
PSYCHOLOGICAL IMPLICATIONS OF NUCLEAR ACCIDENTS: THE CASE OF THREE MILE ISLAND*

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FOUR years ago the Three Mile Island accident was just ending its acute stage. This morning I shall talk to you about the study that my colleagues and I did for the President's Commission that was formed to investigate that accident. The investigation itself will be the point of departure for discussion of psychological implications. It has been described in more detail elsewhere.¹

I was first called about forming a Task Group on Behavioral and Mental Health Effects in the middle of June of 1979, and my colleagues and I met for the first time in July. The Task Group consisted of my late wife, Barbara Dohrenwend, George Warheit from the University of Florida at Gainesville, and Stanislaus Kasl from Yale. We also had a group of collaborating researchers, most of them scholars who lived in the Three Mile Island area and had started to collect data almost immediately after the accident. These were Glenn Bartlett, Rupert Chisholm, Ray and Karen Goldstein, and a graduate student of my wife's at the time, John Martin.

The Task Group was the last to be formed. The commissioners had a number of other questions about physical health and safety that they first wanted to answer. Meeting for the first time in July, we found ourselves confronted by the imminent deadline date of the middle of September. A deadline like that serves to focus one's thinking. It keeps one concentrated on simple, clear questions.

Let me start with a photograph that I think will be familiar to most of you, an aerial view of Three Mile Island. The island is about eight miles from the airport and this is approximately what we saw when we made our first trip to the area. At the time, it was very hard to view those funnel towers as anything but cannons pointed in our direction. But, of course, it

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Fig. 1. Three Mile Island

was not always so; and the important point I want to make with regard to this photograph is that, far from being ominous, those plants, by all accounts, were welcomed by the people in the surrounding area as economic assets.

The next figure is a map of the area within a 20-mile radius of Three Mile Island. Harrisburg is the capital of Pennsylvania, and the population within that 20-mile radius was a little less than 750,000 at the time of the accident. The inhabitants were mainly white Protestants, middle and lower middle class—Middle American and conservative politically. The five mile area closest to Three Mile Island contained less than 5% of the population within the 20 mile radius. That is important to recall. By and large, the most pronounced results were within the five-mile radius that contains a very small minority of the sample of the population within the 20-mile radius that we studied.

In all, we collected data—mostly by telephone interviews, sometimes by face to face interviews or mailed questionnaires—from more than 2,500 people. The studies and the samples involved are summarized in Table I.

Table I shows the times of data collection and the groups involved.

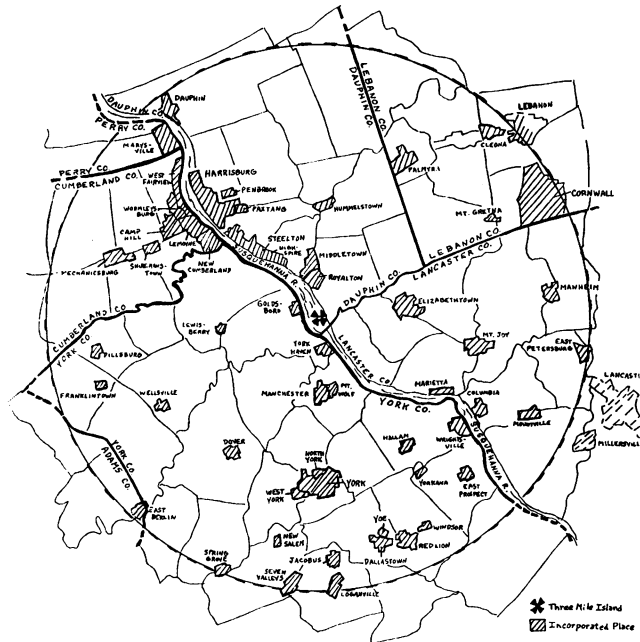


Fig. 2. Twenty-mile radius of Three Mile Island. Counties and incorporated places

They consisted of three samples of male and female household heads, ranging in size from 50 to 380. The small, early samples comprised about 50 people each, and, fortunately for us, one was drawn in April, right after the accident occurred, the other in May. A larger sample of about 350 was drawn in July. The second major sample consisted of mothers of preschool children drawn from birth announcements in the local newspapers, dating back to February 1977, and continuing through June 1979. A sample of 165 mothers was drawn in May, and another of 260 mothers was drawn in July from the area. A similar sample of 328 mothers of young children was drawn in July from Wilkes-Barre, about 80 miles away, as a control sample.

In addition, 632 teenagers were studied. They were from the seventh, ninth, and 11th grades, and resided in the school district closest to Three Mile Island, the Lower Dauphin School District. More than 300 workers from Three Mile Island and 250 from a control plant called Peachbottom, about 40 miles away, were also interviewed, and we also collected interview data from 198 clients from two community mental health

TABLE I. COMPLETED SAMPLE SIZES AND COMPLETION RATES ACCORDING TO TIME OF STUDY, PLACE OF STUDY, AND TYPE OF RESPONDENT.

<i>Dates in 1979</i>	<i>General population: male and female heads of household within 20 mile radius of TMI</i>	<i>Mothers of preschool children sampled from birth announcements in Harrisburg newspapers</i>	<i>Mothers of preschool children sampled from birth announcements in Wilkes-Barre newspapers</i>	<i>TMI workers</i>	<i>Peach Bottom workers</i>	<i>7th, 9th, 11th graders in Lower Dauphin</i>	<i>Clients of community mental health centers</i>
Prior to 3/28		No studies in this period					
3/28 Accident - 4/10 Reopening of schools		No studies in this period					
4/10-4/30	50 (.67)*	—	—	—	—	—	—
5/1-5/31	54 (.67)*	165 (.79)**	—	—	—	632 (.91)	—
6/1-6/30	—	—	—	—	—	—	—
7/1-9/5	380 (.65)	260 (.79)**	328 (.66)	—	—	—	198 (Sample of convenience)
8/20-9/29	—	—	—	305+ (.57)+	258# (.53)#	—	—

Percents in parentheses indicate completion rates for each sample; usually about half to two thirds of those not obtained were refusals, except among the nuclear workers where refusals constituted 40-45% of the total number of persons with whom interviews were not obtained

*Overall completion rate for April and May combined.

**Overall completion rate for May, July, and August combined.

+Does not include 28 workers interviewed between 10/1 and 10/10 in a special follow-up study of a subsample of nonrespondents.

#Does not include 30 workers interviewed between 10/1 and 10/10 in a special follow-up study of a subsample of nonrespondents.

centers, most of whom suffered from chronic mental disorders. We did this study of patients to be able to calibrate our measures of distress. We wanted to know what a high score on the scale of distress was, and we used the scores of the patients, presumably under distress, as an indication. We calibrated the scales against the responses of the known distressed groups of psychiatric patients.

Let me give you some excerpts from an account of the accident as it was reconstructed by the President's Commission. I quote now from the Commission report—their reconstruction of the sequence of events that defined the accident.²

In the parlance of the electric power company, a "trip" means a piece of machinery stops operating. A series of feedwater system pumps supplying water to TMI steam generators tripped on the morning of March 28, 1979. The nuclear plant was operating at 97% power at the time. The first pump trip occurred at thirty-six seconds after 4:00 a.m. When the pumps stopped, the flow of water to the steam generators stopped. With no feedwater being added, there soon would be no steam, so the plant's safety system automatically shut down the steam turbine and the electric generator it powered. The incident at Three Mile Island was two seconds old.

Friday, March 30. Governor Thornburgh convened a meeting of key aides to discuss conditions at Three Mile Island. During this meeting, at about 11:40 a.m., [Commissioner] Hendrie, [the Chairman of the Nuclear Regulatory Commission at the time,] again called the Governor. As Gerusky [who was Director of the Bureau of Radiation Protection of the State] recalls the conversation that took place over a speaker phone, the NRC Chairman apologized for the NRC staff error in recommending evacuation. Just before the call, Emmett Welch, an aide to Gordon MacLeod [the Secretary of Health at the time] had renewed the Secretary of Health's recommendation that pregnant women and children under age two be evacuated. Thornburgh told Hendrie of this. Gerusky recalls this response from Hendrie: "If my wife were pregnant and I had small children in the area, I would get them out, because we don't know what is going to happen."

After the call, Thornburgh decided to recommend that pregnant women and preschool children leave the region within a five-mile radius of Three Mile Island, and to close all schools within that area. He issued his advisory shortly after 12:30 p.m.

Thornburgh was conscious throughout the accident that evacuation might be necessary, and this weighed upon him. He later shared some of his concerns in testimony before the Commission. He said: "There are known risks—I was told—in an evacuation. The movement of elderly persons, people in intensive care units, babies in incubators, the simple traffic on the highways that results from even the best of an orderly evacuation, are going to exert a toll in lives and injuries. Moreover, this type of evacuation had never been carried out before on the face of this earth, and it is an evacuation that was quite different in kind and

quality than one undertaken in time of flood, hurricane, or tornado. When you talk about evacuating people within a five-mile radius of the site of a nuclear reactor, you must recognize that that will have ten-mile consequences, twenty-mile consequences, one-hundred-mile consequences. This is to say, it is an event that people are not able to see, to hear, to taste, to smell.”

Friday, March 30. The schools closed after the Governor’s advisory. Pennsylvania State University called off classes for a week at its Middletown Campus.

Saturday, March 31. The great concern about a potential hydrogen explosion inside of the TMI 2 reactor came with the weekend. That it was a groundless fear, an unfortunate error, never penetrated the public consciousness until afterward, partly because the NRC made no effort to inform the public that it had erred.

Sunday, April 1. By late Sunday afternoon, NRC, which was responsible for the concern that the bubble might explode, knew there was no danger of a blast and that the bubble appeared to be diminishing. It was good news, but good news unshared with the public. Throughout Sunday, the NRC made no announcement that it had erred in its calculations, or that no threat of an explosion existed.

Governor Thornburgh was not told of the NRC miscalculation either, nor did the NRC reveal the bubble was disappearing that day, partly because the NRC experts themselves were not absolutely certain.

Wednesday, April 4. The schools outside the five-mile area surrounding TMI reopened. The curfews were lifted, but Schools within five miles of the island remained closed, and the Governor’s advisory remained in effect for pregnant women and preschool children.

On Saturday, April 7, Kevin Malloy, at the request of the Governor’s Office, read a press release announcing the closing of the evacuation shelter, the Hershey Park Arena. Not until two days later, however, did Governor Thornburgh officially withdraw the advisory.

THE MAIN QUESTIONS WE ASKED

We asked the following questions: Were there mental health and behavioral effects directly attributable to the accident itself? If so, were they transient or persistent?

The behavioral and mental health effects that we had time to analyze, and for which reliable measures could be developed, were in such areas as the following: Recall of immediate upset at the time of the accident; perceived threat to physical health; attitudes toward continuing to live in the Three Mile Island area; attitudes toward nuclear power, including Three Mile Island; a type of nonspecific psychological distress that we prefer to describe using Jerome Frank’s term “demoralization.”^{3,4} And, finally, questions about distrust of authorities—the government, the company, and nuclear authorities.

TABLE II. ESTIMATES OF PROPORTIONS OF GENERAL POPULATION SAMPLE AND OF SAMPLE OF MOTHERS OF PRESCHOOL CHILDREN LIVING WITHIN 20 MILES OF TMI WHO LEFT ON EACH DAY DURING THE ACCIDENT.

Day	Percent of leavers	
	General population sample (13% have preschool children)	Sample of mothers of preschool children
3/28	2.4	2.0
3/29	2.4	6.2
3/30	59.5	65.8
3/31	17.0	14.0
4/1	10.5	7.8
4/2	4.9	3.6
4/3	3.2	0.7
Percent who left	51.8	72.4
Percent who stayed	48.2	27.6

The threat factors that we examined, to see whether these outcomes, behaviors, attitudes, and symptoms varied with them, were factors dictated by the social reality of the way the accident was portrayed by the highest authorities in the state, including the Governor himself. They were embodied in the terms of his advisory, and consisted of living within five miles of Three Mile Island, or having one or more preschool-age children in the home, or both. In the study of teenagers, we added membership in a family that left the area during the crisis versus membership in a family that stayed, because a teenager, unlike an adult family head, had no control over that decision. We did not have enough cases of pregnant women to study that factor in this research.

Our strategy of data analysis relied on a general linear model that allowed us to assess the effect of one factor while holding the other relevant factors, such as sex, age, marital status, level of education, and the other risk factors constant. The procedure has been variously called dummy variable multiple regression analysis or nonorthogonal fixed effects analysis of variance. The results that I shall review were all significant at the 0.05 level or better although, of course, the multiple tests that we conducted reduces that a little.

Let me start with some actual behavior, that of staying or leaving the area during the crisis. This is not so much to indicate how many stayed or how many left, but to demonstrate that these factors varied with the social definition of the threat, with the threat as officially defined.

Table II demonstrated that the tremendously large group who left did so right at the time of the Governor's advisory. This was not hysteria or

TABLE III. ESTIMATES OF PROPORTIONS OF PERSONS IN THE POPULATION LIVING AROUND THREE MILE ISLAND WHO LEFT THE AREA AT THE TIME OF THE ACCIDENT

<i>Type of person</i>	<i>% who left</i>
Men	41
Women	57
Married	57
Not married	38
Less than 65 years old	53
65 or older	42
Not a college graduate	59
College graduate	50
<i>Condition Related to TMI</i>	
Home 5 miles or less from TMI	62
Home more than 5 miles from TMI	48
Preschool child in family	77
No preschool child in family	48

panic. It was a rational response to a directive from the highest authority in the state. One might also note that the percent who were mothers of preschool aged children left in higher proportions than the general population sample, in which about 13% had preschool-age children. Again, the action corresponds to the social definition of the threat by authority; although the threat did not involve tangibles such as fire, flood, and so on, it was no less real to the persons actually involved in the Three Mile Island crisis.

Table III is simply another example of variation in the behavior of staying or leaving depending on presence of the socially defined risk factors. If one lived within five miles of Three Mile Island, one was more likely to leave. If one had a preschool age child in the home, one was more likely to leave—again, in a regular and rational response to an officially defined threat.

I want to focus especially now on two sets of results: One set on the nonspecific distress that I call “demoralization”; the other, on distrust. I shall have less to say about the other outcome variables, but results on them are contained in the full report.

Table IV describes the symptoms that we asked about in our measure of nonspecific distress or demoralization. There are 26 such symptom items about which we elicited information in most of the samples studied. High scores on this symptom scale are in some ways analogous to body

TABLE IV. ITEMS IN THE DEMORALIZATION SCALE OF NONSPECIFIC PSYCHOLOGICAL DISTRESS

Demoralization

1. How often since TMI have you had times when you couldn't help wondering if anything was worthwhile any more? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
2. Since TMI, how often have you felt that nothing turns out for you the way you want it to, would you say? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
3. Since TMI, how often have you felt completely helpless? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
4. Since TMI, how often have you felt completely hopeless about everything, would you say? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
5. Since TMI, how often have you feared going crazy, losing your mind? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
6. Since TMI, how often have you had attacks of sudden fear or panic? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
7. Since TMI, how often have you feared something terrible would happen to you? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
8. Since TMI, how often have you felt confused and had trouble thinking? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
9. Since TMI, how often have you had trouble concentrating or keeping your mind on what you were doing? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
10. Since TMI, how often have you been bothered by feelings of sadness or depression, feeling blue? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
11. Since TMI, how often have you been in very low or low spirits? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
12. Since TMI, how often have you felt like crying? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
13. Since TMI, how often have you felt lonely? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
14. Since TMI, how often have you had frightening dreams? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
15. Since TMI, how often have you feared getting physically sick? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
16. Since TMI, how often have you felt anxious? (5 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
17. Since TMI, how often have you been bothered by feelings of restlessness? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)

18. Since TMI, how often have you feared being left all alone or abandoned? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
19. Since TMI, how often have you been bothered by acid or sour stomach several times a week, would you say? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
20. Think of a person who is the worrying type, a worrier. Is this person (4 very much like you; 3 much like you; 2 somewhat like you; 1 very little like you; 0 not at all like you)?
21. Since TMI, how often has your appetite been poor? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
22. Since TMI, how often have you been bothered by cold sweats? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
23. Since TMI, how often did your hands ever tremble enough to bother you, would you say? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
24. Since TMI, how often have you had trouble with headaches or pains in the head? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
25. Since TMI, how often have you had trouble with constipation? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)
26. Since TMI, how often have you felt you were bothered by all different kinds of ailments in different parts of your body? (4 very often; 3 fairly often; 2 sometimes; 1 almost never; 0 never)

Scoring notes: All items are scored in the same direction on a five-point scale.

Internal consistency reliability: Above 0.90 in all samples.

Interpretation: These 26 items are a sample from a larger set of items that have been developed in the Social Psychiatry Research Unit, Department of Psychiatry, Columbia University, to measure demoralization.⁴ The 26 items correlate .98 with a composite scale formed from the larger set of demoralization scales.

temperature: when it goes up, one knows something is wrong. One does not know what is wrong or how serious it is until one knows a great deal more about the circumstances under which it occurs, its persistence, and so on.

Figure 3 shows our results from samples from the general population. The mean score obtained by the mental patients was 28, so we take that as evidence of high distress. As one can see, distress was very high in our April sample, very high indeed. We estimated, in fact, that directly as a result of the accident, there was an increment at the time of at least 10 percent of the population who were showing distress at or above the level shown by mental patients. As one can also see, however, the high levels of distress plunged down almost immediately, within weeks after the

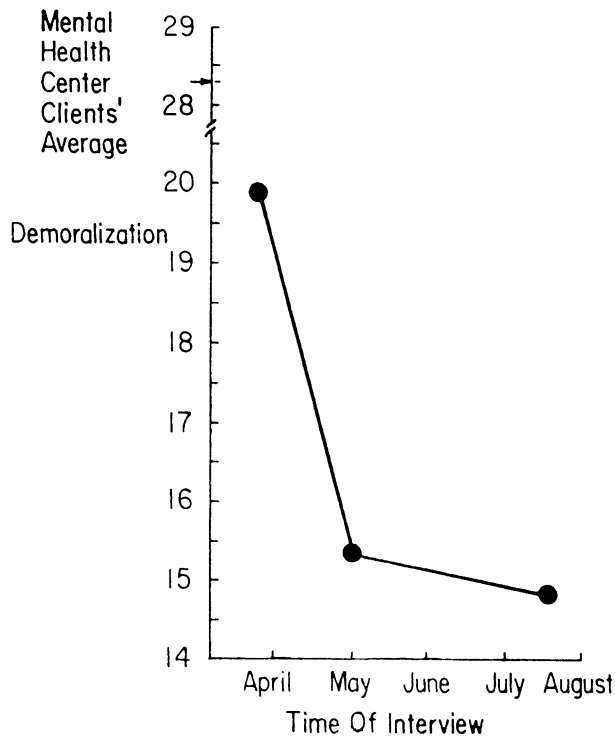


Fig. 3. Relation of time of interview to level of demoralization in the general population. Reproduced by permission from Dohrenwend, B. P., Dohrenwend, B. S., Warheit, G. J., et al.: *Stress in the Community: A Report to the President's Commission on the Accident at Three Mile Island. Ann. N.Y. Acad. Sci.* 365: 159-74, 1981.

accident. If we had not taken that April measure, we would, in point of fact, have missed the elevation in distress. Without the April measure, we would have had to rely, as other studies have done, on retrospective reports, which are not all that satisfactory when one talks about symptoms of stress. The reason we infer that the elevated distress not only decreased but returned to baseline is that we got no difference on this measure between our Wilkes-Barre mothers and our Three Mile Island mothers when measured several months later.

When it occurred, distress varied with risk factors. If one lived within five miles of Three Mile Island, distress tended to be significantly higher than if one did not. If one had preschool-age children in the family, one's distress was likely to be considerably higher than if one did not. If one were a teenager in school with a family within the five miles or had a

preschool child in the family, distress was higher. And it was likely to be higher if one lived in a family that moved rather than stayed. This last finding was something of a surprise; we did not know which way it would go because we thought that either staying or leaving could be stressful.

I have so far not mentioned the results for the nuclear workers.^{1,5} They were very different indeed from the other groups we studied. The Three Mile Island workers whom we studied in August, the last study we did, were higher on distress than the Peachbottom control workers. Apparently there was considerably more persistent distress in this group than in our other samples. In retrospect, their predicament vastly differed from the predicament of the general population or the mothers, and not only did their level of distress remain high, it did not vary with the risk factors that proved so potent in the other groups. Living within five miles of Three Mile Island and having preschool-age children made no difference to the distress of the workers. And there was no resolution of their predicament with the withdrawal of the governor's advisory.

Other people who have worked in the area since we did our work find recurrences of distress in the general population. They found elevations, for example, nine months to a year after the accident, in quite good, careful research on this type of measure of distress^{6,7} and, in fact, on measures of clinical anxiety and depression.⁶ My inference is that the things that have happened since we did our research have rekindled these stress reactions and I shall speculate later on what those things are; meanwhile, I think that there is a strong clue in the next set of results.

In this regard the next measure that I want to consider is a measure of distrust/trust in authority. It consists of a four-item scale composed of the following questions: Do you feel the information you were getting from the State and Federal authorities during the Three Mile Island crisis was truthful? Do you trust utility companies regarding the safety of nuclear energy? Do you think federal officials have been truthful regarding radiation dangers of the Three Mile Island incident? Do you trust the federal government regarding the safety of nuclear energy?

This scale is scored one to three, one being maximum trust and three being maximum distrust. In April distrust in our general population sample was very high. It later dipped, but not much. It remained high as of our last measurements. Unlike our measure of nonspecific distress, distrust did not go down. And when we compare, as best we can, the attitudes of distrust in the Three Mile Island population with opinion polls on trust, nuclear attitudes, and so on, at the time, there is every evidence

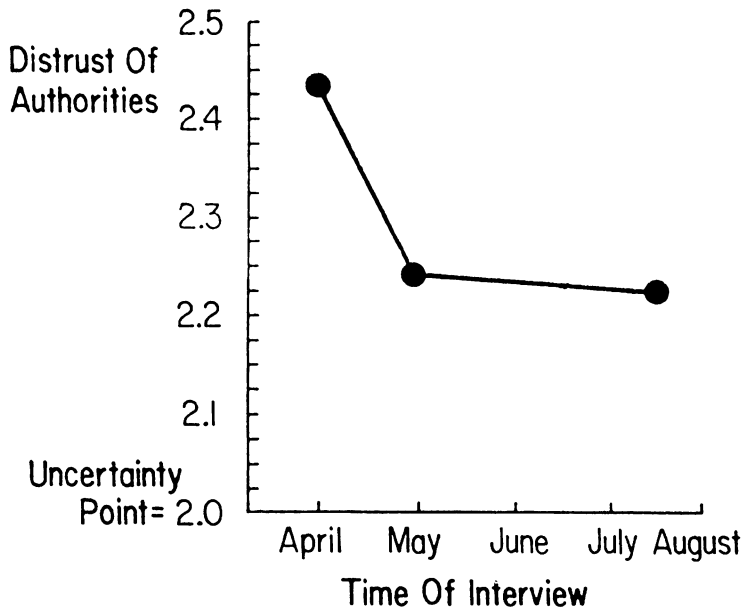


Fig. 4. Change in distrust of authorities from April to August 1979 in general population in area of Three Mile Island. Reproduced by permission from Dohrenwend, B. P., Dohrenwend, B. S., Warheit, G. J., et al.: Stress in the Community: A Report to the President's Commission on the Accident at Three Mile Island. *Ann. N.Y. Acad. Sci.* 365: 159-74, 1981.

that it was far higher than in the general population outside of Three Mile Island.¹ So here we have high levels of distrust remaining, not dissipating, the way the distress reactions appeared to do.

The levels of distrust varied with the risk factors. If the mother of a preschool-age child or if one lived within five miles of Three Mile Island, one was likely to show more distrust. Distrust was also highest among those lowest in educational levels, suggesting that distrust had deep roots in the population and was hardly a monopoly of college educated activists.

Fluctuations in attitudes toward physical health, attitudes toward continuing to live in the Three Mile Island area, other things that we measured, were intermediate between these two extremes of transient nonspecific distress and persistent distrust. They elevated and went down—nowhere near so sharply as distress, but considerably more sharply than distrust.

I have discussed general population groups within a radius of 20 miles of Three Mile Island. I would like to focus for a moment on a little

community located for the most part within the five-mile radius. It is called Newberry, and its residents conducted, with some help from one of our collaborating researchers, a telephone survey before the President's Commission report appeared. Among the questions asked were: "If the President's Commission indicates that your health has not and will not be endangered, will you support an independent health monitoring program in this area, involving intensive psychiatric interviews and physical examinations?" 85% said "yes." 9% said "Don't know." 5% said "no." These data from Newberry Town underline what I reported on distrust in the larger region around Three Mile Island.

In closing, I should like to describe some reactions in the press to the President's Commission report in general and to our contribution to it. Consider *The New York Times*, which I ordinarily dearly love but not at this particular moment. In their editorial on October 31, just after the report came out, the second paragraph of the lead editorial asked:

How serious was the accident last March? The Commission, headed by John Kemeny, President of Dartmouth, concludes it will end up being extremely costly, from \$1 to \$2 billion for clean-up and purchase of replacement power, but the radiation releases will have a "negligible effect" on public health. Beyond severe but short-lived stress for nearby residents, the accident was not all that damaging to the public.

The *Times* was fastening on that transient distress response. Consider their editorial on November 4th:

Who can forget the apprehension that gripped the nation as the events of Three Mile Island unfolded last March? At movie theaters around the country, *The China Syndrome* was depicting a near disaster at a nuclear plant. Then suddenly it came to life; and yet the Presidential Investigating Commission now tells us the accident was much less alarming than originally feared. Despite equipment failures and human blunders that caused extensive plant damage, it caused little real harm to the public.

In other words, if there are no broken bones, blood, and so on, the harm is not real.

Compare these two *New York Times* editorials to an editorial from *The Patriot*, in Harrisburg, within the area, of August 11, 1979. *The Patriot* editorial goes:

In our view, any decision in regard to the restarting of the power stations on Three Mile Island which ignores or whitewashes the trauma inflicted on the people of this region by the accident, or ignores their understandable fear and apprehension of living with the prospect of a repeat performance, qualifies as a negligent and criminal act of omission. This area has paid its dues to the nuclear age with an unprecedented dose of mental anguish that no one who was here

will ever forget. Add to that the physical toll from this psychic overexposure, and one has the sum of an experience that only cruel or callous indifference would repeat.

Well, if these *New York Times* and *Patriot* editorials are put next to each other and taken seriously, one must infer at the very least failure of empathy by an important part of the outside world looking in.

And where does that leave us today? Fortunately, still another piece in *The New York Times* sums it up for us. This is March 27, 1983, not the editorial page, but *The News of the Week in Review*:

Fear and chronic stress are key issues in whether the General Public Utilities Corporation, which owns Three Mile Island, can restart the Unit 1 reactor, the undamaged twin to crippled Unit 2. Last year, a federal appeals court upheld a ruling that called for the Nuclear Regulatory Commission to weigh the possible psychological damage of a start-up to people near the plant. The case, brought by a citizens' group, is before the Supreme Court.

For people of the region, then, the accident at Three Mile Island is a continuing nightmare. The promise of aid is highly suspect, or has not materialized. Studies point to chronic stress, but there are no special clinics or 24-hour telephone services for those in need. Residents have tried to take things into their own hands, with mixed results. In May, 1982, Middletown, Harrisburg, and surrounding counties voted two to one in a nonbinding referendum to permanently shut down the Unit 1 reactor. Plans for its reactivation, however, have pushed ahead.

In very brief summary, it seems that events since the accident have been experienced in the context of continued high levels of distrust with the result that stress and consequent distress have recurred. And what we have in larger terms, I think, is a classic issue in high magnification here: Two sets of values, each of them unimpeachable in itself, each of them fine in itself but for the fact that they conflict with each other. One is the value of technological progress in our society. The other is the value of public health and safety. They have met on what appears to be a near collision course around the issue of Three Mile Island.

It is a situation where it is still very important to sort out facts from fantasy. This will not be done by ignoring the distrust that the Three Mile Island situation engendered within five miles, within 20 miles, and perhaps, as Governor Thornburgh suggested, within much wider areas than these.

Questions and Answers

DR. STANLEY GOLDSMITH (Mt. Sinai Medical Center): I found your presentation quite disappointing. I was amazed at the bias built into your

study. I do not doubt for a moment that there is reason for distress and concern when the governor of a state gets on the radio and advises evacuation. Your questionnaire reinforces all of the stressful factors which these people had experienced. I would suggest that a more appropriate study would have a better balance of questions providing an opportunity for positive responses too.

DR. DOHRENWEND: The opposite of distrust is trust, and the scale gave ample room for people to say how trusting they were. The opposite of unfavorable attitudes toward living in the area was favorable, and those were represented in the scales.

MR. MARK BARNETT (Food and Drug Administration): One of the things you measured about people's attitudes around Three Mile Island was whether or not they trusted the experts. In this case the experts included the utility company, the scientists, and the government people. There is a big difference between believing that the scientists don't know the answers and believing that they know the answers but aren't telling the truth. Did you go beyond the simple question of trust versus nontrust to find out whether the residents believed that the experts themselves actually knew enough about radiation safety and about what was going on in the reactor?

DR. DOHRENWEND: I think that is a very important point, and we did not ask enough on that. Most of our interviews were telephone interviews. We could not talk for more than a half hour and avoid breakoffs. So there were a great many things that we would have liked to do that we did not; and that, I think, would have been an extremely important one, to not only know the level of distrust but to have some feeling as to what the indictment was.

DR. EDWARD ELKIN (New York State Health Department): Some of your reports regarding the Commission's findings with respect to the whole issue of empathy and how mental illness is viewed were not surprising, given the fact that from the time a medical student enters the field of medicine emotional illness is certainly not dealt with in the same fashion as physical illness.

I think it is very important that people like yourself continue to stay publicly active in this particular arena, because it seems that these commission reports are published, filed away in some archives, and everybody forgets about them, only to be surprised 10 or 20 years later, when the same thing happens again. Why is it so difficult to get people who have been doing this work and presenting their information at academic meetings like this to get themselves really involved in the political system so

that the public can begin to understand some of the ideas that have come from studies like yours?

DR. DOHRENWEND: That is a hard question. It has to do, in my case, with my career. This was a time out of my life. I have my research programs and teaching. I took the time to do this. There is, of course, always that misguided faith that if one writes things down and publishes them, people will read them and see some implications. I know that it is unrealistic. It is unrealistic even within our own fields. There is usually a lag of four or five years before an important finding gets taken up; where policy is concerned, one really cannot afford that.

DR. ELKIN: Do you not, in fact, have a certain social responsibility to speak out on these issues long after you have completed your study?

DR. DOHRENWEND: It is very difficult to get some of these points across. For instance, that point on distrust, which we considered one of the major findings, perhaps *the* major finding, at least in terms of policy implications. No newspaper picked it up at the time of the Commission's report, and it was not in the summary of the Commission's main findings; rather, the transient distress was. There is a tendency not to want to see some of these things. People are uncomfortable with a variable such as distrust of authority. However, if officials get shouted down often enough at public meetings, and referenda come out two to one against official policies, some of the consequences of distrust then become obvious and can no longer be ignored.

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