Soc Psychiatry Psychiatr Epidemiol (1993) 28: 49–55

Social Psychiatry and
Psychiatric Epidemiology

Predictors of temporal patterns of psychiatric distress during 10 years following the nuclear accident at Three Mile Island

M. A. Dew[1] and E. J. Bromet[2]

[1] Departments of Psychiatry, Psychology and Epidemiology, University of Pittsburgh School of Medicine, Pittsburgh, Pennsylvania, USA
[2] Department of Psychiatry and Behavioral Science, State University of New York at Stony Brook, New York, USA

Accepted: February 2, 1993

Summary. The present study examines psychiatric symptom levels during a 10-year period in a community sample of mothers of young children. All were identified in the early aftermath of the 1979 Three Mile Island nuclear accident, and followed through the accident's 1989 anniversary. Cluster analysis was used to identify long-term distress profiles during the study period; women's temporal profiles were found to be either (a) stable and at low, clinically nonsignificant levels of distress across all measurement points or (b) at consistently elevated, clinically significant levels that varied with the timing of postaccident events such as the restart of the undamaged reactor and the 10th anniversary. Subsequent multivariate analyses indicated that preaccident characteristics, as well as parameters reflecting respondents' initial involvement with, and reactions to the accident, were important for distinguishing between women within the two temporal profile groups. Implications of the results for both policy formulation and continued research on significant environmental stressors is discussed.

Over 13 years have passed since the nuclear accident at Three Mile Island (TMI) in central Pennsylvania. The accident, which was characterized by a President's Commission report as the "worst . . . in the history of commercial nuclear power generation" (Kemeny 1979, p 35), has unfortunately been superseded by the devastation at Chernobyl. Nevertheless, at the time, the TMI accident had dramatic and immediate mental health effects among the population living in the region (Bromet et al. 1982; Dohrenwend et al. 1979; Houts et al. 1981). Moreover, like many disasters – including Chernobyl – the TMI accident was transformed from an acute event into a situation of long-term chronic stress. Thus, in ensuing years, there have been intermittent radiation leaks, persisting difficulties with the cleanup operations, media reports about presumed health effects and plant-related problems, and public controversy surrounding an extended legal battle and eventual U.S. Supreme Court decision allowing the undamaged TMI Unit-1 reactor to be restarted. Finally, the 10th anniversary of the accident in March 1989 was marked by community protest events and renewed media coverage of the public health significance of the accident.

The prolonged effects of this chronically stressful situation on community residents' psychological and psychophysiological well-being have been documented (e.g., Baum et al. 1983; Davidson and Baum 1986; Dew et al. 1987a, c; Gatchel et al. 1985), as have the enduring effects on residents' beliefs about personal risks and attitudes toward nuclear power (Dew et al. 1987b; Prince-Embury 1991). The bulk of empirical research on long-term effects has focused on identifying variables that predict – or at least correlate cross-sectionally with – exacerbations in psychological distress following new developments in the TMI saga. For example, we identified mental health history and other psychosocial variables that correlated with area residents' psychiatric distress levels in the short-term (9–12 months) following the accident (Bromet et al. 1982; Dew et al. 1987a); we examined similar variables as predictors of psychiatric symptomatology in the long term (30–42 months postaccident; Dew et al. 1987a). We also considered the extent to which area residents' distress levels following the 1985 restart of the undamaged TMI reactor (81 months postaccident) were predicted by their psychiatric history, earlier beliefs about personal risks, and psychosocial characteristics such as social supports during the years between the accident and the restart (Dew et al. 1987c).

While charting and identifying factors predicting subsequent distress levels have been fruitful for understanding long-term sequelae of not only the TMI accident in particular, but chronic stressors in general, a critical question remaining concerns the nature and the predictors of individuals' unique distress patterns, or profiles, over time. Several psychiatric epidemiologic studies have examined temporal symptom patterns descriptively (e.g., Aneshensel 1985; Hankin and Locke 1983; Lin and Ensel 1984; see Coyne and Downey 1991 for a review), but these studies have focused on relatively short time intervals of months or occasionally several years and, being descriptive, have not examined the degree to which environmen-

Table 1. Characteristics at initial assessment of mothers in the Three Mile Island area who did ($n = 110$) or did not ($n = 157$) respond to the 10-year follow-up questionnaire

Characteristic	Respondents		Nonrespondents	
	n	[%]	*n*	[%]
Age (% < 35 years)	100	90.9	137	87.2
Education (% > high school)	64	58.2	74	47.1
Income (% < $ 20000)	42	38.2	60	38.2
No. of children (% ≥ 2)	70	63.6	97	61.7
Employed (% fulltime)	21	19.1	24	15.2
Marital status (% married)	109	99.1	154	98.1
Race (% caucasian)	108	98.2	151	96.2
Psychiatric disorder before TMI accident (% yes)	19	17.3	34	21.6
Pregnant during year of TMI accident (% yes)	15	13.6	13	8.3
Evacuated after TMI accident (% yes)	95[a]	87.2	140	89.2
	Mean	SD	Mean	SD
Proportion of friends who evacuated after accident	0.38[a]	0.23	0.39	0.26
Residential distance from TMI (miles)	6.25	2.51	6.14	2.69
Beliefs of personal risk (1 = less, 3 = more)	2.26[a]	0.57	2.52[a]	0.50
Mastery (1 = less, 4 = more)	3.13	0.50	3.08[a]	0.42
Availability of social support (1 = never, 5 = always available)	4.80	0.42	4.73	0.51
Psychiatric symptoms (0 = less, 4 = more distress)	0.49	0.48	0.56	0.48

Note: No differences in percentages or means reached statistical significance at $P < 0.05$

[a] One case had no data on this variable

tal events or other stressors provoke particular long-term symptom pattern responses. In the present research, therefore, we utilized the TMI accident and its aftermath as an opportunity for investigating (a) the long-term (10-year) distress profiles of area residents' psychiatric symptom status, (b) the degree to which these profiles reflect temporally stable vs changeable patterns of distress during this time, and (c) the features of the accident and residents' involvement with it that predict which distress profile individuals are likely to have had during the 10-year period.

Method

Respondents

A panel of 267 women living within 10 miles of TMI were interviewed in their homes 9, 12, 30, and 42 months after the nuclear accident during an investigation of the accident's long-term mental health effects (Bromet et al. 1982; Dew et al. 1987a). All had delivered a child between January 1978 and March 1979 (the month of the accident). Because Pennsylvania law prohibited access to vital statistics records, women were drawn from area newspaper birth announcements. Hospitals routinely reported birth data to the local newspapers and virtually all local women delivered in a hospital, thereby minimizing sample bias.

Of the 267 respondents, 110 returned a follow-up questionnaire mailed during the month of the 10th anniversary of the TMI accident, March, 1989. The response rate of 41.2% most likely was due in part to our inability to conduct personal interviews in 1989, in view of the fact that attrition during the first four interviews, conducted over a period of almost 3 years, was only 18%. This explanation was supported by our finding that 1989 follow-up respondents were very similar to 1989 nonrespondents on demographic characteristics, and psychiatric and psychosocial measures at their initial assessment 9 months following the accident (Table 1).

We also noted that the 110 women were, as a group, no more likely to report elevated levels of psychiatric distress in 1989 (mean = 0.31 on the symptom measure described below) than they had been at any of their previous assessments [Means for first four interviews of 0.30, 0.26, 0.31, and 0.28, respectively, $F\ (1,420) = 2.79$, $P > 0.05$, effect size, $r = 0.10$], a finding inconsisent with the argument that we received responses only from women who were distressed at the time of the 10th anniversary.

Among the 110 women, 83 had also returned a brief questionnaire mailed in October 1985, the month after the restart of the undamaged TMI unit-1 reactor. As we have discussed previously, women who returned the 1985 questionnaire were also similar to those who did not, along demographic, clinical, and psychosocial parameters (Dew et al. 1987c). In the present report, we focussed on the full group of 110 women with five complete waves of data. However, when possible, we conducted subanalyses utilizing the additional 1985 wave of data (81 months after the accident) available for the subgroup of 83 women.

Outcome measures

Psychiatric symptoms at each wave of data collection were assessed with the depression, anxiety, and hostility subscales of the Symptom Checklist-90 (SCL-90; Derogatis 1983), a scale measuring current levels of disturbance. Because the three subscales were highly intercorrelated at each time point (median $r = 0.77$, ranging from 0.72 to 0.83), a summary symptom index was created by averaging the items (0 = not at all distressed, 4 = extremely distressed) at each interview.

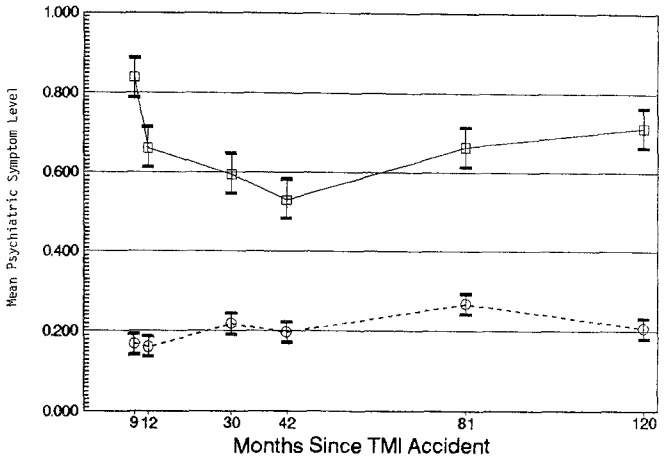

Fig. 1. Mean symptom levels (and standard errors) among 109 women classified according to their long-term psychiatric distress profiles. (Note. Symptom data at 81 months after accident were based on a subsample of 83 women) -⊟- Renewed distress ($n = 38$); --⊖-- Low distress ($n = 71$)

Predictor measures

The initial interview (at 9 months after the accident) obtained information pertaining to the following psychosocial background and accident-related characteristics; these variables were hypothesized to be important predictors of respondents' psychiatric distress patterns during the ensuing 10-year period.

Psychosocial background characteristics. In addition to a complete demographic profile, lifetime history of major depression and/or generalized anxiety at any time prior to the 1979 accident was determined with the Schedule for Affective Disorders and Schizophrenia – Lifetime Version (SADS-L; Endicott and Spitzer 1978). Data about general coping style and social supports at the time of the accident were also assessed. These included (a) the seven-item Sense of Mastery scale (Pearlin and Schooler 1978) that assesses the degree to which respondents feel that the things that happen to them are under their personal control (1 = less control, 4 = more control) and (b) respondents' reports of whether they felt they had someone to turn to in times of need (1 = never, 5 = always).

Accident-related variables. Several items were obtained at the initial interview that pertained to respondents' reactions and behaviors during the initial aftermath of the accident. First, we considered respondents' behavior and personal involvement with the accident through their reports of (a) *whether they evacuated themselves and/or their families* immediately after the accident (0 = no, 1 = yes), and (b) the *proportion of their friends who evacuated* the area following the accident. Indirect measures of respondents' involvement with the accident included (a) their *residential distance* in miles from the TMI plant at the time of the accident and (b) whether they *had been pregnant* at the time of the accident or within 1 year thereafter (0 = no, 1 = yes). Finally, concerning initial affective response to the accident, women were asked at the initial interview their opinions about whether they (a) perceived TMI to be dangerous (1 = not dangerous, 3 = dangerous), and (b) believed it was safe to live near a nuclear facility (1 = yes, 3 = no). These items were correlated ($r = 0.46$) and thus were averaged to form an overall measure of initial *perceived dangerousness of TMI.*

Analyses

Hierarchical agglomerative cluster analysis (Aldenderfer and Blashfield 1984) was applied to the five waves of psychiatric distress measures in order to explore whether distinct temporal profiles of responses could be identified within the cohort. We adopted the widely used unweighted pair-group method with arithmetic averages and squared Euclidean distance coefficients (Romesburg 1984). A cross-validation technique was applied in order to examine the stability of the identified clusters.

The two distress pattern groups that emerged were then examined for differences on all background and accident-related variables assessed at the initial interview. Univariate tests were initially performed to evaluate group differences on each characteristic. Direct discriminant function analyses were then performed to determine whether the entire set of baseline characteristics could reliably discriminate between the distress pattern groups.

Prior to discriminant analyses, variables were examined and found to meet analytic assumptions adequately (Tabacknick and Fidell 1989). One respondent who did not have complete data on outcome variables at the final assessment (but who was otherwise similar to remaining respondents on all predictor variables) was excluded from the analyses.

Results

Exploration and identification of psychiatric distress pattern groups

Cluster analysis of respondents' distress levels across the five waves of data collection revealed two distinct groups of respondents; based on the degree of change in the amalgamation coefficient as cluster agglomeration proceeded (Aldenderfer and Blashfield 1984), a two-cluster solution was optimal. When we explored the groups' distributions on the distress measures across the five time points (Fig. 1), it was clear that the largest group ($n = 71$) consisted of individuals with uniformly low levels of psychiatric distress across the entire period. These individuals' mean symptom levels, depicted by the lower line in Fig. 1, were similar to average symptom levels reported for normative community samples of women (e.g., Derogatis 1983).

The second group ($n = 38$) included individuals whose symptom levels were significantly higher at all time points than the low-distress group [group × time-repeated measures analysis of variance (ANOVA), group effect: $F(1,107) = 90.34$, effect size $r = 0.68$, $P < 0.001$]. (The two groups' means were also evaluated separately at each time

Table 2. Relationship of background and TMI accident-related characteristics to long-term psychiatric distress patterns among 109 mothers of young children

1979 Predictors	Psychiatric distress pattern: 1979–1989		Analysis		
	Low distress $n = 71$	Renewed distress $n = 38$	Univariate test		Discriminant function loading
			Statistic[a]	Effect size[b]	
Psychosocial background characteristics					
Age (years)	30.08	29.84	0.10	0.03	–
Education (1 = grammar sch., 8 = grad degree)	4.23	3.74	3.33*	0.17	0.48
Income (% > $ 20000)	54.93	76.32	4.82**	0.21	0.59
Pre-TMI psychiatric history (% yes)	14.08	23.68	1.58	0.12	0.33
Coping (1 = less, 4 = greater sense of mastery)	3.20	3.06	2.74	0.16	0.44
Social support (1 = never, 5 = always available)	1.17	1.26	1.21	0.10	–
Accident-related characteristics					
Evacuated (% yes)	81.69	94.74	3.55*	0.18	0.50
Proportion of friends evacuated	35.87	41.24	0.75	0.08	–
Residential distance from TMI (miles)	6.34	6.58	0.19	0.04	–
Pregnant during year of accident (% yes)	18.31	10.53	1.14	0.10	–
Perceived danger of TMI facility (1 = not dangerous, 3 = dangerous)	2.09	2.45	4.96**	0.21	0.59
Canonical correlation coefficient					0.34**

[a] $F(1,107)$ for continuous variables, $\chi^2(1, n = 109)$ for discrete variables
[b] Pearson correlation coefficient; eta for continuous variables, phi for discrete variables
* $P < 0.07$, ** $P < 0.05$
Sch., school; grad, graduate

point and were found to differ significantly in one-way ANOVAs.) The symptomatic group appeared particularly distressed in the immediate aftermath of the accident (9 months after the accident). Their distress levels dropped during the ensuing several years, and then climbed again at the occasions of the restart of the undamaged reactor 81 months after the accident and the 10th anniversary of the accident. It is noteworthy that the renewed-distress group's mean symptom levels exceeded 1 standard deviation (SD) from the mean for a normative community sample of women at the 9-, 12-, 81-, and 120-month assessments (Derogatis 1983), indicating that these women were experiencing clinically significant distress at these times. These 38 individuals' temporally changing pattern of high, then lower, then renewed distress, differed significantly from the low, temporally stable pattern among the 71 low-distress respondents [group × time interaction effect: $F(4,428) = 3.66, r = 0.18, P < 0.01$].

The stability of the two-cluster solution for the 109 women was examined with a cross-validation procedure. Thus, in an additional analysis, a random sample of approximately 25% of the cases was withheld from the cluster solution. For the 75% of the cases remaining, a new cluster analysis replicated the pattern noted for the entire group of 109 women, i.e., the degree of change in the amalgamation coefficient as cluster agglomeration proceeded was virtually identical to that noted in the full sample, and all women in the 75% subsample were optimally classified into the same two clusters emerging from the full sample. For the 25% cross-validation subsample, the 2-cluster solution again replicated; 78% of this subsample were classified into the cluster in which they had fallen in the full-sample analysis.

In sum, a low-distress, temporally stable group and a more changeable elevated-distress group (the renewed-distress group) emerged from the exploratory cluster analyses. Additional ANOVAs indicated that these groups differed from each other in their symptom levels at all waves of assessment. We next considered the extent to which distress pattern group membership was predicted by background and accident-related characteristics assessed at the initial post-accident interview.

Prediction of psychiatric distress pattern groups

The first two columns of Table 2 display background and accident-related characteristics of respondents according to their distress pattern group. As shown in the third and fourth columns, univariate analyses indicated several significant or marginally significant group differences: respondents in the renewed-distress group were less educated but had higher incomes, had evacuated following the accident, and were more likely to have perceived the situation to be dangerous at the time of the accident. The sizes of these effects were modest (i.e., r in the 0.15–0.20 range; Cohen 1977).

The univariate tests revealed some differences in individual variables, but did not evaluate whether respondents with different psychiatric distress patterns in the long-term following the accident could be reliably distinguished from one another across the array of interrelated predictor variables that we assessed. Multivariate, discriminant function analysis was used to accomplish this goal.

The small sample size precluded use of the full set of psychosocial characteristics in a single discriminant analysis. We conservatively chose to evaluate the relative importance of only those variables revealed in the preceding univariate analyses to have effects exceeding 0.10 [which

Cohen (1977) defines as only a small effect in behavioral sciences data]. Therefore, the analysis compared the two distress pattern groups on a subset of six variables in Table 2, and these included education, income, psychiatric history prior to the TMI accident, coping style, whether the respondent evacuated, and perceived danger from the TMI facility.

One significant discriminant function emerged [i.e., prior to extraction of this function, there was significant variability in the data, χ^2 (6, $n = 109$) = 12.95, $P = 0.044$; this variability was explained by the extracted discriminant function]. A second, analogous way to view the results is that the function maximally separated the renewed-distress group (group centroid of 0.49) from the low-distress group (centroid of −0.26); these two locations differed significantly [F (6,102) = 2.25, $P = 0.044$].

The predictors' pattern of loadings on the discriminant function are shown in the last column of Table 2. These can be interpreted in the same manner as factor loadings in factor analysis, and all were of at least moderate size (≥ 0.30; Tabachnick and Fidell 1989). The most important predictors of showing initially heightened, then renewed distress during the 10-year study period, as opposed to showing consistently low distress, were having a higher income, perceiving the situation to be more dangerous, and evacuating at the time of the accident. However, the additional loadings showed that several remaining predictors were important as well: distressed women had less education, reported a lower level of mastery over their environment, and were more likely to have had a positive psychiatric history prior to the accident.

The set of six predictor variables classified 64% of all respondents correctly. Classification accuracy for the low-distress group (65%) was similar to that for the renewed-distress group (63%). Although these results indicated that the discriminant function did not fully explain the nature of group differences, the canonical correlation of 0.34 indicated that these particular background and accident-related variables were, as a set, important predictors of long-term psychiatric distress patterns.

The stability of the classification was examined through cross-validation (Tabachnick and Fidell, 1989). Thus, in an additional analysis, a random sample of approximately 25% of the cases was withheld from calculation of the classification functions. For the 75% of the cases from whom the functions were derived, there was a 67% correct classification rate. For the cross-validation cases, 67% were also correctly classified, indicating that the classification scheme had a high degree of consistency, and hence generalizability (Tabachnick and Fidell, 1989).

Discussion

The present research extends previous work on the mental health effects of the TMI nuclear accident by considering long-term distress *profiles* across an entire longitudinal *series* of assessments, rather than considering symptom level differences and their predictors at individual postaccident time points in a more piecemeal fashion, as is the case in the bulk of prior research (e.g., Bromet et al. 1982; Dew et al. 1987c; Gatchel et al. 1985; Prince-Embury and Rooney 1990). Moreover, we studied a substantially longer period – 10 years – than has been previously considered in research related to TMI or to most other natural or technological disasters. (Indeed, with respect to TMI, ours is the only sample we are aware of that was identified early in the postaccident period and followed through to the time of the 10th anniversary.) Finally, the present study is unique in its exploration of the extent to which identified long-term distress profiles could be predicted by an array of parameters characterizing respondents' initial involvement with, and reactions to, the nuclear accident.

Results from cluster analysis of the panel of respondents' psychiatric symptom levels over the study period led us to distinguish two major subgroups of women: those whose temporal profiles were either (a) stable and at low, clinically nonsignificant levels across all measurements points (65% of the sample) or (b) consistently elevated, but markedly fluctuating, levels of distress (35% of the sample). Symptoms in this latter group averaged at clinically significant, high levels – exceeding 1 SD from the mean for a normative community sample of women (Derogatis 1983) – in the early aftermath of the accident (1979–1980), followed by somewhat lower levels (1982–1983), and then by renewed elevations at the time of more recent TMI-related events (the 1985 restart and 1989 anniversary). That such a substantial minority of women – 35% – were highly distressed both early and late post-accident is striking, given that, from an epidemiologic perspective, one would expect only approximately 16% of the sample to score above 1 SD from the mean for a normative community sample of women (Derogatis 1983).

The interpretation of our two observed temporal symptom profiles must be conservative because of an important study design limitation. Specifically, as in other longitudinal studies of community residents' symptom profiles (e.g., Aneshensel 1985; Aneshensel and Frerichs 1982), women's distress levels were assessed at points months or years apart. Without continuous observation – an unlikely achievement in field research – we cannot know whether our low-distress women actually never experienced periods of sustained, elevated distress during the 10-year period. Similarly, the renewed-distress women may have had periods of well-being during the period. Thus, to the extent that there were important omissions in measurement, the two observed temporal profiles should be viewed as imperfect approximations of the true patterns of distress among the women.

These imperfect profiles were, nevertheless, consistent with previous research on TMI area residents' levels of distress at discrete time points postaccident (e.g., Baum et al. 1983; Davidson and Baum 1986; Goldsteen et al. 1989; Prince-Embury 1991), all of which suggests that, while many residents were apparently never obviously distressed following the event, an important minority experienced elevated symptomatology. However, the causal interpretation of these data remains difficult. It is possible, for example, that the consistently distressed individuals' well-being reflected a pattern of chronic, recurrent symptomatology *unrelated* to the occurrence of the accident. While this may be partially accurate, it was also the case

that our distressed respondents – while remaining consistently in an elevated symptomatic range – showed symptom levels that covaried significantly with the timing of TMI-related events. This latter finding suggests that at least some portion of their distress was attributable to this chronic stress situation.

To what extent were respondents' temporal symptom profiles associated with variables related to their initial involvement with, and reactions to the accident, as well as with background characteristics antedating the accident? We found that a core group of such variables were important for distinguishing between women's subsequent symptom patterns. Sociodemographically, the highly symptomatic, renewed-distress women were of similar age, but had had less education and, as indicated by family income levels, were of higher socioeconomic status than consistently low-distress women. Similar patterns of sociodemographic correlates have also been observed in other studies of psychological distress after the accident (Prince-Embury 1991; Prince-Embury and Rooney 1990). We also found that a positive psychiatric history prior to the accident was a strong predictor of which women would show a pattern of highly symptomatic, renewed distress after the accident; this relationship was consistent with the extensive clinical and psychiatric epidemiologic literature (see Coyne and Downey 1991 for a review), as well as earlier TMI-related research (e.g., Bromet et al. 1982), which emphasize the importance of psychiatric history as a vulnerability factor for new periods of significant distress. Concerning other such potential vulnerability factors, we note that, while the perceived availability of social support at the initial interview was not related to the subsequent temporal symptom profile, women whose coping style was that of feeling little control over their environment were also more likely to experience elevated, then renewed, distress during the postaccident period.

Finally, concerning the impact of accident-related characteristics on subsequent mental health, respondents' initial behavior after the accident (evacuating the area) and degree of initial affective response (perceived dangerousness of the TMI situation) were important predictors of temporal symptom profile. These predictors may be of especial relevance to the present sample of mothers of young children because they constituted the segment of the population who were asked by the Pennsylvania governor to leave the TMI area in the initial aftermath of the accident in order to safeguard their families. It is truly striking tht these early postaccident variables remained among the strongest contributors to long-term distress, even after other important background characteristics were statistically controlled.

Before considering the implications of our findings, it is important to note that our results may have been biased by the high nonresponse rate at the 1989 wave of data collection. We attempted to examine this issue directly (Table 1), observing respondents to be very similar to nonrespondents on the demographic, clinical, and psychosocial variables measured at previous interviews. Nevertheless, it must be borne in mind that respondents and nonrespondents may have differed on other variables not assessed.

Taken together, our findings regarding temporal symptom profiles and their predictors in the wake of a major environmental event have important implications for both policy formulation and continued research concerning such stressors. In terms of policy formulation, our findings highlight the need to develop intervention strategies for not only the short-term but also the long-term sequelae of technological disasters. Although procedures for handling the former have been refined to relatively sophisticated levels (American Psychological Association 1987; Cohen and Ahearn 1980), there has been far less progress in designing interventions for – or even descriptive assessments of – the extended deleterious consequences of accidents such as that at Three Mile Island. The recent, much more devastating, disaster at Chernobyl dramatizes the international scope of this problem.

Indeed, in terms of continued research concerning effects of such disasters, we are actively engaged in applying the present findings, plus the larger body of research accumulated in the 10 years since the TMI accident, to the development of research that will fully delineate what many believe to be massive mental health effects of the Chernobyl debacle on regional families. In an effort to determine the feasibility of conducting an epidemiologic study of the disaster's mental health effects, one of us (EJB) visited the Ukraine in 1990 to attend a 5-day workshop organized by the World Health Organization on the mental health of former Chernobyl area residents. A second trip to the Ukraine was made in 1992 to meet with evacuated community residents, teachers, research scientists, and health and government officials about the kind of research needed and wanted to help the local population in the wake of the catastrophe (Bromet and Goldgaber 1992). Our own and others' data collected in the years since TMI are – even in the face of striking cultural differences – valuable sources of information for the design of research protocols to better understand and potentially ameliorate long-term psychological impacts at Chernobyl, as well as at any other unfortunate location where such a catastrophe might occur.

Acknowledgements. This research was supported in part by NIMH contract 278-79-0048 (SM) and grant MH-35425.

References

Aldenderfer MS, Blashfield RK (1984) Cluster Analysis. Sage Publications, Beverly Hills

American Psychological Association (1987) Cataclysms, crises, and catastrophes: psychology in action. APA, Washington, DC

Aneshensel CS (1985) The natural history of depressive symptoms: implications for psychiatric epidemiology. In: Greenley JR (ed) Research in community and mental health, vol 5. JAI Press, Greenwich, Conn.

Aneshensel CS, Frerichs RR (1982) Stress, support, and depression: a longitudinal causal model. J Community Psychol 10: 363–376

Baum A, Gatchel RJ, Schaeffer MA (1983) Emotional, behavioral, and physiological effects of chronic stress at Three Mile Island. J Consult Clin Psychol 51: 565–572

Bromet EJ, Goldgaber D (1992) The feasibility of studying the mental health effects of Chernobyl on children and adolescents. Final progress report prepared for the National Institute of Mental Health, contract 91MS-2347-1401-D

Bromet EJ, Parkinson DK, Schulberg HC, Dunn LO, Gondek PC (1982) Mental health of residents near the Three Mile Island reactor: a comparative study of selected groups. J Prev Psychiatry 1: 225–275

Cohen J (1977) Statistical power analysis for the behavioral sciences. Academic Press, New York

Cohen R, Ahearin F (1980) Handbook for mental health care of disaster victims. Johns Hopkins University Press, Baltimore

Coyne JC, Downey G (1991) Social factors and psychopathology: stress, social support, and coping processes. Annu Rev Psychol 42: 401–425

Davidson LM, Baum A (1986) Chronic stress and posttraumatic stress disorders. J Consult Clin Psychol 54: 303–308

Derogatis LR (1983) SCL-90-R administration, scoring and procedures manual – II, 2nd edn. Clinical Psychometrics Research, Towson, Md.

Dew MA, Bromet EJ, Schulberg HC (1987a) A comparative analysis of two community stressors' long-term mental health effects. Am J Community Psychol 15: 167–184

Dew MA, Bromet EJ, Schulberg HC (1987b) Application of a temporal persistence model to community residents' long-term beliefs about the Three Mile Island nuclear accident. J Appl Soc Psychol 17: 1071–1091

Dew MA, Bromet EJ, Schuldberg HC, Dunn LO, Parkinson DK (1987c) Mental health effects of the Three Mile Island nuclear reactor restart. Am J Psychiatry 144: 1074–1077

Dohrenwend BP, Dohrenwend BS, Kasl SB, et al (1979) Technical staff analysis report on behavioral effects to the President's commission on the accident at Three Mile Island. US Government Printing Office, Washington, DC

Endicott J, Spitzer RL (1978) A diagnostic interview: the Schedule for affective disorders and schizophrenia. Arch Gen Psychiatry 35: 773–782

Gatchel RJ, Schaeffer MA, Baum A (1985) A psychophysiological field study of stress at Three Mile Island. Psychophysiology 22: 175–181

Goldsteen R, Schorr JK, Goldsteen KS (1989) Longitudinal study of appraisal at Three Mile Island: implications for life event research. Soc Sci Med 28: 389–398

Hankin JR, Locke BZ (1983) Extent of depressive symptomatology among patients seeking care in a prepaid group practice. Psychol Med 13: 121–129

Houts PS, Miller RW, Tokuhata GK, et al (1981) Health-related behavioral impact of the Three Mile Island nuclear incident, parts I, II, III. Department of Health, Harrisburg, Pa

Kemeny J (1979) The President's commission on the accident at Three Mile Island. US Government Printing Office, Washington, DC

Lin N, Ensel WM (1984) Depression-mobility and its social etiology: the role of life events and social support. J Health Soc Behav 25: 176–188

Pearlin L, Schooler C (1978) The structure of coping. J Health Soc Behav 19: 2–21

Prince-Embury S (1991) Information seekers in the aftermath of technological disaster at Three Mile Island. J Appl Soc Psychol 21: 569–584

Prince-Embury S, Rooney JF (1990) Life stage differences in resident coping with restart of the Three Mile Island nuclear generating facility. J Soc Psychol 130: 771–779

Romesburg HC (1984) Cluster analysis for researchers. Lifetime Learning Publications, Belmont, Calif.

Tabachnick BG, Fidell LS (1989) Using multivariate statistics, 2nd edn. Harper & Row, New York

Dr. M. A. Dew
Department of Psychiatry
University of Pittsburgh School of Medicine
3811 O'Hara Street
Pittsburgh, PA 15213
USA