
Changes in and Generalization of Unrealistic Optimism Following Experiences With Stressful Events: Reactions to the 1989 California Earthquake

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University students who experienced the 1989 California earthquake were asked a few days afterward to estimate the likelihood that they, the typical student at the school, and the average person their age would someday experience each of several negative life events, including being hurt in a natural disaster such as an earthquake. These responses were compared with those of a quasi-experimental control group of students 3 months later. Unrealistic optimism about being hurt in a natural disaster, as indicated by the difference between the subjects' perceived vulnerability for themselves and for others, was not apparent immediately after the earthquake. However, unrealistic optimism for this item was found 3 months later. Further analysis suggests that the loss of optimism after the earthquake was limited to natural disasters and did not alter perceived vulnerability to other negative events.

At 5:04 p.m. October 17, 1989, Northern California experienced an earthquake registering 7.1 on the Richter scale, the strongest quake to hit the state in 83 years. Millions of people throughout the San Francisco Bay Area witnessed the destruction firsthand or through media images of collapsed bridges and burning buildings. More than 60 lives were lost, hundreds were injured, and thousands of homes, stores, and offices were damaged or destroyed.

The California earthquake provides a unique opportunity to examine how people react to such an unexpected and tragic event and in particular the effects of this experience on the way we cope with the genuine but distant possibility of a life-threatening natural disaster. The study reported here is based on the growing body of research indicating that people often cope with potentially threatening situations by relying on what Taylor (1989) has identified as *positive illusions*. According to

this analysis, personal adjustment is not enhanced by a realistic grasp of the world but, rather, by maintaining a somewhat illusory perception that one is slightly more capable, more in control, and more likely to be fortunate than the average person.

One aspect of this theory that seems relevant to the issue addressed here is the extent to which people engage in what has been called *unrealistic optimism*. Several investigations have demonstrated that people typically see themselves as less likely than others to experience negative life events someday (Perloff & Fetzer, 1986; Weinstein, 1980, 1984, 1987). Subjects in these studies typically rate themselves as less likely than other people to fall victim to heart disease, a drinking problem, divorce, automobile accidents, and so on. Taylor (1989; Taylor & Brown, 1988) has identified this tendency as part of a pattern of positive illusions that help us cope with potentially threatening experiences. Although we know that these unfortunate events happen to some people, we convince ourselves that we are not likely to be among those victimized.

But what happens when we are confronted with information that contradicts these positive illusions? The case in point, the California earthquake, provides a particularly interesting challenge to the unrealistic optimism illusion. After the earthquake, media reports of toppled buildings and collapsed freeways challenged the belief

Authors' Note: This research was supported by the National Science Foundation, Grant #BNS-8718285. Correspondence about this article should be addressed to Jerry M. Burger, Department of Psychology, Santa Clara University, Santa Clara, CA 95053.

PSPB, Vol. 18 No. 1, February 1992 39-43
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of area residents that they were unlikely to be hurt or killed in the next earthquake. Nearly everyone at the university we examined had driven under the freeway that collapsed in the quake and had shopped in some of the stores that toppled onto patrons. The experience also made it difficult to ignore the ever-present possibility of another strong earthquake in the future. Reminders came in the form of frequent aftershocks, rising death toll figures, media reports of victims and destruction, and warnings from experts that an aftershock as strong as the initial quake was possible. Indeed, for several days there seemed to be no other topic of conversation.

The first question addressed by the study reported here was whether illusions about unrealistic optimism would be shattered or maintained following such an experience. One might argue that the anxiety associated with the earthquake would make the need for such illusions stronger. However, Taylor (1989; Taylor, Collins, Skokan, & Aspinwall, 1989) has argued that positive illusions are not delusions. Unlike delusions that increase in response to threat, illusions respond to the utility of the information. Although well-adjusted people typically interpret relevant information in an overly optimistic light, they do not ignore or deny important facts about their well-being. From this analysis we would expect earthquake victims to become more, not less, aware of the dangers associated with earthquakes. Relevant data on this question were reported by Dolinski, Gromski, and Zawisza (1987), who examined reactions among Polish students after their exposure to intense radiation following the Chernobyl disaster. The students, interviewed 1 week after the accident, believed they were *more* likely than the average student to suffer health problems as a result of the exposure. The researchers dubbed this reaction *unrealistic pessimism*.

Although there are some important differences in the nature of the disasters, we expected to find a similar reduction in unrealistic optimism for natural disasters such as earthquakes when we measured illusions a few days after the quake. We based this prediction on past research suggesting that focus of attention and cognitive accessibility are at least partly responsible for the unrealistic optimism effect. Researchers have argued that unrealistic optimism may be mediated by the extent to which people attend to or deny information about their vulnerability and risky behaviors (Kulik & Mahler, 1987; Weinstein, 1984). That is, because people do not attend to information about themselves or their own behaviors associated with vulnerability and risk, they see themselves as relatively less likely to suffer from the potential problem. Some evidence suggests that this process is helped along by motives to reduce anxiety and retain a sense of personal control (Taylor, 1989; Weinstein, 1984).

Further, nearly a decade of research in person perception has demonstrated that people do not use all knowledge equally when making assessments. Rather, we are more likely to rely on the material that is most cognitively accessible (Higgins, 1989; Higgins & Bargh, 1987). Among the variables that affect cognitive accessibility are the perceptual salience of the information and how recently and repeatedly the information has been brought to mind, or primed. We would therefore expect unrealistic optimism to increase or decrease as a function of how saliently and recently the individual has been exposed to vulnerability information.

In the case of natural disasters, people typically pay very little attention to information suggesting that they are as vulnerable as the next person. For example, one study found that Los Angeles students typically dealt with the possibility of a life-threatening earthquake by denying its probability or seriousness (Lehman & Taylor, 1987). However, in the case of the Chernobyl disaster and the California earthquake, the inattention to vulnerability information that ordinarily contributes to unrealistic optimism was replaced by highly accessible and very salient information about one's vulnerability. This flood of information should have made an optimistic outlook next to impossible.

But if illusions are shattered after such experiences, is the consequent lack of illusions a permanent condition, or do people develop new illusions? Taylor (1983) examined this question in breast cancer patients when illusions about controlling the cancer were disconfirmed, as with a recurrence of the disease. She found a remarkable "fluidity of cognitive adaptations." Women whose beliefs about controlling their cancer were disconfirmed responded by eventually developing new illusions about what they could control about the disease. This is part of the adaptive function of positive illusions. Similarly, we expected that the drop in salience of and attention to information about earthquake vulnerability that comes with time would eventually return people to their old patterns of selective attention and, consequently, unrealistic optimism.

The earthquake also provided us with an opportunity to examine yet another aspect of positive illusions. Would the predicted loss of unrealistic optimism concerning natural disasters like earthquakes generalize to other aspects of the subjects' lives? Specifically, we wanted to know whether the increased feelings of vulnerability people experienced after the earthquake would be accompanied by heightened perceptions of vulnerability to other negative life events, such as cancer, automobile accidents, and divorce. Interestingly, the students in the Chernobyl study maintained their illusions of invulnerability in other areas of their lives. These students felt

they were less likely than the average student to be robbed, to be hurt in a railway crash, to become the victim of a street accident, or to suffer from heart disease. It seems these students used the information about the disaster only to change their perceptions of experiences relevant to the disaster. Similarly, Kulik and Mahler (1987) found that students suffering from minor illnesses, such as flu, maintained their unrealistic optimism about the chances of suffering nonhealth problems. However, this optimism was not as strong when the ill students were asked about the possibility of suffering from health problems unrelated to their current complaint (such as a heart attack). Kulik and Mahler argue, consistent with our reasoning above, that the ill students' current health problems helped to focus their attention on their risky health behaviors and on health problems generally. However, because this attention was not focused on such problems as divorce and muggings, unrealistic optimism did not change in these nonhealth areas. Consequently, we expected that any changes in unrealistic optimism we found concerning earthquakes would not generalize to illusions about vulnerability in unrelated areas.

METHOD

Subjects

Forty-three upper-division psychology majors enrolled in a research methods course at Santa Clara University served as subjects. Santa Clara University is located approximately 17 miles from the earthquake's epicenter and near the midpoint between the epicenter and the collapsed freeway structure in Oakland. Twenty-four of the students were enrolled in the course at the time of the October 1989 earthquake. Nineteen students were enrolled in the same course the next quarter. All had been on or near the campus during the earthquake.

Procedure

Less than 72 hours after the October 17, 1989 earthquake, subjects enrolled in the course were asked to fill out a questionnaire as part of a class exercise. The questionnaire contained a list of nine negative life events. Eight of these were taken from Perloff and Fetzer (1986): cancer, heart attack, drinking problem, divorce, being mugged, injury in a car accident, hypertension, and nervous breakdown. We added to this list a ninth item (placed seventh in the list)—being "seriously hurt in a natural disaster (flood, earthquake, storm)." We chose to phrase the item this way in an effort to reduce as best we could any subject expectation or demand characteristics problems that might have been generated by asking about earthquakes directly. Subjects were asked to indi-

cate on a 7-point scale (1, *not at all likely*; 7, *extremely likely*) the extent to which they believed each of the events was likely to happen to them someday. Next, subjects were instructed to use the same scale to indicate the extent to which they believed each event would happen someday to the average student of their gender at the university and the extent to which they believed each event would happen someday to the average person of their gender who lived in the Santa Clara area.

Students enrolled in the same course the next quarter filled out the same questionnaire almost exactly 3 months after the earthquake. These students formed the quasi-experimental control group. We decided to use a quasi-experimental control group, rather than a within-subjects design in which we would have contacted subjects more than once, for several reasons. First, because coping with the earthquake was of paramount importance to most of the subjects (as contrasted with relatively superficial laboratory experiences), we feared that some subjects might think about and recall how they had completed the initial questionnaire if asked to complete an identical questionnaire later. Second, for the same reason, we thought that filling out the questionnaire might even alter the way the subjects thought about the earthquake, thus affecting responses on a follow-up questionnaire. Third, we wanted to use the exercise as an opportunity for subjects to learn something about how to conduct this type of research as well as to open up a discussion of their feelings about the earthquake. Consequently, we debriefed the initial group of subjects immediately after they completed the questionnaire, rendering the use of a follow-up questionnaire impossible.

In addition, the use of a quasi-experimental design seemed appropriate for our purposes. The composition of the two classes was nearly identical in all relevant aspects, including gender, age, major, and year in school. In addition, the same instructor taught the two classes in a nearly identical manner. Finally, the questionnaire was administered at almost exactly the same point in the quarter of the two classes.

RESULTS

As researchers have done in the past, we determined degree of unrealistic optimism by comparing subjects' estimates for their own likelihood of experiencing the negative event with the likelihood estimate they gave for the average student at the university and the average person their age. Our main dependent variable was derived from the estimates for being seriously hurt in a natural disaster, such as an earthquake. As shown in Table 1, subjects showed no evidence of unrealistic optimism on this item shortly after the earthquake. In fact,

TABLE 1: Mean Likelihood Estimates for Being Seriously Hurt in a Natural Disaster, Such as an Earthquake

<i>Time of Estimate</i>	<i>Self</i>	<i>Average Student</i>	<i>Average Person</i>
Three days after the earthquake	3.71	3.50	3.46
Three months after the earthquake	2.79	3.32	3.37

NOTE: Estimates could range from 1 to 7, higher numbers indicating greater perceived likelihood.

TABLE 2: Mean Estimates of Vulnerability to Negative Life Events 3 Days After the Earthquake

<i>Life Event</i>	<i>Self</i>	<i>Average Student</i>	<i>Average Person</i>
Cancer	3.67	3.88	4.04
Heart attack	2.33	3.17***	3.67***
Drinking problem	2.21	3.79***	3.79***
Divorce	2.75	4.04***	4.71***
Mugging	3.33	3.83**	3.92***
Car accident	5.00	5.17	5.25
Hypertension	2.88	3.63***	3.79***
Nervous breakdown	2.29	2.71*	3.08***

NOTE: Estimates could range from 1 to 7, higher numbers indicating a greater likelihood of the life event. Subjects' assessments of their own vulnerability were compared through dependent *t* tests with the estimates given for the average student and the average person; **p* < .10; ***p* < .05; ****p* < .01.

there was a nonsignificant tendency to see themselves as more vulnerable than the average student, dependent $t(23) = 1.42$, $p < .17$, and more vulnerable than the average person their age, dependent $t(23) = 1.45$, $p < .16$.

However, unrealistic optimism was found among the subjects tested 3 months after the earthquake. These subjects saw themselves as less likely to suffer from a natural disaster like an earthquake than the average student, dependent $t(18) = 2.04$, $p < .056$, or the average person their age, dependent $t(18) = 2.25$, $p < .04$. Consistent with this finding, subjects' estimates of their own likelihood of suffering in a natural disaster were significantly higher immediately after the quake than 3 months later, $t(41) = 2.56$, $p < .02$.

To answer the question about the generalizability of this effect, we examined unrealistic optimism for eight other negative events. As shown in Table 2, there was considerable evidence for unrealistic optimism on many of these items immediately after the earthquake. The pattern shown in the table is quite similar to that found by other researchers using similar populations in the absence of an earthquake (e.g., Perloff & Fetzer, 1986).

TABLE 3: Mean Estimates of Vulnerability to Negative Life Events 3 Months After the Earthquake

<i>Life Event</i>	<i>Self</i>	<i>Average Student</i>	<i>Average Person</i>
Cancer	4.00	3.95	4.37
Heart attack	3.00	3.42	4.11***
Drinking problem	2.16	4.26***	4.26***
Divorce	2.53	4.21***	4.63***
Mugging	3.53	3.68	4.00*
Car accident	4.74	4.74	4.74
Hypertension	2.95	3.84**	4.05***
Nervous breakdown	2.63	3.36***	3.79***

NOTE: Estimates could range from 1 to 7, higher numbers indicating a greater likelihood of the life event. Subjects' assessments of their own vulnerability were compared through dependent *t* tests with the estimates given for the average student and the average person; **p* < .10; ***p* < .05; ****p* < .01.

The pattern is also similar to that found in students' estimates 3 months after the earthquake. These data are shown in Table 3. When we compared subjects' estimates for their own vulnerability immediately after the quake with those given 3 months later, no significant differences were found on any of the items. Thus, there was no hint that the loss of unrealistic optimism for natural disasters like earthquakes found immediately after the earthquake generalized to any of the other areas of potential vulnerability that we examined. Rather, the subjects' belief that they were less vulnerable than other people in these other areas remained intact despite their experience with the quake.

DISCUSSION

The findings provide a relatively clear picture of subjects' reactions to the 1989 earthquake. Although they did not show the unrealistic pessimism found among the Chernobyl victims, the students who experienced the earthquake had their unrealistic optimism about earthquakes and other natural disasters shattered. However, sometime over the course of the next 3 months this optimism seemed to return. The data also indicated clearly that this loss of unrealistic optimism did not generalize to perceived vulnerability to other negative life events. After the earthquake the students still felt they were less likely than most people to suffer a heart attack, for example, or develop a drinking problem, or get mugged.

Although the data presented here do not address the question directly, they do provide some important information about the mechanisms underlying positive illusions in general and unrealistic optimism in particular. Our findings suggest that unrealistic optimism vanished

in the face of vulnerability information, only to return again after a period of time. Although motives such as the need to feel in control and the need to reduce anxiety quite probably play a role in the development and maintenance of these illusions, they apparently were not strong enough to overcome the flood of vulnerability information that abounded in the days following the earthquake. Indeed, the findings suggest that unrealistic optimism did not operate like a delusion in this case but, rather, more like the information-sensitive illusions Taylor (1989) describes.

We argue that changes in unrealistic optimism over time may be a function of attention to and cognitive accessibility of information concerning one's vulnerability to a particular event. The postearthquake environment forced our subjects to attend to the highly accessible information concerning earthquake vulnerability. We might speculate that highly accessible pessimistic information concerning radiation-related health problems led to the overly pessimistic assessments by the Chernobyl victims. However, as time passes, attention to vulnerability information diminishes as reminders of the disaster occur less frequently. It is also possible that changing one's behavior, such as engaging in earthquake preparedness, could contribute to this change in perceived vulnerability. Consistent with our analysis, such behavior might focus people's attention on their risk-prevention actions rather than forcing them to rely on the denial that seems to typify many Californians' approach to earthquakes.

One limitation of the study is that we asked subjects about natural disasters like a flood, earthquake, or storm, rather than about earthquakes specifically. Consequently, we are not able to identify the extent to which an experience with one natural disaster affects perceived vulnerability to other disasters; subjects may have been thinking only about earthquakes when responding to this item. One possibility is that an experience with one type of disaster may affect perceived vulnerability to other disasters to the extent to which the person categorizes the events together. This suggestion is consistent with Kulik and Mahler's (1987) finding that experiences with minor health problems lowered unrealistic optimism for other health problems but not for nonhealth problems. At any rate, at this point the answers to these questions await future investigations.

Finally, these findings also raise the question of the value of positive illusions (Baumeister, 1989). Unrealistic optimism is positive to the extent that it helps reduce anxiety. However, the other side of this illusion is that

people may fail to take adequate precautions to avoid negative events in the future. For example, Burger and Burns (1988) found that the more female college students experienced an unrealistic optimism about their chances of becoming pregnant, the less likely they were to use contraception. Similarly, community leaders in the San Francisco Bay Area have been concerned about how quickly efforts to prepare for the next big earthquake have diminished since the October 1989 quake. A survey taken 2 months after the earthquake found that Bay Area residents were considerably less concerned about preparing for future earthquakes than they had been shortly after the quake (Farragher, 1990). Although this "out of sight, out of mind" effect makes living in earthquake country easier, the continental plates continue to move.

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