PSYCHOLOGICAL RESPONSE TO DISASTER: WHAT ARE THE KEY PARAMETERS FOR RESEARCH?

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The patterns of psychological response to disaster have been vividly described by many workers, from Wolfenstein's classic volume, Disaster: A Psychological Essay(1), to the powerful documentation of the horror of Buffalo Creek in K. Erikson's "In the Wake of the Flood"(2). The possible psychopathological consequences have also been studied by many workers, for instance as reviewed by Kinston and Rosser(3), and demonstrated in recent studies, e.g., Adams and Adams(4); Holen, Sund and Weisaeth(5); Wilkinson(6), Patrick and Patrick(7); Bromet, Parkinson, Schulberg et al(8).

Various rationales may be proposed for the scientific study of psychological response to disaster. It may be studied for counterdisaster management objectives: to define patterns of response to warning, threat and impact of disaster; and behaviours in the inventory, rescue and recovery phases that follow.
Adaptational, survival oriented responses may be identified. Non-adaptive responses may be predicted or managed. Much of the research relevant to this view has come from sociologists (e.g., Quarantelli(9)). Weisaeth attempted to examine these factors in a factory fire and has drawn some valuable conclusions(10).

Psychological response to disaster may also be studied for the purpose of defining pathological outcomes in terms of health generally, or specifically psychiatric disorder; or other forms of decompensation. The ultimate aim in this case would be to examine correlating factors and possible service implications so that such pathological outcomes could be prevented(11,12,13) or managed (14,15,16,17).

A third purpose may be for the consideration of a stress model, which in the natural experiment context of disasters, may give clues to stressor and response effects applicable to other situations. The disaster as stressor has been considered theoretically(4), and in the life event context(18), where it has been compared and rated with other stressors and their effects. Adam and Adam(4) have a stress-reaction model for their research into the consequences of the Mount St Helen's Ashfall. Certainly some of the general symptomatology that appears after disaster(19) may be similar to that found after personal disaster stresses such as bereavement(20). Related to this is the possible effect of disaster as a stimulus

challenge as reported by the workers noting the "therapeutic community" that may occur in the post disaster period, and by Williams and Parkes(21) in their paper on increased birthrate and community in Aberfan. A similar effect is noted by some disaster helpers(22) who found their close encounters with death made them re-evaluate their lives and relationships more positively.

Purposes of research may overlap with motivations, which may have many levels: scientific curiosity; altruism, among the more positive; attempts to work through and comprehend meanings of life and death amongst the most natural; politics, ambition and voyeurism, perhaps reflecting real but not always attractive human motivating forces.

The questions psychological research into disaster may wish to address are many, and will of course be related to the purposes of the research. They include the following, and probably many others:

i) What are the "normal" and "pathological" patterns of psychological response following disaster? What behaviours occur as a consequence of these? How many show which patterns for how long? Who are affected?

ii) What factors about the disaster cause or correlate with these? What are the stressors? What are the stimuli?

iii) What background variables cause or correlate with these?

iv) What intervening variables cause or correlate with these?

v) What interventions may modify the psychological responses to disaster?

vi) What are the changes over time?

Many other subcategories of question, or general questions could be generated. Operating in a broader sociological framework, community variables would also be queried. Biological variables may be the source of questions because of their links to stressor effects or a more complex consideration of the biopsychosocial model.

Which question or questions the researcher chooses to ask will depend upon the purposes, but also he must be influenced by methodological issues. For instance, it may not be possible to adequately assess or measure some variables. Moral, humanitarian and ethical constraints may mean that some research questions are in themselves too stressful or difficult to answer in the context of the disaster trauma. Sampling problems may arise with needs of selection, representativeness and size, plus

the difficulties of defining and working with an appropriate control group so that the research question could not be answered with the available populations. Timing of research may be problematic with different timing necessary for different questions. Victims and those affected may be inaccessible because of the confidentiality and dislocation, or because of shock and injury.

The vital and practical issue for researchers rests in defining the questions that can be asked of the populations affected by a particular disaster, and then developing a protocol and techniques which can validly answer these questions, taking into account the human realities of the disaster experience.

The remainder of this paper attempts to identify the key parameters that must be addressed in the psychological response to disaster.

"PRE"-DISASTER MEASURES

It is extremely unusual to have a closely investigated population, on whom all the relevant variables have been examined prior to a disaster. Nevertheless, where there is some anticipation of the likelihood of disaster it should theoretically be possible to accomplish this by systematic survey of the population likely to be exposed. Such a survey might examine not only basic demographic variables, previous "abnormality" in the form of current or past psychological disturbance, past experience of and response to disasters, but could also estimate perception of anticipated response to the potential disaster. I believe there has been a survey of this type carried out in Hawaii in anticipation of volcanic eruption, but, to date, I have been unable to find this study reported.

Another way in which "pre" information may be found is if a region has been fortuitously studied for another purpose before the disaster occurs. An example of this is the study of perception of fire hazard carried out by H. Abrahams in the Adelaide Hills, long before the disastrous Ash Wednesday fires. This did not provide information on pre-existing personality or other factors, but did have some useful information concerning perception of threat and response to such perceptions (e.g., failure to take preventive action in most cases).

When the "pre" information is not available from such sources, some may be sought by examining an independent variable for its occurrence before and subsequent to the disaster. Health care utilisation could be one variable examined in this way. Health records could be examined before and at specified times after in both affected and control non-affected communities. This could detect a change in health seeking behaviour associated with the disaster experience. Specific areas could be examined such as medication utilised. Mental health care utilisation could also be examined in this way, e.g., psychiatric hospitalisation rates pre and post in affected and non-affected communities, or differentially affected groups[8,23].

Other less specific measures or indices in the fields that may be linked to stress or disaster and its psychological impact can also be examined in this way. For instance, indices of heart attacks were scored after the Athens earthquake[24].

Similarly it would be possible to determine marital breakdowns, crime[25], and so forth - perhaps as correlates of a psychological change induced by disaster experience. These gross indices have value in large population samples, particularly when there are closely matched groups which can be compared. "Ideal" pre and post measures could include at least the following: psychiatric hospital admissions and treatment rates; suicide and attempted suicide rates; drunk driving; delinquency and crime rates; sickness benefit rates; marital breakdown; child abuse notifications; stress disease rates and possibly others. For this method to have value there must be good and reliable statistical bases before and after. And, of course, some disasters are such that they could lead to loss of records or disruption of recording systems or data collection, negating the conclusions that might be drawn.

From indices a gross picture of possible psychological response to disaster may be assumed. For a fine-grain analysis of pre and post effects in differentially affected communities what would be the "ideal" "pre" measures?

Demographic variables suggested as being significant in response to stress or disaster include age, sex, marital status, and position in family, and family constitution, race and ethnic background, religion, socioeconomic status, occupation and employment.

Psychological background measures suggested by either theory or research to be relevant include personality and coping styles. Measurement of these two variables is notoriously difficult, but epidemiological studies in the community such as those of Henderson[26] would suggest that the Eysenck Personality Inventory, particularly the neuroticism scale, may be an important predictor of subsequent disorder. A potentially useful coping inventory may be that of Parker and Brown[27], which examines a range of coping styles people believe they would use if faced with a stressful experience or when depressed. These include crying, self-consolation, eating, reckless behaviour, talking with others and so forth. It would be quite possible to orient this coping scale to an anticipated disaster stressor, or to pick up the respondent's perceptions of his responses to other related or similar threats present, past or imagined. It might even be possible to examine separate coping styles for the three main areas of disaster stressors, to be discussed below: death and destruction experience; loss experience; dislocation/relocation.

A further psychosocial parameter suggested as important in the face of adversity or threat is the perception of social network support(26), and specifically attachment ideation and behaviours (28).

It would be useful in the "ideal" "pre"-test situation to have reliable and valid measures of the individual's perception of his family and social network support, particularly its perceived adequacy.

Close attachments are especially important in this context and the protective value of an intimate and confiding marital relationship comes through as a strong variable(29).

Vulnerability to a pathological response may be associated with a previous history of pathology, i.e., past or present psychiatric disorder. While this is not a clear-cut relationship, it would seem appropriate to explore past, or even current psychiatric disorder. The measures for achieving this vary enormously from a simple recording of the respondent's memory of such according to specified criteria; the assessment of past records; life-time diagnosis questionnaires or interviews; trait measures of anxiety, such as the Speilberger Trait Anxiety Scale, or present state assessments by questionnaires through state measures such as the General Health Questionnaire of Goldberg, and Speilberger State Anxiety Scale, or Zung Depression rating; or present state interviews such as the Present State Examination of Wing, or the Diagnostic Interview Schedule of Lee Robins, or the PERI of Dohrenwend. It is difficult to imagine all these measures being accumulated in anticipation of a disaster and examining its effects for even the predictable disasters are difficult to predict in timing and affected groups. Nevertheless, many of the current larger epidemiological studies could have, "fortuitously", a data bank of this kind which could be utilised as a "pre" data resource should a disaster occur.

One other variable that could make some contribution is the person's physical state or other concurrent stressor. The person who is ill or handicapped, or experiencing ongoing stress or major life crisis may be in a more vulnerable state. These measures could be noted by scoring a life event schedule, such as the Tennant and Andrews Scale, or question or interview to estimate their presence and stressful effects. It is probable that some aspects would be detected in the present status measures if highly stressful (e.g., G.H.Q., etc.), but not all may exert such effects; many only do so if disaster were imminent e.g., being paraplegic and limited in mobility and opportunity, for example.

The final area of importance is that of disaster specific perceptions and responses. The person's previous experience of and response to similar disasters, or to related stressor experiences of death and destruction, loss and grief, dislocatior

and relocation, may be predictive of response to future disaster. There are no systematic scales or schedules to examine this and questionnaires or interviews would have to be developed. The other aspect is the current perception of threat from the disaster, the behavioural responses, or the threat and the anticipated response to actual disaster. Again, these would have to be explored by devised questions of relevance. Some preceding views of threat can be carried out when threat is prolonged with specific interview schedule or questionnaire such as prior to the Mt St Helen's Volcanic eruption[30].

These "Ideal" pretest measures are rarely available beforehand. Once the research takes on the post disaster framework, then they become subsumed under the background variables that must be estimated and taken into account. Then, of course, they are subject to further possible distortions by the affective and other responses of the disaster experience which becomes central.

DISASTER STATE MEASURES

In considering research questions that deal with the psychological response to disaster, estimates of the disaster experience itself as a stimulus/stressor are essential. This is one of the most poorly investigated components in most studies, and it is quite clear that a number of elements must be quantified to make the trauma concept meaningful.

Primary qualities of disaster include intensity and duration. But most disasters are a complex amalgam of forces and events, some of which are intense and immediate, others ongoing and yet others delayed. A single event, such as a factory fire, may have many related consequences that add to or constitute the trauma. A cyclone or fire may have a terrifying and forceful impact over many hours followed by profound destruction of the environment with ongoing associated losses and deprivations for many months. Even in the impact of a single disaster, what is experienced by different victims may vary enormously. For example, in the fires there may have been several different threats to life including choking from fumes, crushing by collapse of structures, burning to death or death from radiant heat.

At present we have not defined all the relevant parameters that may be quantified across different disaster experiences, nor specific measures for them. However, some disaster researchers have attempted to examine intensity of exposure by closeness to the centre of a disaster impact. Weisaeth[10] in his total population study of a Norwegian paint factory fire was able to locate the positions of all workers in the factory when the explosion and fire occurred. He divided his subjects into three groups, A-C - A being maximal exposure. He was able to show that maximal exposure correlated with maximal traumatic symptomatology afterwards, with relatively diminishing rates in

the other two groups. A somewhat similar technique was used in the Three Mile Island study, but on a larger and less intense scale, for this was a disaster more of threat than actuality of destruction[8].

Duration is difficult for most exposed victims experience a similar duration of say a cyclone's impact. Theoretically, it might be possible to examine effects of prolonged threat, as McFarlane sugests for some of his subjects in the Ash Wednesday fires, where one town suffered prolonged threat from the fire which seemed to produce significantly increased problems for those involved[31].

The component threats to disaster experience have perhaps been most closely considered by the Norwegian disaster workers, particularly in their attempts to understand the responses to the North Sea Oil Rig Disaster[5]. They have a list of threats including death, destruction, loss, conflict over escape/ assisting others. In a review of this and other disasters, Raphael[32] draws conclusions that the three main classes of threat or trauma to be considered in their occurrence, intensity, frequency and duration are: death/destruction; loss; dislocation/ relocation.

Death/destruction threats and traumata are those where the victim's life or body is threatened by the physical forces of the disaster and its consequences, or he is exposed to the death/ destruction of others' bodies in massive or traumatic ways. The threat of special or massive animal death/destruction, or special or massive property destruction may also have effect, but the key element seems to lie in the "death" component for most of those who are severely affected. This effect is often condensed in the traumatic screen memories of the disaster. It is highlighted in vivid descriptions of overwhelming scenes of death and destruction as experienced by the Buffalo Creek disaster survivors (2). The difficulty of quantifying such experience is pronounced. No systematic measures as yet exist, but useful questions include whether the victim felt his life was threatened; if he thought he was actually going to die, or death was inevitable; was he seriously injured; did he see others die or dead or seriously injured or mutilated; or mutilated bodies; how extensive and intensive were such experiences. The effect of this traumatic experience may be measured to some degree by the Impact of Event Scale of Horowitz which will be discussed subsequently. This area of threat/trauma is identifiable from the earliest stages after the disaster experience, unlike the following:

Loss Threats and Traumata are those which occur following personal or property loss. The person may have been bereaved by the death of his primary attachment figure or a close family member, or someone more distant but still emotionally important to him. He may be bereaved over the many deaths of strangers. He may grieve for a beloved pet. There may be loss of valued

personal possessions with strong symbolic emotional attachment, or of property, home and means of livelihood. In the early phase after a disaster, losses are gradually identified as the "inventory" process occurs. The euphoria of survival, or shock and denial may mean that responses to the losses are not evident, however, and may not be for some weeks. The ensuing deprivations are also increasingly experienced as time goes on. Again there are very few systematically developed measures. McFarlane(33) has developed questionnaires which list losses, personal (i.e., people) and property, and this format could usefully be adopted in other disaster research, i.e., a simple inventory of actual losses. Perceived losses could be added, but would be a much softer measure.

Reactions to loss, i.e., experience of loss/grief measures are also important in this context. The Texas Grief Inventory[34] could be utilised as a state measure. Singh[13] has devised a useful scale which includes state questions, behavioural coping questions and a question about whether or not the body was seen after death. This latter scale has been used to investigate responses in bereaved victims following the Granville train disaster. Further development of measures in this field is essential.

Dislocation/relocation stress/trauma concerns the aspects of dislocation of the person from his family and/or natural environment including home and neighbourhood and the relocation to hospital, other accommodation, social network or community, including temporary rehousing. While separation and dislocation may occur acutely and transiently, they may be very prolonged and contribute significantly to the chronic stresses of the post disaster period. Spontaneous comments by many disaster victims, especially after natural disasters where dislocation and relocation are more likely, indicate the severity and unpleasantness of this ongoing component. This appears clearly in effects on the evacuated victims of the Darwin cyclone(35,36), in the descriptions of the loss of community and its effects following the Buffalo Creek disaster[2], and in descriptive comments following the Ash Wednesday fires. Again there are no systematically defined measures for this variable. However, McFarlane [37] has attempted to define duration of separation of children from their parents and found it to be a significant contributor to their subsequent distress. Measures should include estimates of separation of family members from one another including numbers and duration; move from home or familiar neighbourhood, including evacuation duration; period of time in temporary housing; time absent from familiar work environment; extent of community destruction or breakup. Impact of this trauma component is difficult to measure as it seems to fuse with general stressor effects and responses.

Thus there is a need to develop, test and refine measures of these disaster stressors, perhaps by starting to examine them in the personal disasters of everyday life. They need to be developed in a simple and reliable format that can be readily adapted to use in the many different disasters that may occur.

SHORT TERM AND THE IMMEDIATE POST-DISASTER PHASE

The psychological investigation of the early days and first few weeks after the disaster can achieve only some indication of response and reaction, and an inventory of experiences: death/destruction; loss; dislocation. As noted previously, the "pre" test variables that are potentially relevant may be explored, but this is often difficult to do in the intensity and upheaval of the post-disaster period, and only the basic demographic variables may be possible. While personality measures may be of use and coping styles of interest it is possible that, if the reaction to the disaster is intense, response patterns may be influenced.

Thus at this stage the variables to be explored are more relevant to answering questions of stress/response, adaptational behaviours and possible predictors of longer term pathology or successful adaptation.

A description of behaviours and experiences during and after the disaster may usefully be obtained. This will provide information on the nature and extent of stresses suffered, including any conflicts.

This inventory of stressors should specifically enquire about experience of death/destruction, noting whether or not the person's life was threatened, their injuries and whether or not they saw others dead, dying, trapped or injured, and the detail of any particularly horrifying memories. Losses of person and property should be innumerated in detail. Dislocations from family members (i.e., separations) should be noted and their frequency and duration, as well as dislocation from home and community, its duration or likely duration and the nature of relocation.

The reactive behaviours should be identified in terms of emotional release, activity, denial of effect, arousal levels, interpersonal interactions, attempt at mastery, ongoing non-responsiveness, exaggerated behaviours, inappropriate or self-damaging or destructive behaviours. The primary attachments, their presence or absence, as well as the perceived supportiveness of others should be specifically examined. While shortened questionnaire formats from an instrument such as the ISSI (Index for Social Support Integration) of Henderson's group can be used, it is probably better to ask the specific questions required such as the presence and availability of main relationships during and after the disaster, concerns for them, attachment images or behaviours, and the way they influenced response,

and the current perception of them, their adequacy and availability. These are probably best explored in a review interview or open-ended questionnaire which asks questions about what happened, what the affected person felt and did, what were the inter-actions with others, etc.. This should explore from the time before the disaster when first warning was given, until the time of enquiry. Specific stages of the disaster can be queried, e.g., impact, and what was felt and done. Specific threat/traumata components may be queried. Specific behaviours may be enquired for e.g., the disaster syndrome of dazed response; whether it was present and how long it lasted; or panic, the circumstances under which it occurred, and what the consequences were.

There are no systematically developed measures that can be used to measure the reactions to the disaster, so questions must be developed taking into account the main time frames and parameters described above. The review format is optimal, for it is logical to the affected person, and often helpful in assisting him to externalise and master the experience as well as providing the descriptive information required.

The earliest stages of response to some of the traumatic components may be estimated at this time by simple state measures. The General Health Questionnaire of Goldberg has been useful in the immediate post disaster period for providing a quantification of the level of psychological distress. This is useful too for in personal disasters such as bereavement high initial reaction has been found to be to some degree predictive of subsequent disturbance and poor resolution. Parker's study of Darwin Evacuees showed high initial levels to be reflective of the death threat reaction and later levels more associated with dislocation
stressors.

There is some debate about which form of the General Health Questionnaire is best used. The 12 item seems to provide a satisfactory index of general distress which is all that can be assumed at this early stage, for "caseness" could not be concluded in the face of such severe stressors and the short time span involved. The use of the 28 item scale could distill out further anxiety and depression at this stage, but whether this is a valid procedure remains to be established. It must be borne in mind that the aroused or distressed victim may not be in a state for, or motivated towards, the completion of lengthy questionnaires whose relevance is limited.

The Impact of Event Scale of Horowitz may show some of the specific symptomatology, of post traumatic stress. Arousal, startle, exaggerated response to stimuli, intrusive cognitions, plus associated affects and nightmares of the disaster may be prominent. Some measure of these symptoms in the early weeks is useful as it promotes a profile against which these responses may be monitored subsequently. These reactions have been shown in Weisaeth's study(10) of his factory fire victims, where he

tended to classify these early responses as post traumatic anxiety or symptoms, but not as disorder. McFarlane(33) has similarly commented upon these early symptoms and noted their low correlation with GHQ, for it seems, and Goldberg concurs, that this instrument has not been designed to detect the post traumatic stress symptomatology.

For the most part loss reaction questionnaires ar not relevant for this time, for most of the items cover responses which would be considered part of the bereavement process. Relevant reactive aspects will probably be detected in the general stressor effect in the GHQ. The early shock denial phase may also be prolonged by the other overwhelming and traumatic aspects of the disaster experience, making it difficult to estimate any effects of or reactions to losses.

As psychiatric morbidity to the level of psychosis or clearly defined syndromes apart from the above appears infrequent and difficult to distinguish from reactive aspects, it is usually inappropriate to explore this in a community sample recently affected by a disaster. However, some general questions can be asked about whether the person has experienced any unusual phenomena, about physical health, perhaps as a brief checklist, and any doctor or other visits. This area of question may detect early pathological patterns, but on the whole, the practical realities of the disaster and its aftermath, the pre-occupation with the experience and the tasks it involves, ongoing shock effect, all mean that in these early weeks few patterns develop and the general stressor or impact responses are the ones most likely to be delineated.

In review then, the extent and depth of investigation of the psychological parameters in the early post disaster weeks may be strongly influenced by the severity and extent of the disaster. The key aspects involve the demographic variables, some review of the disaster experience, its stressors, and its interpersonal aspects, and a reactive measure such as the General Health Questionnaire and possibly the Impact of Event Scale. In the situation where victims are less stressed, more extensive investigation of "pre test" parameters and response to the disaster can be considered along the lines outlined above.

INTERMEDIATE TERM POST DISASTER ASSESSMENTS

After the first 2-3 weeks, the acute psychological response to the disaster starts to settle, but reactions to some of the more severe stresses and to ongoing difficulties created by the disaster start to emerge from the general distress. Grief becomes much more pronounced, and is likely to continue over the early months when the loss has been severe. Sometimes the other traumata of the disaster, plus the practical demands to reconstitute a home and environment mean that the grief response may be delayed or masked.

Assessments may be conducted at one month post disaster, two months post disaster, three and so on; six months post disaster; a year later and so forth. Decisions as to timing depends on the purpose of the research. If it is intended to develop a profile of response over time, repeated assessments of distress levels or particular phenomena such as post raumatic stress effects or loss resolution may be used. If, on the other hand, the purpose is to estimate the development of psychopathology or disorder consequent upon the disaster, then assessments at 3 months may give an indication or 6 months, while later would be chosen to estimate longer term and more entrenched pathology outcomes. The two types of assessment, i.e., profile and morbid outcome will be described, bearing in mind both may be combined and the former may be used as a correlate or predictor of the latter.

Profile of Reactions to Disaster Stressors

Such a profile should include measures of general distress such as the General Health Questionnaire, a measure of specific impact, such as the Impact of Event Scale. Where loss has occurred, the loss questionnaire of Singh or the Texas Grief Inventory can be utilised, or a scale using related questions relevant to the actual loss. Repeat of these measures at intervals will give a profile of the phenomenology of stressor response associated with them.

The measurement of dislocation/relocation stressors is more difficult. To the author's knowledge there are no instruments designed to investigate psychological response that may be specific to these variables. It is important to quantify the stressor, as noted in the previous section, in terms of number and frequency and duration of separations from home and family. The quality of replacement or temporary housing, and its duration may be indicated by notation of size, crowding issues. The siting of relocation may be important in the access to service, work, recreation and in the quality of neighbourhood. Fried[38] suggests social interaction aspects of residential attachment may only be significant for some, many valuing privacy more; and that attachment is more related to the quality of housing, neighbourhood and environment, and things like access to nature.

Dislocation/relocation have to be defined in terms of the degree to which they are ongoing stressors, as opposed to limited duration. Most disasters do not include ongoing death/destruction and loss threats or traumata beyond the original incident, unless the disaster continues - as in war. Other chronic stressors may develop as a consequence of the disaster - e.g., unemployment, and these need to be enquired for. This may best be done using a life event schedule which contains all relevant items and the options here range from Holmes and Rahe's Schedule of Recent Events to others such as Tennant and Andrews' scales. Extra disaster relevant items may have to be added.

Possible reactive effects specific to dislocation/relocation may appear in alterations of family functioning. Clinical experience following the Darwin cyclone suggested that dislocation/relocation could have an impact on marital harmony and perhaps through this variable or independently on the reaction of children. McFarlane[37] is currently examining such influences. It is probably useful to specifically query for effects on marriage, parent child-relationships and child behaviour to clarify such possibilities further. There may be increases or decreases in the time family members spend together, increases or decreases of friction and arguments, increases or decreases of closeness and affection. There may be similar repercussions through the social network. The current question format of the ISSI (Henderson) seems inappropriate as a measure for such changes. The Tucker[39] brief social support checklist could be used, but is also somewhat inappropriate to the context. Questions based on the above parameters and with a range of options would probably be the most useful format in the current state of research development, and eventually strong items might be developed into a measure.

Satisfaction/dissatisfaction with current situation is a further reactive measure which could be utilised; satisfaction being estimated in terms of site, duration, physical environment, size and so forth of relocation situation. Again a scale could be developed using such items.

General disturbances of physiological functioning which have not reached the level of disorder may reflect general stressor effects from any or all of the above, and particularly from those stressors that are ongoing. Sleep, appetite and weight, arousal levels, energy levels and fatigue, even bowel and bladder disturbances, sexual interest and functioning could be enquired for a simple checklist. Finally, it is worthwhile to ask the affected person about any changes or reactions he believes to have occurred in response to the disaster.

Norwegian workers(5,10) from the Centre of Disaster Psychiatry at the University of Oslo, have a very useful 10 item check list, the Hosuwe Scale which can be administered simply. Scoring on this measure correlates highly with subsequent morbidity. It is hoped that this scale will be further validated and made widely available to disaster workers generally.

Outcome Measures

Choice of outcome measure will be defined by the parameters of outcome that are selected for research. Potential areas are: psychiatric disorder; physical ill health seen to be a consequence of the stress; medication and health care utilisation; social disorder including marital and family breakdown, alcohol and substance abuse, criminality etc; functional impairment in work, social, recreational and other roles; improvements in any or all of the above or other areas of positive change.

In examining psychiatric outcomes post disaster, enquiry may cover specific syndromes such as the post-traumatic stress disorder using measures such as the Impact of Event Scale, or the criteria of categorisation such as in DSM-III. Or it may be that most possible psychiatric disorders are explored by utilising screening questionnaires strengthened by interviewing of a statistically determined representative sample. GHQ screening especially with 28, 30 or 60 items followed by the Present State Examination interview, or a similar methodology using the Diagnostic Interview Schedule of the N.I.M.H.. The evidence to date on psychiatric morbidity post-disaster suggests that such broadly based explorations may not be productive. More specific query might then again concentrate on affective disorder, utilising a screening such as the Zung and Interview Schedule for Affective Disorders. Independent measures of psychiatric outcome and utilisation could be obtained from hospitals and clinics serving the disaster area. Prescription levels of psychotropic medication could also be estimated. Suicidal behaviour might be a further outcome variable that could be assessed independently.

The measurement of physical ill-health seen as a consequence of stress is difficult. The method of Trichopoulos et al(24) in examining the incidence of fatal heart attack after the 1981 Athens earthquake was to abstract death certificates for the period under study and to compare the rates with carefully matched earlier periods. Adams and Adams used hospital emergency room visit rates as an index. Diagnoses at the local mental health clinic of stress related diseases, and medical clinic visits were further indices. Bennet(23) and the Three Mile Island Study(8) used such formats.

Thus most of the studies that have made comment on this component of physical or psychosomatic illness have used independent data. It would also be possible to screen disaster populations or samples on a check list of common complaints, e.g., headaches, heart disease, blood pressure, and so forth - their frequency and the utilisation of health care associated with them. The Cornell Medical Index or a similar health questionnaire could be utilised more systematically for such a population. Their own health records could be checked, with their permission. And finally, physical examination from simple blood pressure recording to detailed health check could be carried out. General epidemiological indices, plus a simple check list may be the most useful measures for most surveys.

General health care utilisation data in terms of doctor visits, admission numbers, bed occupancy, outpatients and emergency visits, medication levels could all be estimated. Such measures might best link with some of the earlier health data.

Social problems can also be investigated from questionnaire interview or independent indices. Questionnaires for marital and family function would need to be developed querying the specific aspects, and similarly for alcohol, substance abuse and criminality. The MAST or related alcohol questionnaire could be utilised, but a more appropriate format may be of diary recording of alcohol intake.

Interviews may be the most sensitive methods of exploring the quality of marital and family function, particularly if there is opportunity for systematic observation. Most of the structured family assessments and scales would be too detailed, unless this is the main purpose of the research. Bolin's study(40) has addressed family recovery after disaster most fully and he used structured interviews.

Independent indices in this area of disorder include marital breakdown in divorce and separation, child abuse, truancy and delinquency rates; for alcohol, drunk driving charges and alcohol related arrests; for criminality, criminal conviction rates.

Functional impairment in work, social and recreational indices could usefully be measured in questionnaire format by a scale such as Weissman's. Specific questions about work related capacities and recreational capacities can also be asked. Interview can systematically explore these areas in greater depth. Independent measures such as employment/sickness statistics, may add further strength to the data base of this outcome parameter.

It is most important that any exploration of disaster outcome include measures or assessments of possible positive outcomes within the form of improvements in above parameters, or perhaps in measures such as psychological wellbeing. Birth rates have been used to some extent in this manner.

Outcome assessment might usefully be carried out in the first instance at 3-4 months after the disaster. If this is the case it is particularly important that it be repeated later to detect any morbidity which has been delayed in its appearance. Assessment at nine months to one year is likely to detect this later appearing disorder, but it should be remembered that 11 months or 13 may be preferable to 12 months post disaster, so that the anniversary phenomenon is avoided.

Explanatory and Intervening Variables

The changes found at outcome, if any, may be explained by characteristics or experience that existed before the disaster, i.e., the "pre-test" range of variables. When there is no pre-test situation, these will need to be investigated in retrospect, perhaps even alongside outcome assessment, though preferably to some degree independent of it. Disaster variables may also need to be explored in retrospect, particularly if there

independent measure of them.

In the time between the disaster and the outcome measure intervening life events, apart from those brought on by the disaster, may occur and should be noted as possible explanatory factors. Similarly support, compensation, disaster relief programmes, counselling for disaster stress may all be interventions capable of modifying outcome and so must be carefully noted. The affected person's noting of these in questionnaire or interview, plus the independent measures such as data from relief programmes can all be correlated to examine the effect of this parameter.

LONG-TERM PSYCHOLOGICAL RESPONSES TO DISASTER

Few studies address the long-term psychological effects of disaster. Descriptive studies and clinical experience suggest that even the most horrifying and traumatic experiences fade in time, but that the disaster is often used as a reference point about which experience is organised. Vivid screen memories may persist for many years, and there may be some minimal phobic avoidance. Overwhelming disasters such as Hiroshima leave the victims permanently traumatised according to Lipton with phenomena of psychic numbing and psychic death. Systematic investigation, 2, 3, 5 or more years after a disaster has not been carried out. Epidemiological measures of community indices and disease rates, as well as social indices could provide a valid method if the data base was complete and the control communities or samples well matched. Permanent relocation of some members of disaster affected communities would lessen the validity of such measures, unless total population sample could be traced, as has been done in Norway(10). Interviews of selected groups would give indepth data, but would probably be most relevant with the severely affected and it is more difficult to find control groups for them.

Response to future disasters may be one long-term parameter worthy of investigation. Alterations in disaster reaction in those with and without the earlier disaster experience could give an indication of improved coping styles or vulnerability.

On the whole then the long-term effects may be best demonstrated in community indices on the one hand, or in-depth interviews of selected groups on the other.

SPECIAL GROUPS

Different measures and methodologies may be necessary for special groups such as children and the injured. Younger children show stress responses behaviourally, but their reactions may be associated with parental response by identification or as a secondary consequence. The investigation of children may have to rely on parental report measures with the young child, including behavioural checklists, and with the older child on parent plus teacher questionnaires in the method of Rutter's studies exploring behaviour in the two settings. McFarlane(37)

has been the first to systematically develop this aspect with children. Interview assessment is more difficult, especially with younger children, although Terr[41] has maintained an interview therapy exploration of children's fantasies and responses following a kidnap disaster, to produce many interesting findings of the fine grained phenomena that can occur. Independent, objective measures can further strengthen the data base for children including absenteeism from school and academic achievement levels. This latter data is important, for workers such as Sonis and Costello have noted the discrepancies in rating of children's behaviour, from different professional raters such as teachers, psychiatrists, paediatricians and psychologists.

The injured might also be a special group. They may not be identified with other community members in sampling, because they are hospitalised. Distress levels and dysfunction from the injury may complicate questionnaire and interview assessments. Severity and nature of injury and its effects have to be taken into account, plus the dislocation/relocation of hospital.

Migrant and ethnic populations may have additional problems of language, communication and identification that should be assessed. Measures by questionnaire and interviews may have to be greatly simplified and/or translated. Visual analogue scales, once understood, may be helpful. Nevertheless, simplicity of measure is vital for those stressed further by cultural differences, as also with the severely injured.

Helpers, often called the other victims of the disaster, may be assessed along the parameters noted for other victims. Special aspects of disaster roles and their transitions, case loads and specific functions may be important influencing factors that require measurement in addition etc..

OTHER POSSIBLE MEASURES OF PSYCHOLOGICAL RESPONSE TO DISASTER

Behavioural response to disaster images or words such as response time, avoidance could be measured in experimental circumstances and compared in disaster affected and non affected persons. Psychophysiological measures such as the Galvanic Skin Response and Conditionability could also be explored in differentially affected groups. A particularly interesting area in terms of stress research would be the neuroendocrine axis, examining for instance corticosterol excretion patterns and blood levels. Engel examined response to experimentally induced sadness in this way by showing his subjects a film of the Aberfan disaster and testing hormonal response. Immune system response may also be tested as with Bartop's study of post-bereavement effects on T-Cell function(42). No doubt there will be many other fascinating possibilities.

CONCLUSIONS

Questionnaires may proliferate, interviews deepen, objective indices strengthen, but the ultimate end points of researching psychological response in disaster lie in the human who will respond to the questions and the horror he has experienced. For the most part the more simple and compassionate the measures, the more he may be able to offer that will increase our understanding of this field. And the more unified and co-ordinated the approach of disaster workers to systematise research in this field the broader will be the data base from which further development can occur.

REFERENCES

1. Wolfenstein, Martha. (1977). Disaster: A Psychological Essay. Arno Press, New York.

2. Kai T. Erikson. (1979). In the Wake of the Flood. George Allen and Unwin, London.

3. Kinston, W., and Rosser, R. (1974). Disaster: Effects on mental and physical state. Journal of Psychosomatic Research, 18:437- 56.

4. Adams, P.R., and Adams, G.R. (1984). Mount Saint Helen's Ashfall. American Psychologist, 39:252-260.

5. Holen, A., Sund, A., and Weisaeth, L. (1983). Predictors of Disaster Morbidity. Paper presented at Seminar on Disaster Behaviour, Stavanger, Norway.

6. Wilkinson, M.K. (1983). Aftermath of a Disaster: The collapse of the Hyatt Regency Hotel Skywalks. American Journal of Psychiatry, 140:1134-1139.

7. Patrick, V., and Patrick, W.K. (1981). Cyclone '78 in Sri Lanka - The mental health trail. British Journal Psychiatry, 138:210-216.

8. Bromet, E.J., Parkinson, D.K., Schulberg, H.C., Dunn, L.O., and Gondek, P.C. (1982). Mental health of residents near the Three Mile Island Reactor: A comparative study of selected groups. Journal of Preventive Psychiatry, 1:225-276.

9. Quarantelli, E.L. (1978). Disasters: Theory and research. Sage Publications, London.

10. Weisaeth, L. (1983). The Study of a Factory Fire. Doctoral Thesis. University of Oslo.

11. Raphael, B. (1979). Preventive Psychiatry of Natural Hazard. Chapter in Natural Hazards in Australia, Ed. J. Heathcote, Australian Academy of Science, Canberra.

12. Raphael, B. (1979-80). A primary prevention action programme: Psychiatric involvement following a major rail disaster. Omega, Vol. 10(3).

13. Singh, B., and Raphael, B. (1981). Postdisaster morbidity of the bereaved: A possible role for preventive psychiatry. Journal Nervous and Mental Disease, vol.169, No.4, pp.203-212.

14. Tuckman, A.J. (1973). Disaster and mental health intervention. Community Mental Health Journal, Vol.9(2), pp.151 -157.

15. Okura, K.P. (1975). Mobilizing in response to major disaster. Community Mental Health Journal, Vol.11(2), pp. 136-144.

REFERENCES (Cont'd)

16. Cohen, R.E., and Ahearn, F.L. (1980). Handbook for Mental Health Care of Disaster Victims. The Johns Hopkins University Press, Baltimore.

17. Parad, H.J., Resnick, H.L., and Parad, L.G. (1976). Emergency and Disaster Management. The Charles Press Publishers Inc., Maryland.

18. Janney, J.G., Masuda, M., and Holmes, T.H. (1977). Impact of a natural catastrophe on life events. Journal of Human Stess, pp.22-34.

19. Abrahams, M.J., Price, J., Whitlock, F.A., and Williams, G. (1976). The Brisbane Floods, January 1974: Their Impact on Health. Medical Journal Australia, 2:936-939.

20. Raphael, B. (1977). Preventive intervention with the recently bereaved. Archives General Psychiatry, Vol. 34: 1450-1454.

21. Williams, R.M., and Parkes, C.M. (1975). Psychosocial effects of disaster: Birth rate in Aberfan. British Medical Journal, pp.303-304.

22. Raphael, B., Singh, B., Bradbury, L., Lambert, F . (1983-84). Who helps the helpers? The effects of a disaster on the rescue workers. Omega, Vol.14(1), pp.9-20.

23. Bennet, G. (1970). Bristol Floods 1968. Controlled survey of effects on health of local community disaster. British Medical Journal, pp.454-458.

24. Trichopoulos, D., Katsouyanni, K., Zagitsanos, X., Pzonou, A., Dalla-Vorgion, P. (1983). Psychological stress and fatal heart attack: The Athens (1981) earthquake natural experiment. The Lancet, pp.441-444.

25. Whelan, J., Seaton, E., and Dax, E.C. (1976). Aftermath: The Tasmanian Bridge Collapse: Australian Instute of Criminology, Canberra, 1976.

26. Henderson, S., Byrne, D.G., and Duncan-Jones, P. (1981). Neurosis and the social environment. Sydney, Academic Press.

27. Parker, G., and Brown, L (1982). Coping behaviors that mediate between life events and depression. Archives General Psychiatry, 39:1386-1391.

28. Henderson, S., and Bostock, T. (1977). Coping behaviour after shipwreck. British Journal Psychiatry, 131:15-20.

29. Tennant, C. (1984). Vulnerability to Depression. Paper presented at Australian Preventive Psychiatry Workshop on Depression, Newcastle, Australia, April.

REFERENCES (Cont'd)

30. Perry, R., and Greene, M. (1982). Citizen Response to Volcanic Eruptions: The Case of Mt St Helens. Irvington Publishers, Inc., New York.

31. McFarlane, A.C., and Raphael, B. (1984) Ash Wednesday Fires. Paper submitted for publication.

32. Raphael, B. (1984). Psychiatric Consultancy in Major Disaster: Editorial Review in Press in Australian and New Zealand Journal of Psychiatry, December.

33. McFarlane, A.C. Research into the Ash Wednesday Fires, 1983.

34. Faschingbauerm, T.R., Devaul, R.A., and Zisook, S. (1977). Development of the Texas Inventory of Grief. American Journal Psychiatry, 134:6.

35. Parker, G. (1977). Cyclone Tracy and Darwin evacuees: On the restoration of the species. British Journal of Psychiatry, 130: 548-55

36. Western, J.S., and Doube, L. (1979). Stress and Cyclone Tracy. In Natural Hazards Management in North Australia, ed, Pickup, G., Canberra, Australian National University.

37. McFarlane, A.C. (1983) The Ash Wednesday Fires: Effects on Children. Paper presented at the Annual Conference of the Royal Australian and New Zealand College of Psychiatrists, Adelaide, October.

38. Fried, M. (1982). Residential attachment: Sources of residential and community satisfaction. Journal of Social Issues, Vol. 38, No. 3, pp. 107-119.

39. Tucker, M.B. (1982). Social support and coping: Applications for the study of female drug abuse. The Society for the Psychological Study of Social Issues, Vol. 38, No.2, pp. 117-137.

40. Bolin, R. (1982). Long-term family recovery from disaster: Institute of Behavioural Science. University of Colorado.

41. Terr, L. (1979). Children of Chowchilla: A study of psychic trauma. Psychoanalytic Study of the Child, 34:547-623.

42. Bartrop, R.W., Lazarus, L., Luckhurst, E., Kiloh, L.G., and Penny, R. (1977). Depressed lymphocyte function after bereavement. Lancet (16 April): 834-36.