism literature (Helweg-Larsen and Shepperd 2001), there was also a significant main effect of risk target ($F(1, 89) = 14.51, p < .001$), indicating that own risk estimates ($M = 3.49$) were lower than other person risk estimates ($M = 3.85$). There was also a significant main effect of risk type ($F(1, 89) = 32.78, p < .001$), indicating that, on average, breast cancer

risk perceptions were higher ($M = 3.93$) than the gender-neutral risk estimates ($M = 3.40$). Furthermore, there was a significant interaction between the risk target and risk type factors ($F(1, 89) = 6.87, p = .01$), indicating greater comparative optimism for the gender-neutral risks ($M_{\text{own risk}} = 3.13$ vs. $M_{\text{other person}} = 3.67$) than for breast cancer ($M_{\text{own risk}} = 3.85$ vs. $M_{\text{other person}} = 4.02$). No other effect was significant ($ps > .18$).

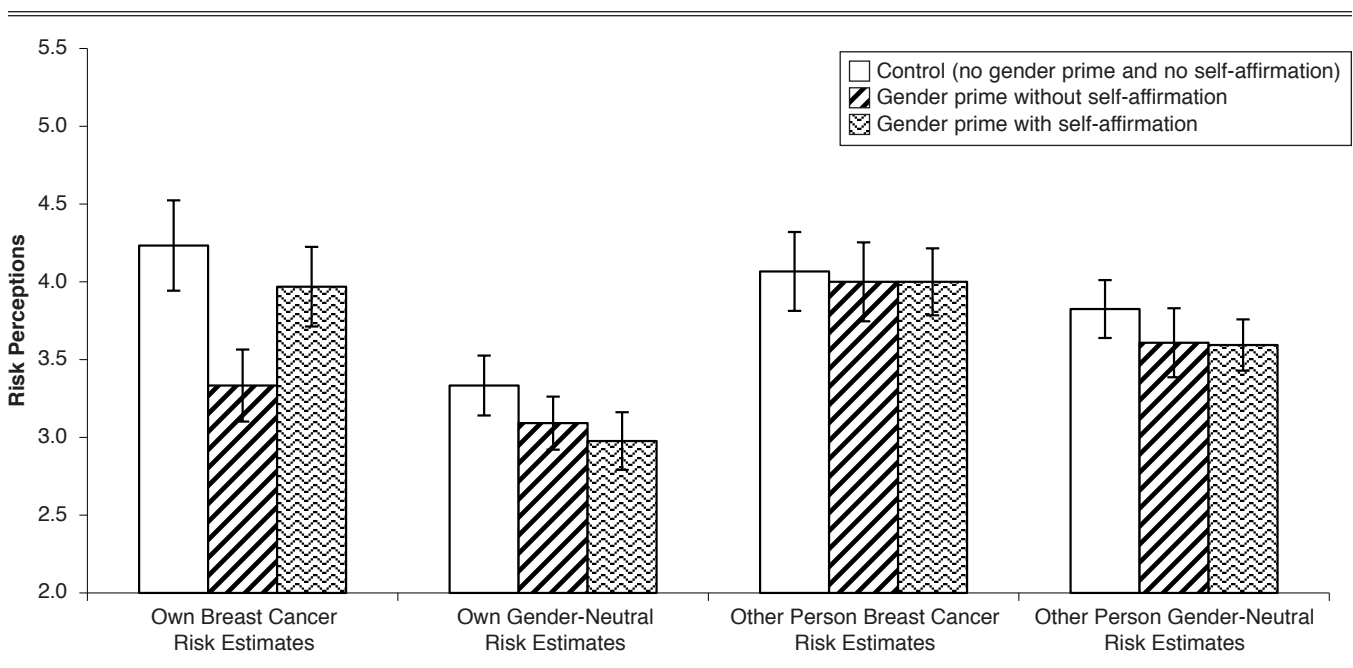
Discussion. Experiment 3a replicates the negative effect of gender identity salience on women's perceived susceptibility to breast cancer using an internally valid gender-priming procedure and members of the general population. In addition, the results differentiate the defensive effect from comparative optimism. As in Experiment 1a, we observed an effect of gender priming on self-risk but no effect on other person risk estimates. Finally, the results provide process evidence for the operation of defensive mechanisms through the moderation by self-affirmation. Defensive mechanisms such as risk minimization or perceptual defense originate from a threat to the self (Baumeister, Dale, and Sommer 1998; Cramer 2000). In line with the extensive research on defensive processing (e.g., Klein and Harris 2009; Reed and Aspinwall 1998), prior self-affirmation in an unrelated domain eliminated the effect of gender priming on personal risk estimates for breast cancer.

Experiment 3b: Fear Voicing Eliminates the Defensive Effect

Experiment 3b examines the role of fear as part of the defensive process. Research on ego defense has argued that defense mechanisms can only operate insofar as the person is not aware of the process (Cramer 2000). Emotional influences often disappear when people pay attention to them, in line with research on the use of affect as information (e.g.,

Figure 3

EXPERIMENT 3A: SELF-AFFIRMATION ELIMINATES THE NEGATIVE EFFECT OF GENDER IDENTITY SALIENCE ON OWN BREAST CANCER RISK ESTIMATES



Schwarz and Clore 1983). If the effect of gender identity salience on breast cancer risk estimates is driven by an underlying feeling of threat, it should be possible to neutralize the effect by making women acknowledge their fear of the disease. The current study tests the prediction that voicing fear of breast cancer before rating the risk eliminates the effect of gender identity salience on breast cancer risk estimates.

Method. One hundred fifteen female students at a U.S. university participated in the study for course credit ($M_{age} = 20.2, SD = 1.65$). The study used a mixed 2 (gender identity salience: gender prime vs. control) \times 2 (order of ratings: fear rating before risk rating vs. vice versa) \times 2 (risk type: breast cancer vs. gender neutral) design, with the first two factors manipulated between subjects and the third within subject. For the gender identity salience manipulation, we used the essay-writing task of Experiments 1b and 3a. In the seemingly unrelated subsequent study, we assessed participants' perceived level of fear and risk for seven negative events, one target (breast cancer) and six fillers (e.g., heart attack, diabetes, Alzheimer's). We assessed both fear and risk ratings on seven-point scales and administered on a per-event basis (with either risk or fear first, depending on the experimental condition). We randomized order of events.

Results and discussion. A repeated measures ANOVA with gender identity salience and order of ratings as between-subjects factors and risk type as a within-subject factor supports a defense mechanism account. The three-way interaction between gender identity salience, order of ratings, and risk type was significant ($F(1, 111) = 5.05, p < .03$). Follow-up analyses show that the gender identity salience manipulation had an effect on the breast cancer risk estimates only when participants assessed risk before fear. Replicating the findings of the previous studies, in this condition, breast cancer risk perceptions were lower in the gender prime condition ($M = 3.97$) than in the control condition ($M = 4.85; F(1, 111) = 5.36, p < .03$). As we predicted, when the fear voicing preceded the risk rating, gender identity salience did not influence breast cancer risk estimates ($p > .65$). These contrasts were not significant in the case of gender-neutral risks ($ps > .29$; we obtained similar results

when we considered the gender-neutral risks separately). Figure 4 presents means and standard errors.

In addition, the main effect of risk type was significant, with breast cancer risk ($M = 4.44$) being higher than the gender-neutral risks ($M = 3.47; F(1, 111) = 69.16, p < .001$), as was the interaction between risk type and gender identity salience ($F(1, 111) = 5.18, p < .03$). Driven by the effect of gender identity salience manipulation in the risk first condition, breast cancer risk perceptions were directionally lower in the gender prime ($M = 4.20$) than the control condition ($M = 4.76; F(1, 111) = 3.65, p < .06$), with no such effect on the average of the other risks ($p > .82$). No other effects were significant in this model ($ps > .19$). Finally, we observed no effects of gender identity salience or order of ratings ($ps > .13$) on women's fear ratings for breast cancer, which seemed to show a ceiling effect ($M = 5.54, SD = 1.63$). Of the 115 women, 72 rated their fear at 6 or 7 on a seven-point scale. If nothing else, these ratings confirm the uniquely threatening nature of breast cancer for women.

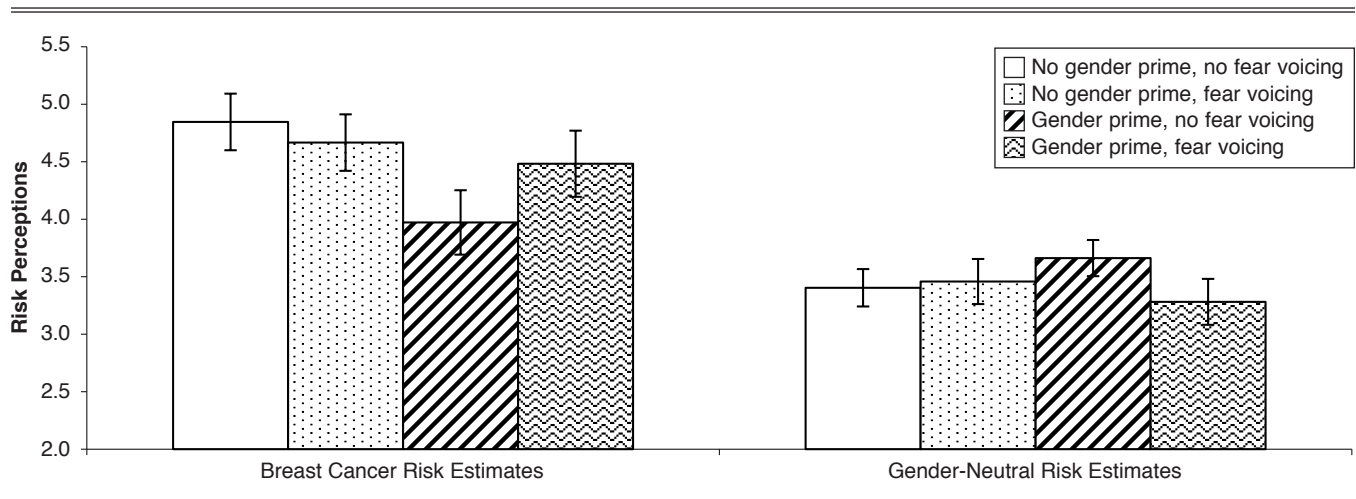
In summary, Experiment 3b tests a boundary condition to the effect of gender identity salience on risk estimates observed in previous studies. When risk ratings were not preceded by explicit fear acknowledgment, breast cancer risk estimates were again lower in the gender prime than in the control condition. Further indicating that defensive risk minimization results from an unconscious feeling of threat to a central dimension of the self (Cramer 2000), the effect did not occur when participants voiced their fear of breast cancer before the risk assessment.

GENERAL DISCUSSION

Breast cancer is one of the most common tumors, killing half a million women every year. In high-income countries in particular, breast cancer is the number one cause of death for women aged 20–59 years, accounting for a greater loss of life than road accidents and heart disease combined (World Health Organization 2009). Therefore, saving lives through campaigns aimed at alerting women to their vulnerability to breast cancer is an important goal for governments, health agencies, and charities. Breast cancer commu-

Figure 4

EXPERIMENT 3B: ACKNOWLEDGING A WOMAN'S FEAR OF BREAST CANCER ELIMINATES THE NEGATIVE EFFECT OF GENDER IDENTITY SALIENCE ON BREAST CANCER RISK PERCEPTIONS



nications often make gender identity salient through textual information, colors, symbols, or images. Moreover, independent of ad copy, women are often exposed to breast cancer communications in situations in which their gender identity is especially salient—for example, because of targeted media contexts. Across a series of experiments, we demonstrate that heightened gender identity salience can trigger defense mechanisms that interfere with the goals of cancer awareness campaigns. We focus on two classes of defense mechanisms that are especially important from a substantive point of view: information processing (e.g., ad memory) and denial of vulnerability (e.g., personal risk estimates). Rather than increasing risk perceptions (a critical antecedent of precautionary behavior), ad copy containing gender cues can decrease breast cancer risk perceptions (Experiments 1a, 3a, and 3b). Fund-raising objectives can also be thwarted by the tendency to distance the self from gender identity-threatening cancers (Experiment 1b). In addition, the cognitive elaboration of message content may suffer from the presence of gender cues because women perceive such advertisements as more difficult to process (Experiment 2a). Consequently, gender cues in the ad context can impair women's memory for breast cancer communications (Experiment 2b). These findings are especially relevant because they are contrary to the beliefs of advertising executives; more than half of the executives we surveyed predicted the opposite, and most of the remainder did not expect any effect of heightened gender identity salience.

Finally, our studies indicate two ways to counter defensive reactions: by affirming the self (Experiment 3a) and by encouraging women to voice their fear of the disease (Experiment 3b). Next, we consider the theoretical contributions of this article and then reflect on the substantive implications of the findings.

Theoretical Implications

Contributions to the risk and identity literature streams. For many conditions, medical risk is predicted by personal traits or behaviors that can form an important part of a person's identity, such as lifestyles (e.g., lung cancer, sport injuries), professions (e.g., stress-induced diseases, work-related hazards), age (e.g., diabetes, osteoporosis), and gender (e.g., breast cancer, prostate cancer). Therefore, it is surprising that the copious attention devoted to the antecedents of risk perception has generated so little research on the influence of identity salience on perceived vulnerability to identity-specific risks. To the best of our knowledge, this article is the first to investigate the link between identity and vulnerability estimates for identity-specific risks.

The dearth of research in this area is worrisome because many theoretical perspectives predict effects opposite from those we found. For example, theories based on cognitive accessibility (Raghubir and Menon 1998; Tversky and Kahneman 1973), personal relevance (Maheswaran and Meyers-Levy 1990; Mandel 2003), and perceived similarity (Gerend et al. 2004; Tversky and Kahneman 1974) concur in predicting an identity congruency effect (Shang, Reed, and Croson 2008), according to which increasing the salience of a particular identity should increase associated risk perceptions. Across several studies, we provide evidence for the operation of a different mechanism. We propose that these effects are the result of defense mechanisms

triggered by a feeling of threat to a central identity (Cramer 2000).

Contributions to the literature on defense mechanisms. Defense mechanisms serve to protect the self and self-esteem (Cramer 2000). Because they help people maintain positive illusions about themselves, defense mechanisms are probably important for mental health (Taylor and Brown 1988). However, in the domain of health behavior and health risk perceptions, defensive reactions are most often maladaptive (Menon, Block, and Ramanathan 2002). Two prominent streams of research that have explored defense mechanisms in health settings are those on mortality salience and motivated reasoning. First, the terror management literature (Pyszczynski et al. 2004) has shown that existential threats can lead to a wide range of maladaptive behaviors aimed at protecting self-esteem, such as unsafe driving and unprotected sex. Recent studies also show that heightened mortality salience reduces women's intentions to carry out breast self-examinations, except when feelings of discomfort can be attributed to a different source (Goldenberg et al. 2008). Second, several studies provide evidence that threatening health messages tend to be processed defensively. For example, Kunda (1987) shows that women who consume large amounts of coffee discounted a health message linking caffeine consumption to breast cancer more than women who consume small amounts of coffee (Lieberman and Chaiken 1992; Sherman, Nelson, and Steele 2000). Agrawal and Duhachek (2010) manipulated both message content (inducing shame vs. guilt) and participants' initial emotional state (feeling ashamed vs. guilty), showing defensive discounting of messages that would aggravate participants' negative emotional state. A common feature of this diverse body of work is that defensive responses stemmed from direct manipulations of ego threat. For example, in Goldenberg et al.'s (2008) studies, participants were asked to contemplate the moment of their death before defensive effects on breast self-examination behavior were observed. Similarly, many studies have manipulated message threat directly by changing the message itself (Klein and Harris 2009), by manipulating or measuring the extent to which the target group is threatened by a certain message (Kunda 1987), or through a combination of the two (Agrawal and Duhachek 2010).

The current article adds to existing research by highlighting a new set of conditions that can result in maladaptive defensive responses. In our studies, we did not manipulate threatening message content or threatening thoughts directly; rather, we triggered defense mechanisms by merely shifting the salience of an aspect of identity. These findings are important because they show that defensive responses can be triggered by interventions that are not threatening in themselves and that the same message can be responded to defensively or otherwise depending on a person's currently activated identities.

Implications for Health Communication and Limitations

Our studies show multiple ways in which the presence of gender cues can interfere with the objectives of health communication campaigns: by lowering breast cancer risk perceptions, reducing donations to ovarian cancer research, and impairing memory for breast cancer communications. These findings contradict the predictions of several prominent

theories and the expectations of the sample of advertising executives we surveyed.

We focused on breast cancer because of its importance and its link to a central identity aspect. Further research should test the effect of identity salience for different risks and identities. We do not expect negative consequences of identity salience when (1) the identity is not central to the self (e.g., a casual tennis player) or (2) the identity-relevant risk does not present a severe threat (e.g., equipment damage). In line with the alternative predictions (e.g., cognitive accessibility), in these cases, vulnerability estimates might show positive effects of identity activation.

In Experiments 1a and 2a, we used devices such as a pink ribbon and pink background to make gender identity salient. This resulted in defensive reactions. However, we must avoid concluding that such cues are ineffective or even counterproductive in general, because we also made use of the second person in the ad copy (“you”), which specifically relates the message content to the self. This can increase message elaboration (e.g., “you,” “your calculator”; Burnkrant and Unnava 1989). In other words, we made a specific aspect of self-identity (gender) salient and also relevant to the message that contained an implied threat. Although self-referencing typically facilitates persuasion, it can also have the reverse effect when a self-relevant message has a high degree of fear appeal; in that case, the increased elaboration primarily results in the generation of counterarguments (e.g., Keller and Block 1996). On the one hand, although the persuasion literature on self-referencing has not focused on identity salience or defensive denial of susceptibility, this finding is consistent with the notion put forth in this article—that health communications tying threatening messages to a central aspect of the self can be counterproductive. On the other hand, it is important to recognize that subtle gender cues that signal self-relevance of the message without explicitly implicating the self may not produce a defensive reaction but even have a positive effect. For example, they may lead to increased accessibility of risk-related knowledge structures (Raghubir and Menon 1998) or attract attention (Maheswaran and Meyers-Levy 1990). In line with this reasoning, we did not observe a defensive response in the control condition of Experiment 2b, in which recognition performance for the breast cancer banner advertisement containing an image of a woman was similar to that for the mascara advertisement. Although our research was not designed to disentangle the effects of self-identity from self-referencing or self-relevance (e.g., issue involvement), this is a promising route for further research.

To summarize the substantive implications of our studies, it is advisable to avoid including self-referencing gender cues in breast cancer advertisements and media contexts that make women reflect on their own gender. When this is unavoidable or undesirable (e.g., when such cues feature in an organization’s name, logo, or slogan), Experiments 3a and 3b provide insight into how to avoid defensive responses. Consistent with research showing that self-affirmation leads to greater acceptance of threatening messages (Klein and Harris 2009; Sherman, Nelson, and Steele 2000), Experiment 3a suggests that ad copy boosting women’s sense of self-worth can increase the effectiveness of breast cancer campaigns (e.g., “Think of all the times you have helped others”). Further research should investigate whether

broader manipulations of self-affirmation (e.g., “Think of the values that are important to you”; Klein and Harris 2009) are as effective as the one we used. The self-affirmation manipulation in Experiment 3a (Reed and Aspinwall 1998) might have been especially effective because it allowed participants to self-affirm along dimensions relevant to their sense of femininity (e.g., mindfulness of others). Moreover, consistent with research on affect as information (Schwartz and Clore 1983), Experiment 3b suggests that another way to prevent defensive responses is encouraging women to voice their fear of the disease (e.g., “How afraid are you of breast cancer?”). Most important, our studies illustrate the need to carefully consider every element in ad design. Seemingly innocuous visual elements or ad copy can have unintended and deleterious consequences for the effectiveness of health communications.

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