A STUDY OF FAMILIES' PHYSICAL AND EMOTIONAL HEALTH SUBSEQUENT TO THE WOODSTOCK TORNADO

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by

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Summary

This study was conducted with the co-operation of 37 families whose homes were destoyed in a tornado. The purpose was to assess the relationship between coping styles and health. The data were collected during structured interviews with family members two years after the tornado. Coping styles were measured by the Ways of Coping Checklist which ascertained scores on two dimensions: problem-focused coping and emotion-focused coping. The following intervening variables were also assessed: social supports, (including the family APGAR), age and perceived impact of the disaster. One dependent variable was also included in the structured interview: current psychological status using the SCL-90. A second dependent variable, the use of services of the Ontario Health Insurance Plan, (OHIP), was obtained with the informed consent of the participants.

Descriptive analysis has shown that family functioning deteriorated during the year following the tornado but returned to pre-tornado levels in the second year. Counselling services markedly increased in the first quarter after the disaster for women but in the second quarter for men.

Logistic analysis showed that the females' use of OHIP services during the first quarter was associated with low levels of social support ($t=1.97$, $p<.05$) and low frequency of problem-focused coping behaviours ($t=1.66$, $p<.10$) controlling for use of services during the same months of the previous year. Males' use of services in the second quarter was affected by social supports and age. The males' level of anxiety two years after the tornado was inversely related to the frequency of problem-focused behaviours.

Marital pairs in which one member scored high for problem-focused coping behaviours used fewer counselling services than pairs in which both members showed many problem-focused behaviours or neither member was problem-focused.

The findings identify the kinds of individuals and families who, in the face of a crisis, may need special attention from health professionals.

INTRODUCTION

In August 1979, a tornado swept through Oxford and Brant Counties of Southwestern Ontario. The stricken families needed help. In addition, they were the unintentional participants in a naturally occurring experiment concerning how families cope with stress. With these two facts in mind, the author sought and obtained funds from Ontario Ministry of Health Provincial Lottery Funds for a four month project having two broad aims: (i) to help the families who lost their home in the tornado by conducting therapeutic interviews with all members and by referring any unmet needs to the appropriate medical or community agency and (ii) to provide data on unmet needs, coping styles and health.

In the context of the longer two-year study funded by National Health Research and Development Program, the initial four month study provided the sample of families and some baseline information. The goals of the two-year study were more ambitious than the four month study. Although there have been informative journalistic studies of Canadian disasters (Scanlon et al, 1979), no scientific studies of victims have been conducted in Canada. Therefore, we have had to rely on American, British and Australian work to provide guidelines to emergency planners (Beach, 1974). The present study sought information on the timing of problems of the victims and their suggestions for necessary community services. These results were presented to a federal-provincial meeting of Emergency Planners at Arnprior, October 1981 (Stewart, 1981; See Appendix 1 for that report).

The second goal was to assess the relationship between coping style and subsequent health. Lazarus' theory of psychological stress was the theoretical framework (Lazarus et al, 1974). The present study makes a unique contribution to knowledge by using this framework in a new context, a study of disaster victims and health. The outcome measures were: (a) psychological health two years after the tornado, and (b) use of health services during the year following the tornado.

The third goal of the study was to consider the family as the unit of analysis and to assess the nature of coping styles among family members in order to discover if certain patterns within families are related to good health outcomes. While the coping styles of individuals have been studied over time (Folkman and Lazarus, 1980), the family patterns of coping have never been addressed, to my knowledge.

METHODS

Three communities which were in the path of a tornado August 1979 were chosen to be studied. Families in these communities

were approached during the four months following the tornado and participated in a long open-ended interview. Two years after the tornado, structured interviews were conducted with all consenting adults and with the mothers regarding children under 16 years of age. The structured interview assessed the following: (i) independent variables, participants memory of their coping style immediately after the tornado, participants perception of social supports, memory of family functioning the year before and the year after the tornado; (2) dependent variables: current psychological health, current use of medical services, use of medications and level of activity. In addition to the subjective dependent variables just mentioned, a more objective measure of health was deemed necessary. For that reason data from the Ontario Health Insurance Plan was used, with the written consent of each participant, to measure the number of services in the year before the tornado and in the year after the tornado.

Sampling:

Approximately nine rural communities suffered damage because of the tornado in 1979. In addition one neighbourhood in the southern part of the city of Woodstock was damaged. The two worst hit rural communities and the urban neighbourhood were chosen to be the focus of the study. Although the goal was to ask each family in these three districts to participate, time restraints limited the study to approximately 50 families. The sampling proceeded by drawing maps of each community, with the help of the City Directory and the Oxford County Voting list. Starting at the most severely damaged street, the interviewer worked out in each direction until a present number of families had consented to participate. Families were excluded only if their home, by some stroke of luck, was not destroyed.

Initial Interview 1979:

These interviews were conducted during the autumn of 1979 starting six weeks after the tornado and continuing for approximately three months. This part of the project was funded by a grant from the Health Sciences Research Fund, The University of Western Ontario. A series of open-ended questions were asked of each member of the family. The interviews were conducted in a variety of settings, usually in the midst of the chaos of rebuilding and most commonly with subgroups of the family, so that more than one visit was needed for all family members to be met.

One variable was assessed in a structured way during these interviews, psychological symptoms assessed in two ways: by the SCL-90 (Derogatis et al, 1976) and by a short form of the General Health Questionnaire (Goldberg et al, 1972).

Because of the uncontrolled conditions under which these initial interviews were conducted, some provided only sketchy information and therefore have been omitted entirely from the analysis.

The subgroup of participants who provided complete information are used in this report in two ways: firstly, to compare their psychological symptoms immediately after the tornado with those two years later and secondly, to compare their open-ended comments on how they coped immediately after the tornado with a structured coping questionnaire administered two years later when they were relying on memory (this latter comparison is described more fully under the heading Validity of the Coping Measure).

Structured Interview, 1981:

These interviews were conducted during the summer of 1981, two years after the tornado. A copy of the interview questions is contained in Appendix 2. All family members 16 years old or over were interviewed individually. For children, the mother was asked a subgroup of the questions. See the questions regarding children in Appendix 3.

The questions asked of the adults fall under three main headings: independent variables, dependent variables and intervening variables. The independent variables were memory of coping style immediately after the tornado, perception of social supports and family functioning.

Coping:

After reviewing the literature on measures of coping, the most relevant was chosen, the Ways of Coping Checklist developed by Folkman and Lazarus (1980). Other measures were considered. Some dealt with coping with everyday problems and were not general enough to use in a crises setting (e.g. Pearlin & Schooler, 1978). Still other measures were rejected because they defined coping as immutable personality traits (Vaillant, 1977), a concept not central to the dynamic theory which this study is based upon.

This theory of psychological stress was developed by Lazarus and considers the person and the environment in a dynamic relationship mediated by the person's appraisal of the situation and his coping style (Lazarus et al., 1974). The Ways of Coping Checklist presents a series of behaviours and asks the respondent whether or not he had reacted in such a manner to a specific crisis. It recognizes, therefore, that behaviours may be different depending on the event and the respondent's appraisal of the event.

The 68-item checklist was modified by omitting six items which were not in keeping with the fact that the crisis was a natural disaster (e.g. item "Got the person responsible to change his or her mind"). The checklist was designed to measure two coping functions: problem-focused coping, P scale (22 items, e.g. "Made a plan of action and followed it") and emotion-focused coping, E-scale (40 items, e.g. "daydreamed or imagined a better time or place than the one you were in"). The scales have been tested for concurrent validity (78% agreement and reliability 80%) (Folkman and Lazarus, 1980).

Social Supports:

Social supports are considered by many prominent writers to be a key mediator between stress and illness (Kaplan and Cassel, 1977; Nuckolls, 1972).

In my view, inadequate tools for measuring social support have hindered progress in this area. Some writers have chosen to assess social support in terms of the social network i.e. the number of interactions (Andrews et al, 1978). Social support can also be defined in terms of crisis support. However, the concept I have chosen is that of social support as the perception of the participant that he is esteemed and part of a group. This measure consists of vignettes and was developed by Kaplan and Cobb (1977). Its reliability (.79) and validity have been adequately assessed (Turner and Noh, 1980).

Family Functioning:

Because the present study focused on the family, it was particularly important to include a measure of the family's support and cohesiveness. I chose a short scale called the Family APGAR, developed in the family medical setting and tested for reliability (.93) and validity (.80) (DelVecchio-Good et al 1979). The validity test consisted of a comparison with responses to a longer and well respected scale called the Family Function Index (FFI) (Pless and Slatterwhite, 1973).

Psychological Health:

The dependent variables ascertained by the structured interview were current psychological health, current use of medical services, use of medications and level of activity.

This variable was assessed using two scales. The first is the Symptom Check List (SCL-90) developed by Derogatis et al (1976). While this check list covers nine psychological symptom dimensions, I chose to include only three dimensions: somatization, anxiety and hostility. Other dimensions less relevant to a community sample recovering from a disaster were excluded, e.g. paranoid ideation. The psychometric properties of the SCL-90

have been documented in reliability and validity studies quoted in the manual (SCL-90 Manual, 1977).

The General Health Questionnaire (GHQ) was developed in the family medicine setting for identifying psychiatric disturbance in an objective manner. (Goldberg, 1972). Normally a 60-item questionnaire, it can be used in a variety of short forms. I chose the 12 best items. The questionnaire as a whole has been validated against psychiatrists' ratings (.80) (Goldberg and Blackwell, 1970).

Current Physical Health:

A series of questions were asked at the beginning of the questionnaire about the use of medical services in the past two weeks. Also we asked about the use of medications in the past two days. Longer periods of time to recall health behaviour have been found to result in memory loss and inaccurate replies (Bennett & Ritchie, 1975). A series of three items concerning level of functioning was included. This series was developed for use in community surveys of health (National Center for Health Statistics 1964, 1965).

Impact of the Tornado:

Several crucial intervening variables were also contained in the questionnaire: impact of the tornado and stressful life events.

The questions about the impact of the tornado are very similar in concept to Lazarus' concept of appraisal of the stressful event. The participants were asked not only for a listing of the damage inflicted to homes, farms and businesses but also for their assessment of the impact the tornado had on their lives, financially and in other respects.

Stressful Life Events after the Tornado:

Using the widely known Schedule of Recent Experience developed by Holmes and Rahe (1967), we identified the occurrence and the date of any stressful life events from the time of the tornado to the time of the interview two years later. Such events have been found to affect health in numerous studies (Thurlow, 1967; Rahe, et al, 1964) and were therefore ascertained as potential confounding variables. Two scores were calculated in life change units: the first represented stressful life events which occurred during the six months following the tornado, and the second represented events which occurred during the 18 months following the tornado. Each score is used where necessary in the analysis involving an outcome variable which occurred after the

time period covered by the score.

Health Calendar and Needs Calendar:

The questionnaire also contained two calendars. The first ascertained the participants recollection of health from the time of the tornado until the interview, two years later. The second calendar focused on the participants needs for assistance during the two year period. These calendars formed the basis for the presentation to the federal-provincial meeting of Emergency Planners, Arnprior, 1981, and will not be discussed in the body of this report. These results can be found in Appendix 1.

Ontario Health Insurance Plan Data (OHIP data):

All participants over 16 years old were asked to sign a consent form permitting OHIP to release information on services rendered during the year before the tornado and the year after the tornado (strictly speaking 17 months after because we covered to the end of 1980). The consent form can be seen in Appendix 4. Appendix 5 contains a detailed explanation of the data provided by OHIP and the steps taken to transform that data into eight dichotemous outcome measures: visits (or not) to health professionals for counselling in the first quarter after the tornado and in the second, third and fourth quarters; visits (or not) to health professionals for reasons other than counselling in the first quarter and in the second, third and fourth quarter. Identical measures were constructed for the four quarters preceding the tornado as well and were used as covariates in the analysis, for the purpose of eliminating the influence of pre-tornado utilization habits and effectively studying change in utilization after the tornado.

RESULTS

Population Studied:

Table 1 shows the population hierarchy of the study participants. We see that 37 (63.8 percent) of households approached consented to both an interview and to the study's access to OHIP data regarding medical services. Table 2 indicates that while the heads of households not participating in the study were slightly older than those of participating households, the age difference was not statistically significant. Table 2 also shows that of the 37 participating households, a slight majority were in early middle age, i.e. the head of the household was 25-44 years old. Table 3 shows the composition of the 37 families. Most commonly, the household was a marital pair with no children living at home. Table 4 shows the composition of the sample of 88 individuals in the study.

Coping Measure:

Table 5 shows the results of a comparison of the problem-focused score (P-scale) and the emotion-focused score (E-scale) recalled by the participants two years after the tornado with responses to open-ended questions shortly after the tornado. On the whole, people who reported emotional behaviour immediately after the tornado scored high on the E-scale when they responded two years later. This finding affirms the validity of these scales even when administered two years after the event.

Tables 6 and 7 show histograms of the P-scale and E-scale for males and females who are heads of households. We see that for both groups scores were higher on the E-scale than P-scale but this merely reflects the greater number of items on the E-scale. Males showed a somewhat higher score on the P-scale than females and lower scores on the E-scale.

Tables 8 and 9 show the responses to individual items on the P-scale and E-scale. Differences between the three groups can be noted especially for items 35 and 46 of the P-scale where males more often responded affirmatively and items 26 and 30 where the young adults aged 16-22 tended to respond to the negative. On the E-scale these items showed differences among the three groups: items 8 and 34 to which more women responded affirmatively, item 29 to which the majority of young adults replied "yes" and item 55 to which men more often replied "yes". Table 10 shows correlations between age, perceived impact of the tornado and the coping styles (P-scale and E-scale). Impact of the tornado (how has it changed your life) was related positively to age (the higher the age the stronger the impact) and negatively to problem-focused coping (for females only). Both males and females showed highly significant correlations between P-scale and E-scale. This implies that people are not exclusively problem-focused or emotion-focused copers but rather are inclined to use both coping behaviours together if they use any at all.

Social Support Measures:

Table 11 shows distributions of responses to the social support items. The three vignettes, in which the participant chose who he was like, showed consistently that women had a perception of highest social support, men perceived a moderate degree of social support and adolescents had the lowest perception of their social support.

Table 12 was used to choose which social support measure most strongly correlated with the others and could represent the concept in the multiple regression analysis reported later. We see that for females "people have faith in me" was significantly related to the other three measures and for males "people you can

count on" related to the remaining three. The best measure for adolescents was "have a close friend".

Table 13 displays scores on the Family APGAR, a measure of family function. The participants were asked to recall the family function before the tornado, during the year after the tornado and finally during the year of the data collection, the second year after the tornado. These scores show two things. Firstly, the females perceive the best family functioning, then the males followed by the adolescents. This trend mirrors that found with the social support measures reported earlier in Table 11. Secondly, the percentages of high scores drop dramatically for the year following the tornado but return to pre-tornado levels in the second year after the tornado.

Kendall correlations, not shown in tables, were computed for the social support variables and family function against P-scale, E-scale, impact of the tornado and age.

For females, no significant correlations were found for any variable in connection with family function immediately after the tornado. However, for the second year after the tornado, family function was significantly correlated with two social support measures: "have a close friend" and "belong to group". Neither family function measure related significantly to coping styles. However, P-scale was related to two social support measures: "belong to a group" (.32, $p<.01$) and "people have faith in me" (.39, $p<.01$). E-scale was related to the third "have a close friend" positively to "people you can count on" (.28, $p<.05$).

For males, P-scale and perceived damage were related to social support (.21, $p=.04$ and .21, $p=.05$ respectively).

For children > 16 years old P-scale and E-scale were both negatively related to family functioning immediately after the tornado (-.30, $p<.05$ and -.30, $p<.05$ respectively) suggesting that adolescents who have a large coping repetoire also perceived their families in a negative light.

Life Events after the Tornado:

The important variable likely to intervene between any effective coping style and health outcomes is life events. Life change units (LCU) measures by Holmes and Rahe's Schedule of Recent Experience, were calculated for two time periods, the 6 months and 18 months after the tornado. The 6-month LCU was used in analyses concerning health outcomes 7-12 months after the tornado. The 18-month LCU was used in analyses of psychological status two years after the disaster. Table 14 shows the median LUC's for females, males and children >16 years.

Psychological Status two years after the tornado:

The outcome variables regarding psychological status two years after the tornado are shown in Table 15. On the three SCL-90 scales, male and female adults had similar scores but adolescents seemed to have somewhat lower scores (i.e. fewer symptoms/problems). The General Health Questionnaire (GHQ) showed female adults with the largest proportion of high scores on psychological distress, adolescents next and males with the lowest proportion. Table 16 shows the correlations among the four measures of psychological status. For females, all three SCL-90 scales correlated significantly and the GHQ correlated with the somatization scale. For males, the three SCL-90 scales correlated almost perfectly but none were related to the GHQ. Children showed somewhat weaker correlations than the adults but nonetheless, several were significant.

Ontario Health Insurance Plan Services:

Table 17 shows the percentage of people who billed OHIP for services during the year before and the year after the tornado. We can see that counselling services were more in demand the year after than the year before for females, somewhat for males but not for children > 16 years. All other outpatient services were not in greater demand by females, but were for males except for the first quarter and for children except for the third quarter.

Relationship and Coping Style to Health:

The degree of association of dichotomous dependent variables (e.g. OHIP services) to relevant independent variables was assessed by logistic analysis. Demand for OHIP services during the corresponding quarter in the preceding year was entered into every equation as a means of controlling for normal utilization and essentially assessing the impact of other independent variables upon increased demand for services. The significance of the relationship between any one independent variable and OHIP services is ascertained by a large sample t-statistic for which a value of 1.96 or greater represents significance at the 5% level and 1.645 significance at the 10% level.

Coping, being the main independent variable, was included in all analyses. Age was included because it was found to be associated both with coping (refer back to Table 10) and to OHIP use. Similarly social support was a confounding variable and in this case, the measure of social support which correlated best with all the other social support measures was chosen i.e. for females, "people have faith in me" and for males "people you can count on" (refer back to Table 12). Other than social support and age, no other variables were found to be confounders.

The findings are shown in Tables 18 and 19. No significant relationships were found in the third and fourth quarter after the tornado. During the first quarter women who had high scores on emotion-focused coping were not likely to use counselling services (t=-1.91). Low scores on problem-focused coping in the first quarter was associated with utilization of OHIP services for reasons other than counselling (t=-1.66). However, more important in that quarter was the significant impact of social supports (t=-1.97). Also noteworthy was the strong association between utilization after the tornado and utilization before the tornado, reminding us of the importance of this pre-tornado data to the study.

Unlike females, males did not show any associations between independent and dependent variables in the first quarter but only in the second quarter when older age (t=1.83) and few social supports (t=-1.95) were related to utilization of services other than counselling.

Of the four outcome variables regarding current psychological status (the three SCL-90 scales and the GHQ) only one showed significant findings. As shown in Table 20, men who recall more frequent problem-focused behaviours in the wake of the tornado had lower anxiety scores two years later (B=-.14 p=.029). The analysis here was multiple regression because the dependent variable was continuous. The reader should note that life stress during the 18 months after the tornado was not found to be a confounding variable and therefore was not included in these regressions. Also on this table we see that, for men, the greater the emotion-focused coping behaviours the greater the anxiety. This finding conflicts with the result for females shown on an earlier table (Table 18) in which emotion-focused coping was related to lower utilization for counselling. The finding casts doubt on the validity of the psychological status measures in a study of this sort in which both coping styles and anxiety are measured in one interview; it may be that the two scales measured the same dimension only referring to different points in time. Apart from revealing this difficulty, Table 20 replicates in males the most important finding regarding the females in the study i.e. a high number of problem-focused coping responses after the tornado is related to lower utilization and lower anxiety.

Analysis with the family as the unit:

The concordance of the members of a marital pair on the coping scales is shown on Table 21. While problem-focused coping of one member did not relate to the same style of coping in the other member, a relationship was evident for emotion-focused coping (p=.085) indicating that if one member reacted to the

disaster in this manner, the other member was also likely to.

Whether or not families use services more when all members have the same coping style is the question addressed by Table 22. It appears that the marital pairs least likely to have a member use counselling services have just one member who has a high degree of problem-focused coping. Marital pairs in which both or neither member has a high score are more likely to use counselling services during the whole year following the tornado.

The analysis of families has not been concluded but the preceding examples illustrate that it holds promise of contributing new insights into families' reactions to stress.

DISCUSSION

The study has provided important findings in three areas: firstly, the timing of the needs of the victims of the tornado, secondly, the responses of individuals to the tornado in terms of coping styles and health and thirdly, the reactions of families to stress.

The presentation to the annual meeting of Federal and Provincial Directors of Emergency Services showed much of the data regarding needs and their timing (see Appendix 1). In addition, the descriptive tables in this report contain some such information. In general, there was a marked increase in psychological distress after the tornado measures several ways: the checklists of psychological symptoms, utilization of counselling services and family functioning. The problems had reverted to pre-tornado levels by the two year follow-up interview.

The impact of the variables hypothesized to intervene between the stressful event and the outcome was found to be strong only for the first and second quarter following the tornado. This follows logically from the knowledge gained from the descriptive analyses mentioned in the previous paragraph i.e. the increased utilization was marked for the six months after the tornado. Two findings occurred both for males and females. One was that the greater the social support from family, friends or a peer group, the less likely the need for medical services. This result concurs with other studies which have found that in stressful situations, social support has a protective effect (Nuckolls et al, 1972). It has implications for future studies of natural disasters in which it will be necessary to obtain social support data and to recognize their powerful mediating influence. All previous studies of the effect of disasters upon outcomes have ignored social support (Melick, 1978; Anderson, 1976; Anderson, 1977).

The second important finding concerned coping styles. In

contrast to Anderson (1977), I found that problem-focused coping and emotion-focused coping were positively correlated suggesting that people in this sample used a mixed style of coping. Anderson's study, of 90 entrepreneurs after the flooding damage of Hurricane Agnes, showed a high negative correlation between task-based decision style and emotion-based style. Several differences in the studies could account for the conflicting findings: businesses were destroyed in Anderson's study, homes in the tornado; men, women and children participated in the tornado study whereas there were only businessmen in Anderson's. Folkman and Lazarus (1980), in contrast to Anderson, have found that most middle-aged people used both problem and emotion-focused coping in the face of stressful life events. The major finding of the tornado study was that people with a large repetoire of problem-focused coping responses were less likely to need services than people with limited problem-focused repetoires. When interpreting this finding it is important to consider the validity of the outcome measure.

Some writers argue that utilization of health services is not so much an outcome measure as another example of a problem-solving behaviour (Gore, 1978). If this were the case, a positive relationship between problem-focused behaviours and utilization would be expected instead of the negative one found. It would appear, therefore, that use of medical services is a coping response distinct from those used by people who demonstrate many problem-focused behaviours.

The outcome measure in this study is, in fact, more valid than any used in other studies of coping and disasters (Melick, 1978; Pearlin and Schooler, 1978). The reason for this is the Ontario Health Insurance Plan. Its data do not suffer from inaccuracies because of participants problems of recall. Furthermore, they provided accurate data for the year before the tornado which were included in every multivariate analysis reported here. Therefore, the findings do not refer to utilization in general but rather to increased utilization after the tornado.

Folkman and Lazarus (1980) have found that coping styles are more variable than consistent from one stressful event to another. Because of this, it is important to be cautious in generalizing the findings of this study to other stressful events.

A method problem in the study leads to further caution in interpreting the results. We do not know what came first, the coping style or the utilization of services. This is because the Ways of Coping Checklist was administered two years after the tornado and participants were asked to recall their coping responses to the tornado. However, I have been able to validate the Coping Checklist with responses to open-ended questions asked no

later than four months after the tornado.

While problem-focused coping is related to reduced use of services for individuals, two problem-focused members in the same marital pair does not mean reduced services for the pair. It seems that a balance of one highly problem-focused member and one passive (low problem-focused) member is related to low utilization. This information is an important addition to the literature on families because most studies of families fail to gather information on all members, instead relying on reports from one respondent, usually the wife-mother (Sofilos - Rothschild, 1969).

RECOMMENDATIONS

- that studies of disasters be mounted quickly, as this one was, and that the funding support two teams (each of one or more individuals), one team responsible for helping victims and one team responsible for collecting valid and complete data.

- that victims of disasters such as the tornado studied here be provided support from community, public health and medical agencies for a much longer period of time than has been usual. The study showed that a sizeable proportion of victims perceived a need for a variety of services 6-8 months after the disaster.

- that future studies focus on family patterns of coping with larger samples, to replicate the findings of this study.

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Table 1

Population Hierarchy

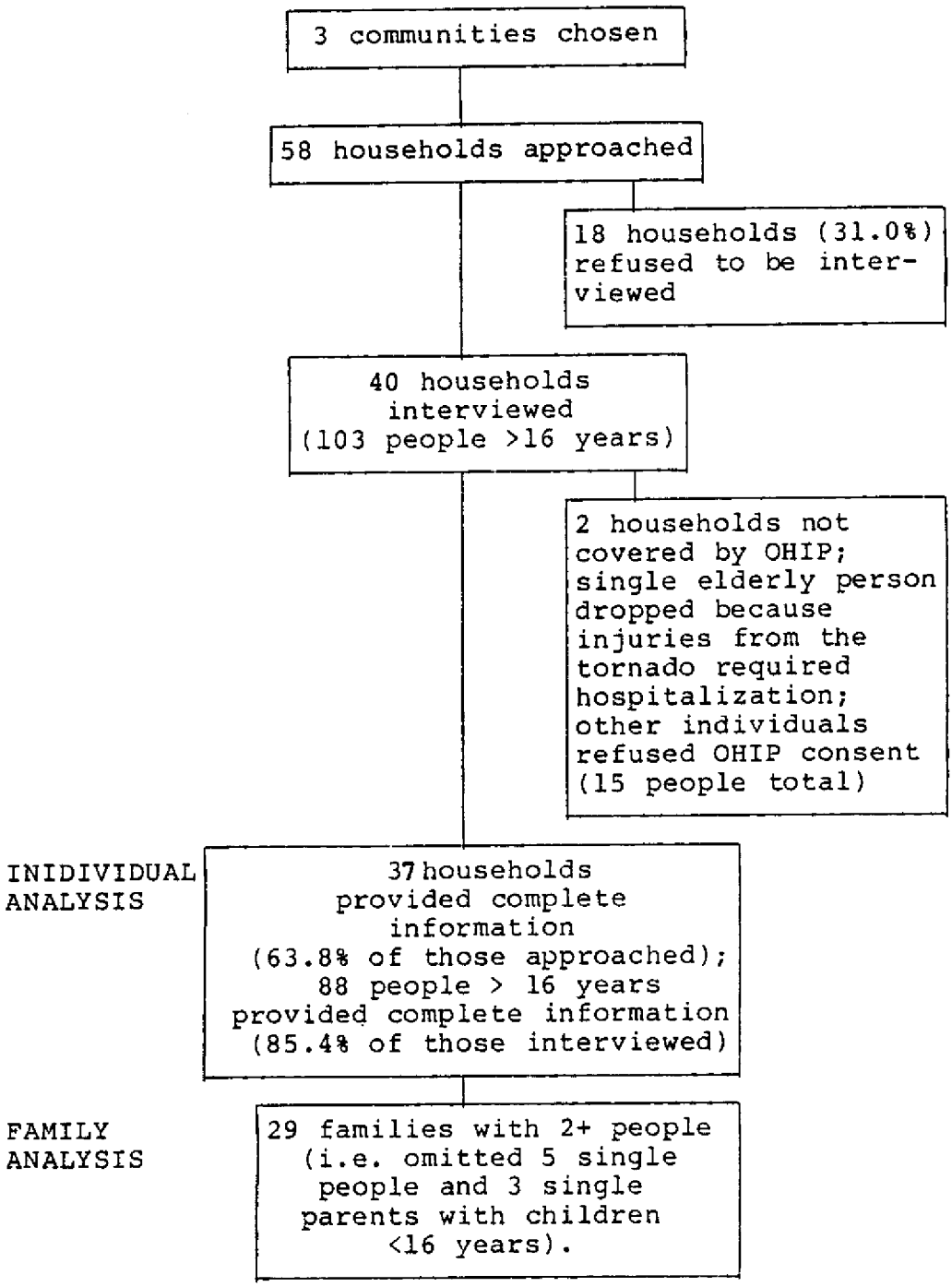


Table 2

Age distributions of heads of households

Age	PARTICIPANTS	%	NON-PARTICIPANTS	%
0-24	2	5.4	1	4.8
25-44	19	51.4	6	28.6
45-64	14	37.8	12	57.1
65+	2	5.4	2	9.5
TOTAL	37	100.0	21	100.0

$X^2_c=2.08$, df=1, p>.10

Table 3

Description of the family composition of the participating families

	#	%
Two parents with at least 1 child >16 years	12	32.4
Married pairs with no children at home	16	43.3
One parent with children <16 years	3	8.1
One parent with child >16 years	1	2.7
Single people with no children at home	5	13.5
	37	100.0

Table 4

Individuals in the Study

	#
Female heads of household	32
Male heads of household	33
Adult children >16 years old	23
TOTAL	88

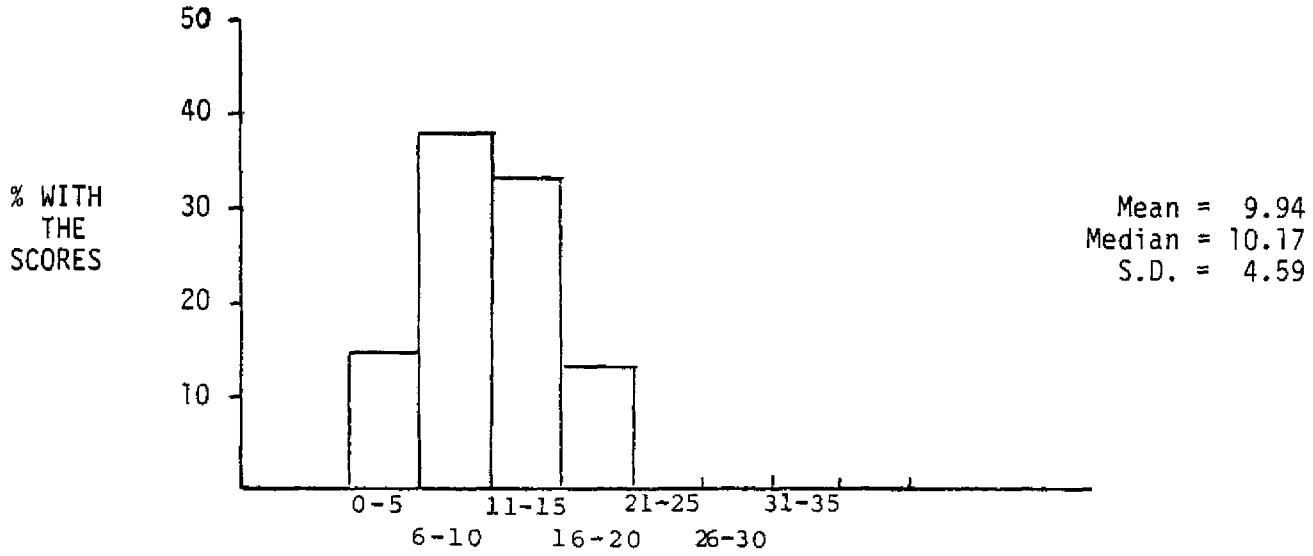
TABLE 5

CORRELATION BETWEEN NUMBER OF COPING REACTIONS ELICITED AT THE INITIAL INTERVIEW IN 1979 AND THE SCORES ON P-SCALE AT THE FOLLOW-UP INTERVIEW IN 1981

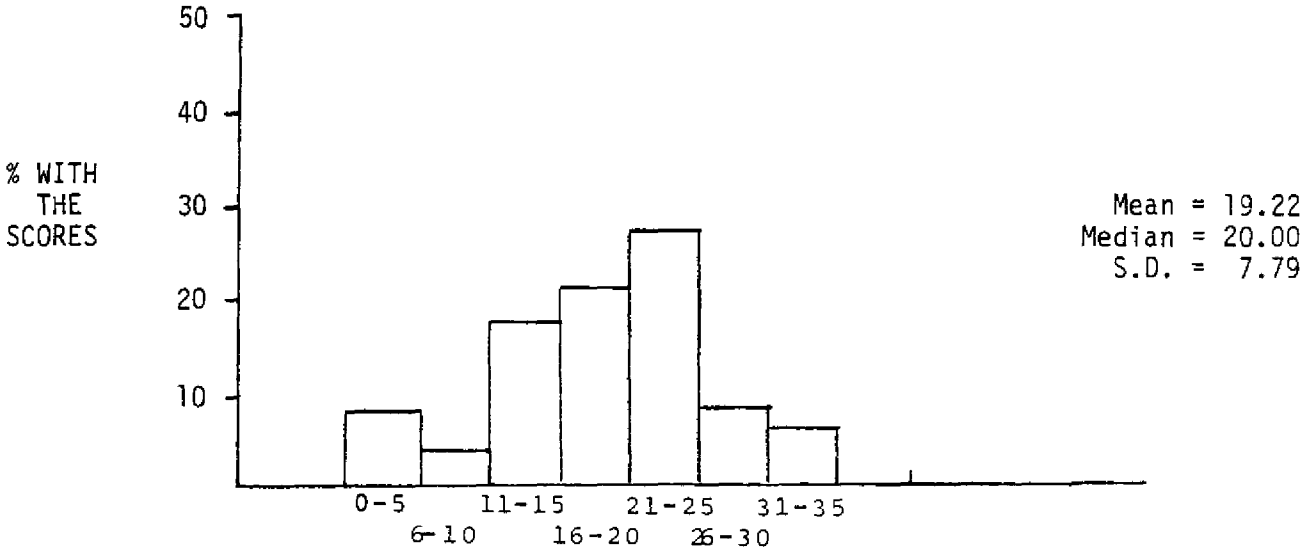
	SPEARMAN RANK CORRELATION COEFFICIENT	p-VALUE
Number of emotional reactions in 1979 with score on E-Scale in 1981. N=43	.24	.06
Number of problem-solving reactions in 1979 with score on P-Scale in 1981. N=49	.27	.02

TABLE 6

HISTOGRAMS OF SCORES ON THE PROBLEM-FOCUSED SCALE AND THE EMOTION-FOCUSED SCALE OF THE WAYS OF COPING CHECKLIST-ADULT FEMALES N=32



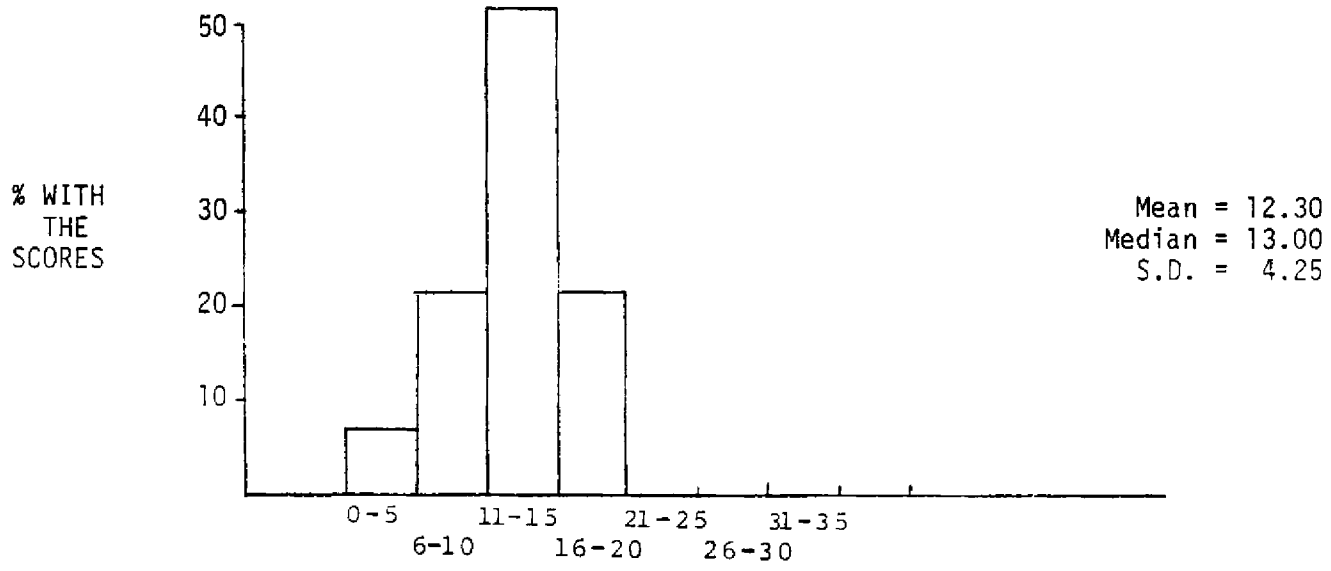
SCORES ON THE PROBLEM-FOCUSED SCALE (PSCALE)



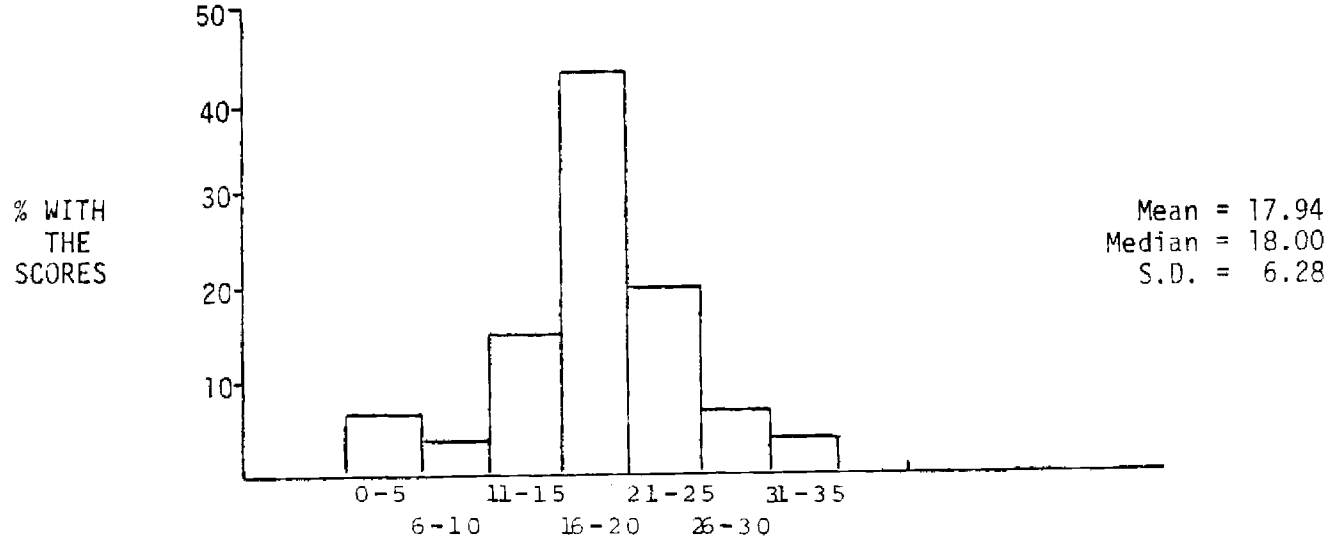
SCORES ON THE EMOTION-FOCUSED SCALE (ESCALE)

TABLE 7

HISTOGRAMS OF SCORES ON THE PROBLEM-FOCUSED SCALE AND THE EMOTION-FOCUSED SCALE OF THE WAYS OF COPING CHECKLIST-ADULT MALES N=33



SCORES ON THE PROBLEM-FOCUSED SCALE (PSCALE)



SCORES ON THE EMOTION-FOCUSED SCALE (ESCALE)

TABLE 8

P-SCALE

(PROBLEM-FOCUSED COPING)

22 ITEMS

		Percent YES Responses		
		Adult Females N=32	Adult Males N=33	Children Aged 16-22 N=23
1.*	Just concentrated on what you had to do next -- the next step.	81.3	84.8	69.6
2.	You went over the problem again and again in your mind to try to understand it.	50.0	51.5	34.8
5.	Bargained or compromised to get something positive from the situation.	53.1	66.7	47.8
7.	Talked to someone to find out more about the situation.	62.5	69.7	52.2
9.	Tried not to burn your bridges behind you, but leave things open somewhat.	71.9	66.7	69.6
20.	You were inspired to do something creative.	28.1	51.5	26.1
22.	Got professional help and did what they recommended.	12.5	27.3	0.0
24.	Waited to see what would happen.	40.6	36.4	73.9
25.	Did something totally new that you never would have done if this hadn't happened.	31.3	45.5	52.2
26.	Made a plan of action and followed it.	53.1	66.7	21.7
27.	Accepted the next best thing to what you wanted.	43.8	57.6	65.2
30.	Talked to someone who could do something concrete about the problem.	34.4	60.6	17.4
33.	Took a big chance or did something very risky.	3.1	15.2	17.4
35.	Tried not to act too hastily or follow your first hunch.	59.4	81.8	39.1
39.	Changed something so things would turn out all right.	34.4	42.4	21.7
42.	Asked someone you respected for advice and followed it.	43.8	66.7	26.1

* Item numbers refer to items on Ways of Coping checklist shown as part of Appendix 2.

*		Percent YES Responses		
		Adult Females N=32	Adult Males N=33	Children Aged 16-22 N=23
46.	Stood your ground and fought for what you wanted.	62.5	75.8	47.8
48.	Drew on your past experiences; you were in a similar situation before.	6.3	12.1	0.0
49.	Just took things one step at a time.	90.6	100.0	95.7
50.	You knew what had to be done, so you doubled your efforts and tried harder to make things work.	71.9	78.8	69.6
52.	Came up with a couple of different solutions to the problem.	28.1	42.4	47.8
58.	Changed something about yourself so that you could deal with the situation better.	31.3	30.3	47.8

*Item numbers refer to items on Ways of Coping checklist shown as part of Appendix 2.

TABLE 9

E-SCALE

(EMOTION-FOCUSED COPING)

38 ITEMS

		Percent YES Responses		
		Adult Females N=32	Adult Males N=33	Children Aged 16-22 N=23
* 3.	Turned to work or substitute activities to take your mind off things.	56.3	57.6	52.2
4.	You felt that time would make a difference, the only thing to do was to wait.	62.5	54.5	69.6
6.	Did something which you thought wouldn't work, but at least you were doing something.	25.0	24.2	39.1
8.	Concentrated on something good that could come out of the whole thing.	90.6	66.7	73.9
10.	Hoped a miracle would happen.	28.1	21.2	39.1
11.	Went along with fate; sometimes you just have bad luck.	68.8	69.7	52.2
12.	Went on as if nothing had happened.	25.0	21.2	26.1
13.	Felt bad that you couldn't avoid the problem.	31.3	42.4	13.0
14.	Kept your feelings to yourself.	40.6	51.5	39.1
15.	Looked for the"silver lining", so to speak; tried to look on the bright side of things.	81.3	69.7	73.9
16.	Slept more than usual.	6.3	6.1	13.0
17.	Got mad at things or people that caused the problem.	28.1	18.2	13.0
18.	Accepted sympathy and understanding from someone.	75.0	72.7	78.3
19.	Told yourself things that helped you to feel better.	50.0	45.5	52.2
21.	Tried to forget the whole thing.	43.8	27.3	21.7
23.	Changed or grew as a person in a good way.	62.5	66.7	69.6

* Item numbers refer to items on Ways of Coping checklist shown in Appendix 2.

Table 9 - E-Scale (Continued) ....

		Percent YES Responses		
		Adult Females N=32	Adult Males N=33	Children Aged 16-22 N=23
28.*	Let your feelings out somehow.	59.4	45.5	43.5
29.	Came out of the experience better than when you went in.	53.1	48.5	73.9
31.	Got away from it for awhile; tried to rest or take a vacation.	28.1	15.2	13.0
32.	Tried to make yourself feel better by eating, drinking, smoking, taking medication, etc.	25.0	27.3	30.4
34.	Found new faith or some important truth about life.	78.1	60.6	52.2
36.	Joked about it.	53.1	48.5	65.2
37.	Maintained your pride and kept a stiff upper lip.	71.9	87.9	62.5
38.	Rediscovered what is important in life.	84.4	78.8	82.6
40.	Avoided being with people in general.	21.9	21.2	17.4
41.	Didn't let it get to you; refused to think too much about it.	53.1	60.6	34.8
43.	Kept others from knowing how bad things were.	40.6	36.4	26.1
44.	Made light out of the situation; refused to get too serious about it.	31.3	48.5	52.2
45.	Talked to someone about how you were feeling.	62.5	51.5	39.1
47.	Took it out on other people.	6.3	3.0	8.7
51.	Refused to believe that it had happened.	21.9	12.1	17.4
53.	Accepted it, since nothing could be done.	71.9	84.8	95.7
54.	Wished you were a stronger person -- more optimistic and forceful.	56.3	30.3	34.8
55.	Accepted your strong feelings, but didn't let them interfere with other things too much.	65.6	78.8	52.2
56.	Wished that you could change what had happened.	65.6	60.6	60.9

* Item numbers refer to items on Ways of Coping checklist shown in Appendix 2.

	Percent YES Responses		
	Adult Females N=32	Adult Males N=33	Children Aged 16-22 N=23
57.* Wished that you could change the way you felt.	50.0	39.4	43.5
59. Daydreamed or imagined a better time or place than the one you were in.	37.5	27.3	34.8
60. Had fantasies or wishes about how things might turn out.	28.1	39.4	52.2
61. Thought about fantastic or unreal things (like the perfect revenge or finding a million dollars) that made you feel better.	12.5	12.1	39.1
62. Wished that the situation would go away or somehow be over with.	68.8	60.6	56.5

* Item numbers refer to items on Ways of Coping checklist shown in Appendix 2.

TABLE 10

RELATIONSHIP BETWEEN AGE, PERCEIVED IMPACT OF THE TORNADO AND COPING BEHAVIOURS

ADULT FEMALES N=32

VARIABLE	1	2	3	4
1. Age	-			
2. Perceived impact	.33*	-		
3. Number of problem-solving coping behaviours	-.15	-.27**	-	
4. Number of emotion-focused coping behaviours	-.16	-.12	.71***	-

ADULT MALES N=33

1. Age	-			
2. Perceived impact	.23**	-		
3. Number of problem-solving coping behaviours	-.19	-.09	-	
4. Number of emotion-focused coping behaviours	-.01	-.09	.69***	

CHILDREN AGED 16 - 22 N=23

1. Age	-			
2. Perceived impact	.24	-		
3. Number of problem-solving coping behaviours	.29**	.23	-	
4. Number of emotion-focused coping behaviours	.04	.04	.56*	-

* Pearson r correlation, $p < .05$
** Pearson r correlation, $.10 > p > .05$
*** Pearson r correlation, $p < .001$

TABLE 11

FREQUENCY DISTRIBUTIONS OF RESPONSES TO -

FOUR MEASURES OF SOCIAL SUPPORT

I AM LIKE	EVERYONE HAS CONFIDENCE AND FAITH IN THESE PEOPLE 1	2	3	4	PEOPLE RARELY HAVE FAITH IN THEM 5	Total
Female N=28*	28.6	28.6	35.7	3.6	3.6	100.0
Male N=32*	15.6	43.8	37.5	3.1	0.0	100.0
Children ≥16 N=22*	4.5	40.9	22.7	31.8	0.0	100.0

I AM LIKE	THESE PEOPLE RARELY HAVE A CLOSE FRIEND 1	2	3	4	ALWAYS HAVE A CLOSE FRIEND 5	Total
Female N=29*	3.4	6.9	24.1	10.3	55.2	100.0
Male N=32*	6.3	9.4	31.3	9.4	43.8	100.0
Children ≥16 N=22*	0.0	22.7	27.3	13.6	36.4	100.0

I AM LIKE	THESE PEOPLE DO NOT BELONG TO ANY GROUP THEY CAN LEAN ON 1	2	3	4	ALWAYS KNOW THERE ARE A LOT OF PEOPLE TO LEAN ON 5	Total
Female N=30*	6.7	10.0	26.7	16.7	40.0	100.0
Male N=33	12.1	12.1	18.2	30.3	27.3	100.0
Children ≥16 N=23	4.3	13.0	17.4	52.2	13.0	100.0

NUMBER OF PEOPLE WHO CAN BE COUNTED ON "VERY MUCH"

	0	1	2	3	4	5	6	Total
Females N=24*	4.2	0.0	25.0	12.5	29.2	16.7	12.5	100.0
Males N=31*	16.1	3.2	29.0	16.1	6.5	22.6	6.5	100.0
Children ≥16 N=18*	38.9	33.3	11.1	11.1	5.6	0.0	0.0	100.0

* Some participants did not reply to this item.

TABLE 12

CORRELATIONS AMONG THE FOUR MEASURES OF SOCIAL SUPPORT

FEMALES N=32	KENDALL CORRELATION COEFFICIENTS			
	1	2	3	4
1. People have faith in me	-			
2. Have a close friend	.38**	-		
3. Belong to group	.37**	.28*	-	
4. People you can count on	.32*	.24*	.09	-

MALES N=33				
	1	2	3	4
1. People have faith in me	-			
2. Have a close friend	.13	-		
3. Belong to a group	.26*	.54**	-	
4. People you can count on	.29*	.47**	.28*	-

CHILDREN AGED ≥ 16 N=23				
	1	2	3	4
1. People have faith in me	-			
2. Have a close friend	.24*	-		
3. Belong to a group	.02	.24*	-	
4. People you can count on	.07	.06	.04	-

* Kendall correlation coefficient $p < .05$

** Kendall correlation coefficient $p < .01$

TABLE 13

FREQUENCY DISTRIBUTIONS OF MEASURES OF FAMILY FUNCTION USING THE FAMILY APGAR

THE YEAR BEFORE THE TORNADO

	LOW SCORES 1 - 5	6	7	8	9	HIGH SCORES 10	Total
Females N=22*	0.0	0.0	0.0	0.0	9.1	90.9	100.0
Males N=29*	10.3	3.4	0.0	3.4	6.9	75.9	100.0
Children ≥16 N=19*	15.8	0.0	5.3	5.3	10.5	63.2	100.0

THE YEAR AFTER THE TORNADO

	LOW SCORES 1 - 5	6	7	8	9	HIGH SCORES 10	Total
Females N=22*	4.5	0.0	9.1	4.5	13.6	68.2	100.0
Males N=30*	13.4	0.0	0.0	0.0	16.7	70.0	100.0
Children ≥16 N=19*	10.6	0.0	10.5	15.8	10.5	52.6	100.0

THE SECOND YEAR AFTER THE TORNADO

	LOW SCORES 1 - 5	6	7	8	9	HIGH SCORES 10	Total
Females N=22*	0.0	0.0	4.5	0.0	4.5	90.9	100.0
Males N=29*	13.8	0.0	0.0	0.0	3.4	82.8	100.0
Children ≥16 N=19*	10.6	5.3	0.0	5.3	21.1	57.9	100.0

* Some participants did not reply to this item.

TABLE 14

MEDIAN LIFE CHANGE UNITS

IN THE SIX MONTHS FOLLOWING THE TORNADO

	MEDIAN
Females N=32	155.5
Males N=33	142.0
Children 16≥N=23	78.0

IN THE EIGHTEEN MONTHS FOLLOWING THE TORNADO

Females N=32	237.5
Males N=33	228.0
Children 16≥N=23	161.0

TABLE 15

FREQUENCY DISTRIBUTIONS OF MEASURES OF
PSYCHOLOGICAL STATUS TWO YEARS AFTER THE TORNADO

SCL-90 SOMATIZATION SCALE

	0 -.25	.26 -.50	.51 -.75	.76 - 1.00	Total
Females N=32	65.6	25.0	3.1	6.2	100.0
Males N=32	68.8	15.6	3.1	12.5	100.0
Children ≥ 16 N=23	52.2	34.8	13.0	0.0	100.0

SCL-90 ANXIETY SCALE

	0 -.25	.26 -.50	.51 -.75	.76 - 1.00	Total
Females N=31	51.6	22.6	16.1	9.7	100.0
Males N=32	53.1	31.3	3.1	12.5	100.0
Children ≥ 16 N=23	60.9	30.5	4.3	4.3	100.0

SCL-90 HOSTILITY SCALE

	0 -.25	.26 -.50	.51 -.75	.76 - 1.00	Total
Females N=31	64.5	19.4	3.2	12.9	100.0
Males N=32	65.6	21.9	3.1	9.4	100.0
Children ≥ 16 N=23	47.8	30.5	0.0	21.7	100.0

GENERAL HEALTH QUESTIONNAIRE

	Low Score	High Score	Total
Females N=32	62.5	37.5	100.0
Males N=33	81.8	18.2	100.0
Children ≥ 16 N=23	73.9	26.1	100.0

TABLE 16

CORRELATIONS AMONG THE MEASURES OF

PSYCHOLOGICAL STATUS

	PEARSON CORRELATION COEFFICIENTS			
FEMALES N=32	1	2	3	4
1. Somatization SCL-90	-			
2. Anxiety SCL-90	.64*	-		
3. Hostility SCL-90	.65*	.99*	-	
4. General Health Q (GHQ)	.31**	.09	.11	-
MALES N=33				
1. Somatization SCL-90	-			
2. Anxiety SCL-90	.99*	-		
3. Hostility SCL-90	.99*	.99*	-	
4. General Health Q (GHQ)	.20	.23	.19	
CHILDREN $\geq$ 16 YEARS N=23				
1. Somatization SCL-90	-			
2. Anxiety SCL-90	.47**	-		
3. Hostility SCL-90	.33	.43**		
4. General Health Q (GHQ)	.38**	.19	.19	

* $p < .001$

** $p < .05$

TABLE 17

UTILIZATION OF OHIP SERVICES IN THE FOUR QUARTERS

BEFORE THE TORNADO AND THE FOUR QUARTERS AFTER

	PROPORTION USING THE SERVICES							
COUNSELLING SERVICES	Aug.-Oct.78	Nov.-Jan.79	Feb.-Apr.79	May - Jul.79	Aug.-Oct.79	Nov.-Jan.80	Feb.-Apr.80	May - Jul.80
Females N=32	3.1	9.4	9.4	3.1	12.5	12.5	15.7	19.7
Males N=33	3.0	3.0	3.0	3.0	3.0	9.1	12.1	3.0
Children ≥ 16 N=23	0.0	0.0	4.3	4.3	4.3	0.0	0.0	4.3
ALL OTHER OUT PATIENT SERVICES								
Females N=32	56.2	56.2	56.2	56.2	62.5	56.2	59.4	53.1
Males N=33	42.4	27.3	39.4	33.3	36.4	48.5	51.5	51.5
Children ≥ 16 N=23	34.8	26.1	34.8	26.1	43.5	39.1	34.8	47.8

TABLE 18

MULTIPLE LOGISTIC ANALYSES OF COPING AND

DEMAND FOR OHIP SERVICES - FEMALES N=28

LARGE SAMPLE t-STATISTIC

INDEPENDENT VARIABLES	FIRST QUARTER DEMAND FOR OHIP SERVICES	
	COUNSELLING SERVICES	ALL OTHER OUT PATIENT SERVICES
Problem-focused coping	1.44	-1.66*
Emotion-focused coping	-1.91*	1.26
Age	-1.39	-1.15
Social support	-1.09	-1.97**
Demand for the same kind of OHIP service in the same quarter of the previous year	-0.197	1.71*
	SECOND QUARTER DEMAND FOR OHIP SERVICES	
Problem-focused coping	1.16	0.50
Emotion-focused coping	0.81	-0.49
Age	-0.14	1.18
Social support	-1.46	-0.87
Demand for the same kind of OHIP service in the same quarter of the previous year	0.75	-0.39

* $.10 > p > .05$

** $p < .05$

TABLE 19

MULTIPLE LOGISTIC ANALYSES OF COPING AND

DEMAND FOR OHIP SERVICES - MALES N=31

LARGE SAMPLE t-STATISTIC

INDEPENDENT VARIABLES	FIRST QUARTER DEMAND FOR OHIP SERVICES	
	COUNSELLING SERVICES*	ALL OTHER OUT PATIENT SERVICES
Problem-focused coping	-	0.09
Emotion-focused coping	-	-0.46
Age	-	1.47
Social support	-	-0.38
Demand for the same kind of OHIP service in the same quarter of the previous year	-	0.72
	SECOND QUARTER DEMAND FOR OHIP SERVICES	
Problem-focused coping	0.59	-0.42
Emotion-focused coping	0.84	0.18
Age	0.60	1.83**
Social support	-0.24	-1.95**
Demand for the same kind of OHIP service in the same quarter of the previous year	-0.13	1.21

* Because at least two of the independent variables were so highly correlated the equation did not compute - a problem called multicollinearity.

** $.10 > p > .05$

TABLE 20

MULTIPLE REGRESSION OF COPING,

SUPPORT AND PSYCHOLOGICAL STATUS

(SCL - 90 ANXIETY SCALE)

INDEPENDENT VARIABLE	DEPENDENT VARIABLE SCL-90 ANXIETY SCALE B	SIGNIFICANCE
MALES N=29		
Problem-focused coping	-.49	.029
Emotion-focused coping	.26	.076
Support	-.004	.899
FEMALES N=27		
Problem-focused coping	.006	.776
Emotion-focused coping	.015	.172
Support	.072	.292

TABLE 21

CORRELATION BETWEEN COPING STYLES

OF HUSBANDS AND WIVES

N OF MARITAL PAIRS=28

	PEARSON CORRELATION BETWEEN HUSBANDS' SCORES AND WIVES' SCORES	p - VALUE
Problem-focused coping behaviours	0.155	.21
Emotion-focused coping behaviours	0.262	.08

TABLE 22

RELATIONSHIP BETWEEN CONCORDANCE OF COPING STYLES

IN MARITAL PAIRS AND USE OF COUNSELLING SERVICES IN

THE YEAR FOLLOWING THE TORNADO

PROBLEM-FOCUSED COPING BEHAVIOURS	NO SERVICES #	%	ONE OR MORE SERVICES #	%	Total	
Both husband and wife have high scores	2	25.0	6	75.0	8	100.0
One of the pair has high scores	8	80.0	2	20.0	10	100.0
Neither have high scores	6	60.0	4	40.0	10	100.0

$X^2 = 5.54$ on 2df, $.10 > p > .05$

EMOTION-FOCUSED COPING BEHAVIOURS						
Both husband and wife have high scores	4	50.0	4	50.0	8	100.0
One of the pair has high scores	7	70.0	3	30.0	10	100.0
Neither have high scores	5	50.0	5	50.0	10	100.0

$X^2 = 1.06$ on 2df, $p > .10$