
Do Messages About Health Risks Threaten the Self? Increasing the Acceptance of Threatening Health Messages Via Self-Affirmation

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Two studies demonstrate that self-image maintenance processes affect the acceptance of personally relevant health messages. Participants who completed a self-affirmation were less defensive and more accepting of health information. In Study 1, female participants (high vs. low relevance) read an article linking caffeine consumption to breast cancer. High-relevance women rejected the information more than did low-relevance women; however, affirmed high-relevance women accepted the information and intended to change their behavior accordingly. In Study 2, sexually active participants viewed an AIDS educational video; affirmed participants saw themselves at greater risk for HIV and purchased condoms more often than did nonaffirmed participants. Results suggest that health messages can threaten an individual's self-image and that self-affirming techniques can increase the effectiveness of health information and lead to positive health behaviors.

The goal of most health-promotion campaigns is to change people's behavior (Salovey, Rothman, & Rodin, 1998; Taylor, 1990). Whether the campaign aims at encouraging people to quit smoking, reduce caffeine intake, or practice safer sex, the goal is to change behavior that increases risk for disease or illness. To motivate behavior change, many health campaigns attempt to increase perceptions of risk through information and appeals about the disease. For example, AIDS education campaigns aimed at college students (e.g., Fisher, Fisher, Misovich, Kimble, & Malloy, 1996) deliver information about AIDS and describe how students have been infected as a means of increasing perceptions of risk and promoting safer sexual behaviors.

However, research in social psychology reveals a potential obstacle for these health campaigns. Individuals often are motivated to interpret information in a self-serving

manner that may prevent them from accepting their risk for disease (Ditto & Lopez, 1992; Weinstein & Klein, 1995). If recipients of a health message fail to accept the information, then they will be unlikely to change their risky behaviors. This problem is compounded because health messages are often the least persuasive among the individuals for whom the issue is of high personal relevance (Jemmott, Ditto, & Croyle, 1986; Kunda, 1987; Liberman & Chaiken, 1992; Morris & Swann, 1996).

In trying to understand why personally relevant health messages produce defensiveness and resistance to acceptance, this article builds on theories of self-evaluation (e.g., E. Aronson, 1969; Solomon, Greenberg, & Pyszczynski, 1991; Tesser & Cornell, 1991) and, in particular, self-affirmation theory (J. Aronson, Cohen, & Nail, 1999; Steele, 1988). Personally relevant health communications may link behaviors important to an individual's

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self-image to disease and, hence, threaten that self-image. An individual's self-image, consisting of important relationships, values, experiences, and behaviors, is an important regulator of the individual's motivational and behavioral systems (Baumeister, 1996; Steele, 1988). For individuals who seek to preserve a self-image as positive, moral, and adaptive, the self-image-threatening nature of these health messages may arouse defensiveness. This defensiveness, in turn, may prompt individuals to attempt to restore their self-image by denying that they are at risk and in need of modifying their behavior.

This article suggests a strategy for reducing defensiveness and increasing the acceptance of health messages. If defensiveness is prompted by threatening an important part of one's self-image (Steele, 1988; Tesser & Cornell, 1991), then affirming the self-image should decrease the defensive responses to the health information. Indeed, the research presented in this article suggests that affirming one's self-image by making salient important values could increase the acceptance of threatening health messages and motivate participants to engage in positive health behaviors.

RELEVANCE AND DEFENSIVENESS

Research linking personal relevance to increased defensiveness and reduced acceptance of health messages has a long history. Early research (Janis & Terwilliger, 1962) found that heavy smokers, relative to light smokers or those who did not smoke, were more likely to reject a health communication that linked smoking to cancer (also see Berkowitz & Cottingham, 1960). Personal relevance was associated with defensiveness and reduced acceptance of health communications.

However, in these early studies, high- and low-relevance groups differed greatly in prior information and beliefs. Hence, more recent research has used novel issues to study the relationship between relevance and defensive processing. Jemmott et al. (1986) created a fictitious enzyme deficiency and manipulated whether participants believed they possessed the deficiency. Those for whom the enzyme deficiency was of high personal relevance rated the deficiency as less serious than did those for whom the deficiency was of low personal relevance. Kunda (1987) had heavy and light caffeine-consuming participants respond to an article documenting the link between caffeine consumption and fibrocystic disease (a precursor to breast cancer). High-relevance individuals, that is, women (a group at risk for breast cancer) who consumed heavy amounts of caffeine, believed the link between caffeine and fibrocystic disease less than did women who consumed light amounts of caffeine. Men (a group not at risk for breast cancer), who had the same prior beliefs as women, showed no such difference between heavy and light caffeine consumers.

Kunda (1987) argues that heavy caffeine-consuming women, who are motivated to disbelieve that they are at risk for cancer, evaluated information linking caffeine to cancer in a self-serving way.

Liberman and Chaiken (1992) replicated the finding that a high-relevance group (female coffee-drinkers) was less accepting of an article linking caffeine consumption to breast cancer than was a low-relevance group (female non-coffee-drinkers). Moreover, Liberman and Chaiken (1992) found differences in cognitive processing between high- and low-relevance groups. High-relevance individuals exhibited biased systematic processing of the article; they were more critical of aspects of the article linking caffeine to breast cancer than were low-relevance individuals.

The research suggesting that personal relevance increases defensiveness and reduces the acceptance of important health messages seems to contradict studies suggesting that increased personal relevance or issue involvement leads to greater persuasion for high-quality messages (Petty & Cacioppo, 1979, 1986). However, drawing on the Johnson and Eagly (1989) distinction between value-relevant involvement (or, in our terms, self-image relevant) (Steele, 1988) and outcome-relevant involvement suggests that increased value relevance should lead to decreased persuasion (see also Eagly & Chaiken, 1993). When the issue is evaluating whether one's behaviors are associated with an increased risk for cancer, the self-image is relevant; consequently, biased defensive processing and reduced persuasion will result (Giner-Sorolla & Chaiken, 1997).

MOTIVATIONAL APPROACHES TO DEFENSIVENESS

The research reviewed above (e.g., Giner-Sorolla & Chaiken, 1997; Liberman & Chaiken, 1992) has examined the cognitive mechanisms in defensive responses to health information. However, cognitive strategies have been largely ineffective at changing defensive responses to health information (e.g., Weinstein & Klein, 1995). In contrast, motivational strategies have been effective at reducing defensiveness and increasing acceptance of health messages.

Research from the cognitive dissonance perspective (e.g., Stone, Aronson, Crain, Winslow, & Fried, 1994) has used the self-threatening nature of AIDS in studies where college students were made mindful of their failure to use condoms after publicly advocating safer sex. The dissonance aroused by being hypocritical motivated students to resolve their inconsistency by purchasing condoms. These findings demonstrate that understanding the motivational factors leading to defensiveness can result in positive health behaviors.

Motivational strategies also have reduced vulnerability-denying defensive distortions. One study had participants take a bogus test of their emotionality; experimenters told half of the participants that emotionality leads to early death and half that emotionality leads to long life (Greenberg et al., 1993). Informing people that emotionality leads to early death attenuated reports of emotionality. However, this defensive tendency was reduced by a boost to self-esteem in the form of positive personality feedback.

SELF-AFFIRMATION AND DEFENSIVENESS

Research has shown that when an individual's self-image is threatened, the person is more likely to respond in a self-serving way (Ditto & Lopez, 1992; Dunning, Leuenberger, & Sherman, 1995; Kunda, 1990). Many health messages simultaneously threaten the self and present important information. Thus, an analysis of the self-system is central to understanding why threatening health information prompts defensive responses.

Self-affirmation theory (J. Aronson et al., 1999; Steele, 1988) proposes that thoughts and actions are motivated by a desire to maintain a self-image as moral, adaptive, and capable.¹ When people receive threatening health information (Ditto & Lopez, 1992; Jemmott et al., 1986; Kunda, 1987), they respond defensively as a means of maintaining their positive self-image. However, self-affirmation theory predicts that if one's self-image can be affirmed through some other means, the need to respond defensively to the threatening information should be reduced. One study (Trope & Pomerantz, 1998) found that a successful experience with an unrelated task increased interest in diagnostic but potentially threatening feedback, providing evidence that positive experiences bolster the self and can prepare the individual to confront negative information. Other research finds that optimistic beliefs predict attention to health threats (Aspinwall & Brunhart, 1996) and that self-affirming activities could reduce stress and illness (Keough, Garcia, & Steele, 1998), suggesting that cumulative positive experiences and affirming activities may buffer the self and help the individual confront potential health risks. Viewed in this light, the positive personality feedback provided to participants in the Greenberg et al. (1993) study reviewed above may have affirmed the self-image of participants in response to the threat of the disease. This affirmation, in turn, may have reduced the need to respond defensively to the threatening health information.

This interpretation is plausible because self-affirmations have reduced defensive processing in many domains. Previous research has shown that affirming an important value reduces the need to change one's atti-

tude in a dissonance-arousing, forced-compliance paradigm (Steele & Liu, 1983). Other studies have found that a self-image-affirming activity reduces defensive evaluation of stereotyped group members (Fein & Spencer, 1997), the defense of a strongly held belief in the face of opposing arguments (Cohen, Aronson, & Steele, 2000), and the biased processing of threatening health information (Reed & Aspinwall, 1998).

In this article, we examine a specific postulate of self-affirmation theory (Steele, 1988), namely,

Salient, self-affirming thoughts should make it easier to be objective about other, self-threatening information; they should reduce the pressure to diminish the threat inherent in this information. In this way, self-affirming thoughts may be an effective means of reducing thought distorting defense mechanisms such as denial and rationalization. (p. 290)

The theory proposes that affirming a central value could reduce defensive responses to threatening health messages. Threatening health messages put an individual's self-image at risk; the finding that high-relevance women are less accepting than are low-relevance women of an article linking caffeine consumption to breast cancer (Kunda, 1987; Liberman & Chaiken, 1992) is the result, we argue, of the self-image-threatening nature of this health information. Our hypothesis is that providing an alternative means to reduce the threat in this information via a self-affirmation should reduce the defensiveness of the relevant message recipients and increase their acceptance of the message. A more accepted message will then lead to greater perceptions of personal risk and greater movement toward positive health behaviors.

OVERVIEW OF STUDIES

The present studies address whether self-image maintenance processes affect the defensive processing of health messages by providing an opportunity to affirm the self as a means of reducing this defensiveness. In Study 1, we use the design employed by Liberman and Chaiken (1992) to test whether affirmed coffee-drinkers are more accepting of the content of a high-threat message than are nonaffirmed coffee-drinkers. Study 2, in the domain of AIDS education, extends this research from self-report attitudes to health-related behaviors. We test whether sexually active college students who receive a self-affirmation prior to seeing an AIDS educational video will perceive themselves as potentially at greater risk for AIDS and be more likely to engage in safer sexual behaviors such as purchasing condoms and obtaining AIDS educational brochures.

STUDY 1

In Study 1, we presented high-relevance (i.e., coffee-drinking) and low-relevance (i.e., non-coffee-drinking) women with an article linking caffeine consumption to fibrocystic disease. After reading the article, participants in the affirmation condition affirmed a central value by filling out a values scale of their highest-ranked value, whereas those in the no-affirmation control condition filled out a values scale of their fifth-ranked value. All participants then completed measures assessing their acceptance of the article and intentions to change behavior. Following Kunda (1987) and Liberman and Chaiken (1992), we predicted that in the no-affirmation condition, high-relevance participants (the coffee-drinking women) would be more defensive and less accepting of the health information than would the low-relevance participants (the non-coffee-drinking women). However, we predict that this tendency would be reversed in the affirmation condition, with high-relevance participants accepting the health information to a greater extent than would low-relevance participants. Moreover, we predict that this greater acceptance among the affirmed high-relevance participants would lead to greater intention to reduce caffeine intake.

METHOD

Participants and Design

Sixty female students at Stanford University participated in the 30-minute experiment in exchange for \$5. Relevance was determined prior to the experiment; as part of a preselection questionnaire, participants identified themselves as either coffee-drinkers ($n = 28$) or non-coffee-drinkers ($n = 32$). Participants were randomly assigned to either the affirmation or no-affirmation condition. Thus, the experiment consisted of a 2 (relevance: coffee-drinker vs. non-coffee-drinker) \times 2 (affirmation status: affirmation vs. no-affirmation) between-participants factorial design.

Procedure

Experimental sessions were run in small groups of 2 to 5 by an experimenter who was unaware of participants' coffee-drinking status. The experimenter instructed participants that they would be completing two studies, one measuring personal values and the other attempting to assess student opinions of scientific articles. After signing the consent form for the personal values experiment, participants ranked a list of five personal values (social, political, religious, theoretical, aesthetic) (Allport, Vernon, & Lindzey, 1960) in order of importance.

The caffeine-cancer article. Participants then signed the consent form for the scientific article experiment. Participants read the article, "Caffeine and Women: A New Health Risk," which appeared to be photocopied from the *Health Today Newsletter*. The content of the article was the same as the high-threat article in Liberman and Chaiken (1992). The article describes fibrocystic disease, a precursor to breast cancer, and research that links caffeine intake with the disease. The article concludes by stating that caffeine poses a significant risk of breast cancer for women.

Affirmation manipulation. While the participants read the article, the experimenter randomly assigned them to either the self-affirmation condition or the no-affirmation condition. After reading the article, participants completed the affirmation manipulation. The experimenter, based on the participants' rankings of values, gave affirmation participants a scale concerning their highest-ranked value and no-affirmation participants a scale concerning their fifth (i.e., lowest-ranked) value. The value scales, adapted from Allport et al. (1960) have been employed in other self-affirmation studies (Steele & Liu, 1983; Tesser & Cornell, 1991) and are theorized to affirm the self by making salient values that are central to the individual's self-image (Steele, 1988). The value scales consist of 10 pairs of statements. For participants in the affirmation condition, one statement of each pair was associated with their most important value and the other statement was filler. For participants in the no-affirmation condition, one statement was associated with their least important value and the other statement was filler. Participants assigned 1 to 4 points to each statement, with greater points indicating greater agreement with the statement.

Dependent measures. Next, participants completed the dependent measures. Two questions examined whether participants accepted the conclusions of the article, asking on 9-point scales, "To what extent do you agree or disagree that there is an association between caffeine and fibrocystic disease?" and "How important do YOU think it is that women reduce their caffeine intake in order to avoid fibrocystic disease?" Two other questions assessed participants' intent to reduce caffeine consumption, asking on 9-point scales, "To what extent do you think that you, personally, SHOULD reduce the amount of caffeine you consume?" and "To what extent do you think that you, personally, will ACTUALLY reduce the amount of caffeine you consume?" Next, in an open-ended section, participants listed any thoughts they had while reading the article. Finally, participants reported their self-feelings and mood, responding on 9-point scales to the questions, "How do you feel about yourself?" and "What is your current mood?"

Debriefing. After completing the dependent measures, the experimenter debriefed participants with a particular emphasis on the false content of the article and provided a brief summary of research findings describing the relationship between caffeine and breast cancer.²

RESULTS

Checks on the Experimental Manipulation

To examine the effect of the self-affirmation on self-feelings, participants responded to the question, "How do you feel about yourself?" on a 9-point scale anchored at *poorly* and *extremely positively*. Affirmed participants ($M = 6.94$) felt better about themselves than did nonaffirmed participants ($M = 6.07$), $F(1, 59) = 4.64$, $p < .05$. Participants also responded to the question, "How would you describe your mood, right now?" on a 9-point scale anchored at *extremely bad mood* and *extremely good mood*. This question was uncorrelated with the self-feeling question ($r = .08$, *ns*), indicating that it measured a conceptually distinct state. There was no difference between affirmed participants ($M = 5.84$) and nonaffirmed participants ($M = 6.10$), $F(1, 59) < 1.00$, *ns*, suggesting that mood was not affected by the manipulation.

For the values scale, the affirmation manipulation, the participants assigned 1 to 4 points to each of 10 pairs of values. The scale ranged from 10 to 40 points, with more points indicating greater agreement with the values. As expected, affirmation participants assigned more points ($M = 29.26$) to their most important value than the no-affirmation participants, who assigned fewer points ($M = 23.10$) to their least important value, $F(1, 59) = 42.31$, $p < .001$. Both of these means differed from chance (25) in the predicted directions, $t(30) = 6.79$, $p < .001$, and $t(28) = -2.69$, $p < .01$, for the affirmation and no-affirmation conditions, respectively.

Affirmation and Acceptance of the Threatening Information

Our hypothesis was that affirming a central value would reduce defensiveness and increase acceptance of the health information. We measured acceptance by evaluating participant responses to the article linking caffeine and fibrocystic disease. Participants rated "To what extent do you agree or disagree that there is an association between caffeine consumption and fibrocystic disease" on a 9-point scale anchored at *strongly disagree* and *strongly agree* and "How important do YOU think it is that women reduce their caffeine intake in order to avoid fibrocystic disease?" on a 9-point scale anchored at *not at all important* and *very important*. These measures had high reliability (Cronbach's $\alpha = .71$) and were aver-

aged and analyzed as a single measure of acceptance of the article's conclusions, with higher numbers indicating greater acceptance. A two-way ANOVA revealed that affirmed participants ($M = 6.50$) were more accepting of the article's conclusions than were nonaffirmed participants ($M = 5.29$), $F(1, 59) = 8.04$, $p < .01$. This main effect was qualified by the predicted Affirmation \times Relevance interaction, $F(1, 59) = 16.44$, $p < .001$. As Figure 1 shows, within the no-affirmation condition, coffee-drinkers ($M = 4.15$) were less accepting of the conclusions than were non-coffee-drinkers ($M = 6.22$), $F(1, 28) = 10.77$, $p < .01$. However, in the affirmation condition, coffee-drinkers ($M = 7.23$) were more accepting of the article's conclusions than were non-coffee-drinkers ($M = 5.81$), $F(1, 30) = 5.85$, $p < .05$.

Examining the results somewhat differently shows that the effects of the affirmation were most beneficial to the relevant participants. For the non-coffee-drinkers, there was no difference between the affirmation condition ($M = 5.81$) and the no-affirmation condition ($M = 6.22$), $F(1, 31) < 1.00$, *ns*. However, for the coffee-drinkers, the affirmation had clear beneficial effects. Affirmed coffee-drinkers were much more accepting of the article's conclusions ($M = 7.23$) than were nonaffirmed coffee-drinkers ($M = 4.15$), $F(1, 27) = 33.26$, $p < .001$ (see Figure 1). Thus, for the coffee-drinking women, the self-affirmation reduced the defensive processing of the threatening message and persuaded them to accept that they should reduce their caffeine intake.

Behavioral Intentions

Would this greater acceptance of the conclusions of the article by the affirmed coffee-drinkers result in behavioral change? Although we did not measure coffee-drinking behavior, two questions examined behavioral intentions among the coffee-drinkers.³ Participants were asked, "To what extent do you think that you, personally, SHOULD reduce the amount of caffeine you consume?" on a 9-point scale anchored at *to no extent at all* and *to a very great extent* and "To what extent do you think that you, personally, will ACTUALLY reduce the amount of caffeine you consume?" on a 9-point scale anchored at *to no extent at all* and *to a very great extent*. These two items had high reliability (Cronbach's $\alpha = .83$) and were analyzed as a composite measure, with higher numbers indicating greater predicted reduction of caffeine consumption. This combined measure was subjected to a one-way ANOVA among the coffee-drinking participants. The affirmed coffee-drinkers ($M = 6.10$) predicted much greater reduction in caffeine consumption than did the nonaffirmed coffee-drinkers ($M = 2.73$), $F(1, 27) = 25.89$, $p < .001$. Thus, not only were the affirmed coffee-drinkers more accepting of the message that caffeine intake was related to fibrocystic disease but

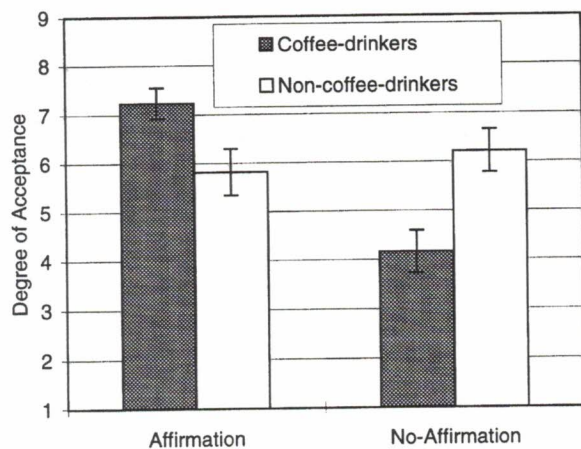


Figure 1 Acceptance of article's conclusions (+ SE) as a function of relevance (coffee-drinkers vs. non-coffee-drinkers) and self-affirmation condition.

they also intended to reduce their caffeine intake as a result.

Thought Listing

Participants listed any thoughts relevant to the article in a free-response format. Two coders unaware of the participants' condition or coffee-drinking status coded the thoughts. Coders rated the valence of the comments—whether they were positive toward the issues raised by the article (e.g., "The study raised important issues about breast cancer") or negative toward the issues raised by the article (e.g., "The study was poor, it had no control group"). Interrater reliability was 80% (reliability was calculated by number of agreements divided by total number of agreements and disagreements) and differences were resolved through discussion among the coders. A thought-valence index was created (following Killea & Johnson, 1998) using the following formula: $\text{thought-valence index} = (\text{positive issue-relevant thoughts} + 1) / (\text{total issue-relevant thoughts} + 1)$. (The constant of 1 was added to the numerator and the denominator to prevent divisions by zero). Scores on the index approaching 1.00 indicate a predominantly positive thought list, whereas scores approaching 0.00 indicate a predominantly negative thought list.⁴ The index was strongly related to both the number of positive thoughts ($r = .59, p < .001$) and negative thoughts ($r = -.68, p < .001$).

Results indicate no main effects of either affirmation condition or coffee-drinking status or interactions on the thought-valence index (scores range from .36 to .44 for the four cells, all F s < 1.0). However, correlational analyses indicate that the thought-valence index is related to the primary dependent measure, the accep-

tance of the article's conclusions ($r = .29, p < .05$). Stronger support for the effect of the self-affirmation on increasing the participants' acceptance of the article's conclusions comes from results indicating that the relationship between the thought-valence index and acceptance of the article's conclusions only holds for the affirmed participants. That is, the correlation between the thought-valence index and acceptance of the article's conclusions is strong only for the affirmed participants ($r = .46, p < .01$) but not the nonaffirmed participants ($r = .09, ns$). Thus, for affirmed participants, the acceptance of the article's conclusions is related to the positivity of their issue-relevant thoughts.⁵

DISCUSSION

Study 1 replicated the findings of Liberman and Chaiken (1992) and Kunda (1987) in that within the no-affirmation control condition, coffee-drinking women were much less accepting of the message linking caffeine consumption to fibrocystic disease than were non-coffee-drinking women. However, Study 1 also found that with a self-affirmation, this defensive response pattern was not only attenuated but reversed. Affirmed coffee-drinkers were more accepting of the article's conclusions than were affirmed non-coffee-drinkers. Most interestingly, affirmed coffee-drinkers were significantly more accepting of the article's conclusions than were nonaffirmed coffee-drinkers, demonstrating not only that self-affirmation reduces the defensiveness among high relevance participants (e.g., Reed & Aspinwall, 1998) but also that self-affirmation exerts a clear beneficial effect on increasing the acceptance of threatening health messages. Indeed, affirmation also led affirmed coffee-drinkers to greater behavioral intentions because they indicated far greater intentions to reduce their caffeine consumption than did nonaffirmed coffee-drinkers.

Examination of the thought-listing responses in Study 1 helps clarify the mechanism by which the affirmation reduced the defensive processing and led to the increased acceptance of the threatening health messages. Although participants did not differ by condition in the positivity of thoughts listed (as assessed by the thought-valence index), among affirmed participants (both coffee-drinkers and non-coffee-drinkers) there was a high correlation between the thought-valence index and acceptance of the article's conclusions, whereas there was no correlation among the nonaffirmed participants. This suggests that the nonaffirmed participants were being defensive; relative to the affirmed participants, they were much more rejecting of the article's conclusions, and this was unassociated with the positivity of the thoughts they generated. In contrast, the affirmed participants were much more accepting of the article

and had a strong correlation between the thought-valence index and the acceptance of the article's conclusions. This finding suggests that the affirmation may have reduced the defensiveness observed in the nonaffirmed and led people to accept the article to the extent that they generated positive thoughts about it.

The strong correlation between the thought-valence index and acceptance of the article's conclusions among the affirmed also suggests that the self-affirmation results are not due to positive mood (a point we will return to in the General Discussion). If the affirmation results were due to mood, we would expect minimal correlation between the thought-valence index and acceptance of the article's conclusions because regardless of content (positive or negative), they would be more accepting of the article. In contrast, we found a strong correlation only among the affirmed participants, suggesting that it was not positive mood driving the results. Thus, Study 1 clarifies the mechanism by which affirmation leads to greater acceptance of threatening health messages, a finding that extends the process findings of Reed and Aspinwall (1998), which showed that high-relevance participants who are affirmed orient more quickly to risk-confirming information.

Study 1 found increased persuasiveness of a health communication when the affirmation was administered after the participants read the threatening information. This suggests that it was not an on-line process that mediated the differences found in the conditions (as in Reed & Aspinwall, 1998) but rather a reconsideration of the evidence at the time the dependent measures were asked. Study 2 examines whether an affirmation given prior to the threatening information would produce analogous results. As previous research (Steele & Liu, 1983; Steele, Spencer, & Lynch, 1993) has shown, self-affirmations can be effective at reducing defensive processing at either stage, operating as either an inoculation or a cure against the threatening information.

Two other concerns with Study 1 motivated our design of Study 2. First, Study 1 used the domain of caffeine and fibrocystic disease, an issue that is probably not as salient to a college-age population as are other health concerns. In Study 2, we generalize the findings of Study 1 to a more central concern for our college student participants—AIDS; would a self-affirmation increase the acceptance of a potentially threatening AIDS educational message? Second, although the affirmation resulted in increased behavioral intentions, Study 1 did not measure behavior. Thus, Study 2 examines whether a self-affirmation would allay threats provoked by an emotional message about AIDS and whether this would translate into positive health behaviors.

STUDY 2

In Study 1, affirming a central value among relevant participants increased the acceptance of a health communication linking caffeine to breast cancer. Study 2 generalizes this finding to the domain of AIDS education. College students are typically very sexually active, engaging in intercourse with multiple partners; one survey of college students reported that 86% were sexually active, yet only 21% used a condom every time they had intercourse (Caron, Davis, Wynn, & Roberts, 1992). Students use risky strategies, adopting implicit personality theories about who is and is not at risk for AIDS to justify their continued risky behavior (Williams et al., 1992).

To combat these beliefs, and change students' risky sexual behaviors, intervention studies have attempted to make students confront their risk for AIDS (Choi & Coates, 1994; J. D. Fisher & Fisher, 1992). Motivational factors such as attitudes toward performance of AIDS-preventive behaviors and perceived personal vulnerability to HIV are central components of many AIDS-intervention strategies (J. D. Fisher et al., 1996). For example, the Information-Motivation-Behavioral Skills Model for AIDS intervention (J. D. Fisher & Fisher, 1992; J. D. Fisher et al., 1996), an intervention successful at modifying risky sexual behavior in a college sample, has a motivation component that includes an educational video depicting attractive young adults who had contracted AIDS through sexual contact, describing life with the disease.

Although this intervention effectively changed behavior, the AIDS video was embedded in a larger program of AIDS education. When shown in isolation, however, these videos may have the consequence of causing defensive reactions. One study (Morris & Swann, 1996) showed virgins and nonvirgins an AIDS educational video featuring emotional appeals by young people with AIDS. Whereas the video prompted virgins to perceive themselves as being at greater risk for HIV (relative to nonvideo controls), the video prompted nonvirgins to perceive themselves as less at risk for HIV. That is, the AIDS educational video prompted a denial response among the most relevant people, a pattern of results similar to the nonaffirmed participants in Study 1.

Thus, Study 2 has three primary goals. The first goal is to generalize the findings from Study 1 that providing an opportunity to affirm the self will increase the effectiveness of a potentially threatening health message. In particular, we predict that an affirmation will reduce the defensive responses among sexually active students found in Morris and Swann (1996). The second goal is to go beyond the self-report attitude measures in Study 1 to examine whether an affirmation coupled with a poten-

tially threatening health message would result in greater AIDS-preventive behaviors. Thus, in Study 2, participants could purchase condoms and obtain AIDS educational brochures, important behaviors in the prevention of the disease. The third goal is to demonstrate that an affirmation could increase the persuasiveness of a threatening health message when the affirmation was administered before the presentation of the health information.

METHOD

Participants and Design

Sixty-one Stanford undergraduate students, 30 men and 31 women, participated in exchange for either course credit or \$5.⁶ On a pretest survey as part of a packet of questionnaires, all students indicated whether they had engaged in sexual intercourse in their lifetimes. Only students who engaged in sexual intercourse were recruited.⁷ As part of the pretest survey, all students also responded to the questions, "Are you concerned that you have been exposed to the HIV virus sexually?" and "How at risk do you think you are for HIV?"

The participants wrote an essay on either a central or unimportant value (affirmation manipulation) prior to watching a potentially threatening AIDS educational video. The experiment had two conditions: the affirmation condition and the no-affirmation control condition. The dependent measures were AIDS-preventive behaviors (buying condoms and obtaining brochures), assessments of the video, and perceptions of personal risk for AIDS.

Procedure

Via e-mail, participants signed up for the study, "Evaluating AIDS Educational Materials." After the participant arrived at the study, the experimenter explained that there would be three parts to the experiment. First, participants would fill out a brief questionnaire and complete a writing exercise. Second, they would view an AIDS educational video. Third, the participants would answer a series of questions about the video as well as themselves. After administering the consent form, the experimenter explained that due to the personal nature of this experiment, all responses the participant provided would be identified only by his or her participant number. In addition, the experimenter mentioned that the experiment may go over the allotted 30 minutes but that the participant would be paid an additional \$3 for his or her time. All participants agreed to this.

Participants then ranked a list of 11 values and personal characteristics (Harber, 1995) in order of personal importance. The list included such values or personal characteristics as athletics, artistic skills, creativity, rela-

tions with friends/family, spontaneity, and physical attractiveness.⁸

Affirmation manipulation. After ranking the values, participants completed a brief writing assignment. Participants opened a sealed envelope that contained the essay task, which kept the experimenter unaware of condition. The task, adapted from previous affirmation studies (e.g., Fein & Spencer, 1997), served as the experimental manipulation. Participants were randomly assigned to one of two conditions. Those in the affirmation condition first indicated their most important value and then wrote an essay describing why the value was important to them and a time when it had been particularly important. Participants in the no-affirmation condition first indicated their ninth most important value and then wrote an essay describing why the value might be important to the average student. Participants wrote for 5 minutes.

AIDS educational video. After completing the essay, participants viewed the AIDS educational video. The video, titled *People Like Us* (J. D. Fisher, Fisher, & Marks, 1992), was part of the motivational component of the Information-Motivation-Behavioral Skills AIDS intervention (J. D. Fisher et al., 1996). The video, edited to 12 minutes for the purposes of our experiment, consisted of six people (four heterosexual women and two homosexual men, ages approximately 18 to 30) living with AIDS who described how they contracted the disease and what life has been like since they became aware of their infection. For example, one woman said, "Having to tell my roommates was really difficult. . . . One of my roommates didn't want to live with me anymore." The video concluded with one woman remarking, "No guy or girl, no matter how cute, is worth waking up with this every day." The video focused on increasing perceptions of personal vulnerability and emphasized the need to change students' AIDS-preventive behavior and attitudes.

Dependent measures. We tested whether the affirmation would increase the effectiveness of the AIDS educational video through both self-report measures assessing perceptions of the video and personal risk and behavioral measures assessing whether participants purchased condoms and took AIDS-related brochures.

Participants rated, on 9-point scales, how similar their own sexual experience was to the people in the video and how accurately they thought the video represented the likelihood of HIV infection for people like them. Then participants indicated their personal risk for AIDS responding on a 9-point scale to the question, "How at risk are you for contracting HIV?"

After the questionnaires, the experimenter paid participants \$3 for the experiment going overtime. Following the condom-purchasing methodology employed in

other studies (Stone et al., 1994; Stone, Wiegand, Cooper, & Aronson, 1997), the participants filled out a receipt while the experimenter completed some paperwork. The experimenter told participants that AIDS educators from the health center donated condoms and brochures for participants as part of the experiment. Participants in the experiment could buy condoms for the same price that they are sold at the health center, 10 cents each, and could take as many AIDS educational brochures as they wanted.

On the table was a large jar filled with 50 condoms of various brands along with a cup containing coins to make change. In addition, 10 copies each of three AIDS educational brochures (one on HIV-testing options, one about the AIDS virus, and one on how to use a condom). When the participants were finished buying condoms and/or taking brochures, the experimenter returned and debriefed the participants. After the experimental session, the experimenter counted the number of condoms and brochures remaining.

RESULTS

Pretest Covariate: Concern About HIV

All of the participants were sexually active. However, because being sexually active does not necessarily mean one is at risk for AIDS, we asked participants in the pretest, "Are you concerned that you have been exposed to the HIV virus sexually?" on a 9-point scale anchored at *not at all concerned* and *extremely concerned*. We use this measure as a covariate on the self-report attitude questions to control for pretest levels of concern about AIDS.

Effects of Self-Affirmation on Perceptions of the Video

The purpose of the AIDS educational video is to encourage students to recognize their potential similarity to people with AIDS and the danger of risky sexual behavior. Two questions were related to the video: "How similar is your sexual experience to any of the six people in the video?" on a 9-point scale anchored at *not at all similar to any person in the video* and *extremely similar to at least one person in the video* and "How accurately do you think the video represented the likelihood of HIV for people like you?" on a 9-point scale anchored at *inaccurate perception of risk* and *accurate perception of risk*. These measures had high reliability (Cronbach's $\alpha = .71$) and, therefore, were summed into an index of "similar risk," with higher numbers indicating greater perceived similarity in risk to the people in the video. An ANCOVA with pretest concern for HIV as the covariate, and similar risk as the dependent variable, revealed a marginal effect of gender, $F(1, 60) = 3.51, p < .10$ (the covariate met the assump-

tion of homogeneity for regression slopes across affirmation conditions and gender). Women felt greater similar risk to people in the video (adjusted $M = 6.18$) than did men (adjusted $M = 5.25$). As noted before, the video contained four heterosexual women and two homosexual men; thus, it is reasonable that the (predominantly heterosexual) men in the study saw their sexual experience as less similar and the risk represented in the video as being less accurate for people like them. This main effect of gender was qualified by an Affirmation \times Gender interaction, $F(1, 60) = 5.61, p < .05$; women who completed a self-affirmation saw far greater similar risk (adjusted $M = 7.17$) than did nonaffirmed women (adjusted $M = 5.06$), whereas men were not affected by the affirmation (adjusted M s = 5.18 and 5.45 for affirmed and nonaffirmed men, respectively). Thus, for participants who could see themselves as similar to those in the video (female participants), the affirmation led to an increased perceived similarity of risk.

Effects of Self-Affirmation on Perceptions of Risk

We predicted that the affirmation would reduce the need to respond defensively in assessing personal risk for AIDS. Participants responded to the question, "How at risk are you for HIV?" on a 9-point scale anchored at *very minimal risk* and *very serious risk*. After controlling for the pretest report of concern about HIV, results indicate that affirmed participants saw themselves as being at more serious risk for HIV (adjusted $M = 4.02$) than did nonaffirmed participants (adjusted $M = 2.78$), $F(1, 60) = 6.62, p < .05$. (Again, the covariate met the assumption of homogeneity for regression slopes across the affirmation conditions.) Analogous to Study 1, affirmation increased perceptions of personal risk after a threatening health message.

However, did the affirmation coupled with the AIDS educational video increase the participants' perceptions of risk or did the lack of an affirmation coupled with the video decrease perceptions of risk? Participants responded during pretest to the same question of how at risk they were for HIV. A paired t test indicates that affirmed participants increased their perceptions of risk from 3.16 to 3.97, paired $t(31) = -2.25, p < .05$, whereas nonaffirmed participants did not differ (M s = 2.48 and 2.71 for pretest and posttest, respectively), $t(30) = -0.83, ns$. Thus, the affirmation coupled with the AIDS video increased participants' perceptions of risk.

Did the affirmation coupled with the AIDS educational video reduce defensiveness, as we found in Study 1? Based on Study 1, which showed the defensive responding of high-relevance participants, and the previous literature about assessments made about personal risk for AIDS (J. D. Fisher & Misovich, 1990; Morris &

Swann, 1996; Williams et al., 1992), it appears that students are usually responding in a defensive manner when asked questions such as, "How at risk are you for HIV?" The purpose of the AIDS video (J. D. Fisher et al., 1996) is to reduce this defensiveness among students and promote willingness to confront the potential link between their risky sexual behavior and HIV. For affirmed participants, this goal was achieved; the affirmation coupled with the video reduced their pretest defensiveness and increased their perceived personal risk for HIV. For nonaffirmed participants, this goal was not achieved; they maintained their defensiveness and did not change their personal risk for HIV after seeing the video.

Effects of Self-Affirmation on AIDS-Preventive Behaviors

We hypothesized that affirming an important value prior to watching a potentially threatening AIDS educational video would elicit greater acceptance of the information in the video, resulting in greater AIDS-preventive behaviors. We examined the percentage of participants in each condition who purchased condoms. As shown in Figure 2, 50% of the affirmed participants purchased condoms, whereas 25% of the nonaffirmed participants purchased condoms, $\chi^2(1, 60) = 4.03, p < .05$. Among those who did purchase condoms, the average number of condoms purchased did not differ between affirmation participants ($n = 16, M = 4.88$) and no-affirmation participants ($n = 7, M = 5.00$), $F(1, 22) < 1.00, ns$.

In addition to purchasing condoms, participants could also take any of the three AIDS educational brochures. Each individual brochure-taking measure was highly correlated with the others (Cronbach's $\alpha = .84$); therefore, we measured the percentage of participants who took at least one AIDS educational brochure. As seen in Figure 3, in the affirmation condition, 78% of the participants took at least one brochure, whereas in the no-affirmation condition, 54% of the participants took at least one brochure, $\chi^2(1, 60) = 4.09, p < .05$. Thus, affirming a central value prior to viewing the AIDS educational video resulted in greater AIDS-preventive behaviors; a greater percentage of affirmed participants purchased condoms and took AIDS educational brochures relative to nonaffirmed participants.

DISCUSSION

Study 2 demonstrated that completing a self-affirming activity prior to viewing an AIDS educational video would increase perceptions of personal risk for HIV and affect AIDS-preventive behaviors, such as purchasing condoms and obtaining AIDS educational brochures. That affirmed female participants saw themselves as

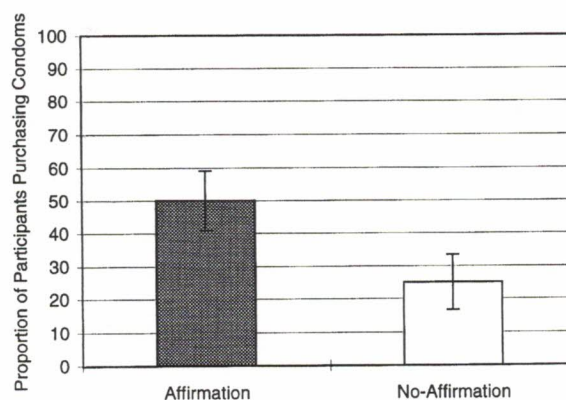


Figure 2 Proportion of participants (+ SE) purchasing condoms as a function of self-affirmation condition.

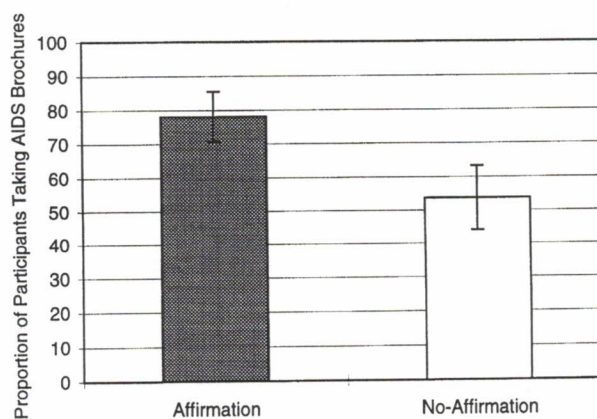


Figure 3 Proportion of participants (+ SE) taking at least one AIDS educational brochure as a function of self-affirmation condition.

more similar to the people in the video in terms of their risky behavior, and that affirmed participants overall saw themselves as more at risk for HIV, suggests that the affirmation, coupled with the AIDS video, had a positive effect on promoting participants' awareness of personal risk for AIDS. Moreover, similar to Stone et al. (1994), Study 2 demonstrates that using motivational factors in conjunction with AIDS educational techniques can produce positive AIDS-preventive behaviors, such as purchasing condoms and obtaining AIDS educational brochures. Finally, Study 2 provides evidence that the affirmation could lead participants to accept potentially threatening information—that they are at risk for HIV—that would presumably put them in a worse mood, suggesting that affirmation results cannot be accounted for by mood.

GENERAL DISCUSSION

Across the two studies, a self-affirmation procedure increased the acceptance of a potentially threatening health communication. Consistent with self-affirmation theorizing (J. Aronson et al., 1999; Steele, 1988), salient self-affirming thoughts made it easier to be less defensive about threatening information. Participants who were given an opportunity to affirm a central value were more accepting of the threatening information than their behaviors—coffee drinking or unprotected sex—may have put them at risk for disease. Affirmed participants saw themselves as being at greater risk, intended to change their behaviors (Study 1—reduce caffeine consumption), and took positive behavioral steps (Study 2—buying condoms and taking AIDS brochures).

An alternative explanation for the self-affirmation increasing the acceptance of the threatening health messages is that perhaps the affirmation improved participants' mood and the positive mood led to increased persuasion (e.g., Mackie & Worth, 1991). However, it seems that a mood explanation cannot fully account for the results in both studies. In Study 1, affirmed participants had a strong correlation between the positivity of the thoughts they generated and the acceptance of the article's conclusions linking caffeine to fibrocystic disease. If the affirmation results were due to mood, we would not expect this but rather a minimal correlation because regardless of the valence of their thoughts, participants would have been more accepting at the articles' conclusions. In Study 2, affirmed participants felt more at risk for HIV than did nonaffirmed participants. Models of affect, such as the feelings-as-information model (Schwarz, 1990), suggest that positive mood should lead to positive judgments because people attribute a mood boost to the object of judgment. If the effects were due to self-affirmation increasing positive mood, then we would not expect affirmed participants to make negative self-judgments, seeing themselves as more at risk for HIV, the result of Study 2. Thus, it is unlikely that mood could account for the converging findings that self-affirmation increases the acceptance of threatening health messages, consistent with other research (Cohen et al., 2000; Fein & Spencer, 1997; Liu & Steele, 1986), showing that mood does not account for affirmation results.

The fact that the effects obtained when the affirmation was administered after the threatening information (Study 1) as well as before the threatening information (Study 2) speaks to the robustness of the effect. Research has shown that a self-affirmation can reduce self-justifying behavior in cognitive dissonance studies regardless of whether it was provided before the dissonance-arousing act (e.g., Tesser & Cornell, 1991) or after the dissonance-arousing act (e.g., Steele & Liu, 1983). Yet, the question remains as to how the affirmation in Study 1

could reduce the defensive responses found in previous studies (Kunda, 1987; Liberman & Chaiken, 1992) when it was administered after the information was supposedly processed. As Kruglanski (1996) has argued, motivation can exert effects throughout the information-processing sequence, not just at encoding and storage but also at retrieval and integration. Given that the information in the article is continually reprocessed and reformulated until the participant is asked to report on the attitude (indeed, even after the attitude is reported, the information is still being processed), it is not surprising that a motivational manipulation could affect how threatening the health information was to a person's self-image. In this way, the self-affirmation, by reducing the threat in the information, made the individual more open to the risks contained in that information.

INTEGRATING THE SELF
INTO MOTIVATED INFORMATION
PROCESSING

Kunda (1990) highlighted the importance of motivated social cognition—understanding the processes by which motivations guide cognitive processes to a desired end (see also Baumeister, 1996; Dunning et al., 1995; Kruglanski, 1996). Individuals use information-processing strategies that lead them to a desired conclusion but do so in a manner that appears logical and correct to themselves and others. Thus, the defensive processing found by Kunda (1987) and Liberman and Chaiken (1992), which Study 1 replicated, is the result of the more stringent cognitive evaluations of the evidence among the coffee-drinkers relative to the non-coffee-drinkers. However, these cognitive processes are guided by motivational states. Hence, the self-affirmation manipulation reduced the need to critically examine and nullify the evidence and decreased the motivation to arrive at the preferred conclusion that the health information was unimportant. Indeed, the self-affirmation, across both studies, allowed individuals to accept the less-desired conclusions that they are potentially at risk for harmful diseases such as breast cancer or AIDS.

This analysis is possible when self-motives are integrated into motivated informational-processing models. That is, assessments of personal risk necessarily require the processing of information, such as recalling instances of dangerous behavior and integrating these memories with probability estimates for the potential risk (Linville, Fischer, & Fischhoff, 1993). In the assessment of risk, however, motivations to preserve self-image are invoked. As the individual tries to maintain an integrated self-image as moral and adaptive in regard to these health prospects, the information will be processed to result in desired ends (e.g., Ditto & Lopez, 1992; Kunda, 1987). Yet, if the motivational need to

maintain one's self-image is achieved via other means (e.g., a self-affirming activity), then the need to process the information defensively can be reduced.

CONCLUSION

If a health campaign is designed to promote the reduction of caffeine intake, then it is most important to target caffeine consumers. If a health campaign is designed to promote safer sex, then it is most important to target sexually active people. Although it is usually necessary and logical to target relevant groups for a health intervention, research has shown that high-relevance groups are often the least persuaded by threatening health appeals (Jemmott et al., 1986; Liberman & Chaiken, 1992; Morris & Swann, 1996), presenting an important obstacle in constructing a health campaign. Our research presents a strategy to overcome this obstacle. In Study 1, self-affirmation eliminated defensive responses by coffee-drinking women and increased their intentions to reduce caffeine consumption. In Study 2, self-affirmation increased the acceptance of an AIDS educational video by sexually active college students and led to greater perceptions of personal risk and AIDS-preventive behaviors. This research suggests that employing a self-affirmation as part of a health campaign by, for example, encouraging college students to reflect on their central values could reduce defensiveness and increase acceptance of important health information.

In summary, the present research explored the self-threatening implications of health messages. Communications in health domains are relevant to the self-image because they implicate important behaviors to the individual. Indeed, many behaviors potentially threatening to health, from smoking cigarettes or drinking coffee to sexual activity, originate from the need to maintain a valued self-image, such as appearing cool, suave, or sexy. Because people smoke or drink or have sex with self-image concerns at stake, it is important to consider the role of these behaviors in the individual's self-image. If these acts are relevant to the person, then this article offers an alternative to putting the person's self-image at stake; with the self-image bolstered by other means, the health message can become less threatening to the person, and the person, more accepting of the health message.

NOTES

1. This desire to maintain a positive self-image holds, in particular, for Western individuals (see Heine & Lehman, 1997, for a relevant cultural analysis of affirmation and dissonance).

2. Participants were told that, contrary to the conclusions of the article, current research on the caffeine/breast cancer link is inconclusive and contradictory. In particular, participants were told that some researchers (e.g., Tavani, Pregnolato, La Vecchia, Favero, & Franceschi, 1998) have shown that there is no effect of caffeine on breast cancer,

whereas other researchers (e.g., Wolfrom & Welsch, 1990) have suggested there may indeed be such a link.

3. The behavioral intention questions were asked of all participants. However, because the intention-to-reduce-caffeine-consumption questions are most relevant to the coffee-drinking participants, we only report those results. (The affirmation did not affect the non-coffee-drinkers, $F[1, 31] = 2.07, ns$).

4. Note that the thought-valence index formula results in participants who reported no thoughts yielding the highest possible thought-valence index (1.0). To combat this problem, the data were analyzed in a number of different ways. First, the cases where participants reported no thoughts were omitted ($N = 3$). Second, the analyses were run with an alternative thought-valence index (Positive issue-relevant thoughts + 1) / (Total issue relevant thoughts + 2); this alternative thought-valence index results in a score of .5 when participants report no thoughts. Finally, analyses were run using only the positive thoughts. In all cases, the results obtained did not differ significantly from the results reported in the text.

5. Mediation analysis (e.g., Baron & Kenny, 1986) reveals that the thought-listing did not mediate the acceptance of the article's conclusions because controlling for the relationship between thought-listing and acceptance did not diminish the strength of the relationship between affirmation condition and the acceptance of the article's conclusions (controlling for the thought-valence index reduced the β between affirmation and acceptance of the article's conclusions from -0.79 to $-0.74, z = .27, ns$) (Kenny, Kashy, & Bolger, 1998).

6. Whether participants received money or credit did not affect any of the results.

7. Four additional students who indicated that they had never engaged in intercourse were mistakenly run through the study, and their data are not included.

8. The choices in terms of personal values were distributed equally across conditions and did not interact with the affirmation manipulation.

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