

**Hurricane Iniki:
Psychological Functioning Following Disaster**

By

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Final Report

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Introduction

On September 11, 1992, hurricane Iniki struck the Hawaiian island of Kauai with sustained winds of 165 miles-per-hour. Hurricane Iniki damaged homes and businesses across the island (Kite, 1992). Property damage was estimated to be \$1.8 billion, approximately 1,400 homes were destroyed, and at least 5,000 homes were significantly damaged. Three persons were killed as a direct result of the hurricane. Hurricane Iniki was the costliest hurricane in Hawaiian history, and it was the strongest storm to hit Hawaii this century (Rappaport & Lawrence, 1992).

The population of Kauai is estimated to be 51,000. The populated areas are located along the coast, due to the mountainous interior. Kauai is 33 miles long and 25 miles wide.

The present study assessed the reactions of persons who survived the hurricane seven weeks after the storm. The subjects participating in the study either had severe damage to their home and were living with other families or had damage to their home but were still living in their homes. The objective was to obtain information about the subjects' psychological and psychophysiological distress, coping responses, use of mental health services, assistance received from various agencies, loss of property, and preparation for the hurricane.

Method

Sample and Procedure

Seven weeks after hurricane Iniki, 380 persons were asked to complete the questionnaires, and 322 persons (119 male, 203 female) agreed to do so--a participation rate of approximately 85%. The subjects were 131 (59 male, 72 female) adults who completed the survey in their homes, 112 (32 male, 80 female) students at Kauai Community College, 49 (13 male, 36 female) 10th grade high school students, and 30 (15 male, 15 female) 12th grade high school students.

We visited the communities of Ele-Ele, Hanapepe, Poipu, and Princeville, went door-to-door, and asked people living in their homes to complete the questionnaire. We asked each adult who was home to complete the questionnaire. There were occupants in approximately two-thirds of the homes. The four communities sustained significant damage. We also visited Kauai Community College and a high school. The high school students and college students completed the questionnaire in their class. The questionnaires were administered on five consecutive days: Friday, October 30, 1992 through Tuesday, November 2, 1992, from 9:00 a.m. to 7:00 p.m. The interviewers were two undergraduate students and a social psychologist.

Table 1 presents the demographic characteristics of the sample. The majority of the sample was female, single, had a high school education, and had an annual income of less than \$40,000. Thirty-two percent of the subjects did not report their annual income.

The average age of the subjects was 22 years, with a range from 14 to 87 years. The subjects lived in their city for an average of 9 years, with a range from less than 1 year to 72 years. The majority of the sample had been through a natural disaster other than hurricane Iniki (68%).

Table 1

Demographic Characteristics of the Sample

Characteristic	N	Percent
Gender		
Males	119	37
Females	203	63
Marital Status		
Single	198	63
Married	100	32
Separated/Divorced	18	6
Education		
Did not complete elementary school	3	1
Completed elementary school	18	6
Some high school	74	23
Completed high school	142	45
Earned college degree	65	21
Graduate degree	15	5
Annual Income		
Less than \$10,000	61	20
\$10,000 - \$19,999	43	14
\$20,000 - \$39,999	55	17
\$40,000 - \$59,000	26	8
\$60,000 or more	20	6
Do not know	106	32
Persons in Household		
1 person	11	3
2-3 persons	100	34
4-6 persons	162	51
7 or more persons	15	5
Employment Status		
Full-time	93	29
Part-time	52	16
Unemployed	45	14
Student	130	41

Materials

The questionnaire had three sections. The first section asked for demographic information, extent of preparation for the impending storm, subjects' location when the hurricane struck, and extent of property damage. The second section contained questions about use of coping strategies, visits to mental health professionals, and assistance received from people in various organizations. Use of coping strategies was assessed with the COPE inventory (Carver, Scheier, & Weintraub, 1989). Subjects were asked to indicate how much each item described them since the hurricane. The 60-item COPE inventory has adequate reliability, convergent validity, and discriminant validity (Carver et al., 1989). The subjects used a 5-point scale (1 = not at all to 5 = extremely) to indicate their answers to the questions in the second section. The third section was the Symptom Check List (SCL-90-R) (Derogatis, 1983). The 90-item SCL-90-R assessed the intensity of psychological and somatic symptoms during the seven days prior to completing the questionnaire. The subjects used a 5-point scale (0 = not at all to 4 = extremely) to indicate their answers. The questionnaire took approximately 40 minutes to complete.

Results

Preparation for the Hurricane

When the hurricane warning came, about half of the sample took the hurricane warning seriously (49%), and about half were prepared with food, water, and supplies (43%). The majority of the subjects did not evacuate their homes (67%).

Correlations were performed to explore the relationship between taking the hurricane warning seriously and demographic variables. Taking the hurricane warning seriously was significantly *positively correlated* with higher education level ($r = .18, p < .05$), being married ($r = .22, p < .01$), and being older ($r = .28, p < .01$), but it was *not significantly correlated* with gender ($r = .01, p > .05$).

Property Loss and Personal Harm

The majority of subjects were able to live in their home after the storm (81%), and 19% could not live in their home due to severe damage. The subjects were without electric power for an average of 21 days, with a range from 1 to 70 days. The subjects were without running water for an average of 6 days, with a range from 0 to 64 days. The subjects returned to work after an average of 16 days, with a range from 0 to 43 days. Twenty-one percent of the sample lost their job due to the storm. Less than one-fifth of the subjects were physically injured (13%) or had a family member or close friend who was physically injured (19%) during the hurricane or clean-up. About one-quarter of the sample had seen a medical doctor since the storm (23%). The majority of the sample had property insurance coverage for their house and possessions (60%), whereas 13% had no coverage and 30% did not know.

Table 2 presents a rank ordering of the frequency of loss of property. At least half of the sample lost trees or bushes on their property, home contents, furniture, and clothing. Less than one-tenth of the subjects lost personal transportation or pets.

Table 2
Rank Ordering of the Frequency of Property Loss

Item	Percent
Trees or Bushes on Property	67
Home Contents	60
Furniture	54
Clothing	50
Home Appliances	46
Sentimental Possessions	34
Personal Transportation	10
Pets	5

Psychological Distress

Table 3 presents a rank ordering of the frequency of the SCL-90-R items reported by at least 25% of the sample as the most distressing symptoms. About half of the sample was feeling easily annoyed or irritated and having headaches. About one-third of the sample was worrying too much about things, feeling low in energy or slowed down, and had soreness in muscles. About one-quarter of the subjects had trouble falling asleep.

An overall measure of psychological distress, the Global Severity Index (GSI), was created by totalling the responses to the SCL-90-R items. The mean GSI score was 55, with a standard deviation of 56.

Coping Responses

The responses to the COPE inventory items were evaluated by a principle components factor analysis with varimax rotation. The items were required to load at or above .50 on a primary factor without loading above .35 on another factor. The results showed that 13 principle factors were present. We named the first factor *active coping and planning*; Factor 2, *seeking social support for emotional reasons*; Factor 3, *acceptance*; Factor 4, *alcohol-drug disengagement*; Factor 5, *use of humor*; Factor 6, *turning to religion*; Factor 7, *denial*; and Factor 8, *restraint and suppression*. Factors 9 to 13 were not interpretable. Table 4 shows the factor loadings, means, and standard deviations for each item for Factors 1 - 8.

Table 3

Rank Ordering of Most Distressing Psychological Symptoms

SCL-90-R Item	Percent
Feeling easily annoyed or irritated	48
Headaches	45
Worrying too much about things	38
Feeling low in energy or slowed down	36
Soreness in your muscles	34
Awakening in the early morning	30
Having to check and double-check what you do	30
Feeling critical of others	30
Worried about sloppiness or carelessness	30
Repeated unpleasant thoughts that won't leave your mind	30
Trouble falling asleep	26

Table 4

Factor Loadings, Means, and Standard Deviations for COPE Inventory Items

Scale name and items	Loading	M	SD
Active coping and planning			
I have tried to come up with a strategy about what to do.	.80	2.70	1.17
I have made a plan of action.	.76	2.78	1.23
I have thought hard about what steps to take.	.71	2.83	1.15
I have taken direct action to get around the challenges.	.59	2.61	1.06
I have focused on dealing with the situation, and if necessary let other things slide a little.	.68	2.75	1.21
I have taken additional action to try to get rid of the problems.	.56	2.59	1.19
I have thought about how I might best handle the situation.	.56	3.34	1.17
I have concentrated my efforts on doing something about the situation.	.54	3.21	1.18

Table 4, Cont'd

Scale name and items	Loading	M	SD
Seeking social support for emotional reasons			
I have talked to someone about how I feel.	.79	2.56	1.22
I have discussed my feelings with someone.	.67	2.92	1.30
I have let my feelings out.	.65	2.66	1.20
I have gotten sympathy and understanding from someone.	.64	2.90	1.28
I have felt a lot of emotional distress and I have been expressing those feelings a lot.	.63	2.32	1.15
I have tried to get emotional support from friends or relatives.	.58	2.42	1.21
I have gotten upset and let my emotions out.	.55	2.65	1.17
Acceptance			
I have accepted that the hurricane has happened and that it cannot be changed.	.83	4.13	1.12
I have accepted the reality of the fact the hurricane happened.	.75	4.12	1.16
I have learned to live with the situation.	.74	3.77	1.19
I have done what has to be done, one step at a time.	.58	3.57	1.13
I have looked for something good in what is happening.	.56	3.30	1.23
I have learned something from the experience.	.55	3.97	1.17
I have gotten used to the idea that the hurricane happened.	.54	3.85	1.19
I have tried to see the situation in a different light, to make it seem more positive.	.53	3.23	1.22
Alcohol-drug disengagement			
I have tried to lose myself for a while by drinking alcohol or taking drugs.	.94	1.33	0.88
I have drank alcohol or taken drugs, in order to think about the situation less.	.93	1.35	0.89
I have used alcohol or drugs to make myself feel better.	.93	1.46	0.99
I have used alcohol or drugs to help me get through the situation.	.91	1.38	0.86
Use of humor			
I have made fun of the situation.	.78	2.45	1.34
I have kidded around about the hurricane.	.87	2.48	1.35
I have made jokes about the situation.	.85	2.36	1.31
I have laughed about the situation.	.83	2.24	1.31
Turning to religion			
I have put my trust in God.	.85	3.62	1.39
I have sought God's help.	.83	3.05	1.43
I have tried to find comfort in my religion.	.78	2.57	1.35
I have prayed more than usual.	.77	2.74	1.39

Table 4, Cont'd

Scale name and items	Loading	M	SD
Denial			
I have acted as though it has not even happened.	.75	1.75	1.06
I have pretended that the hurricane has not really happened.	.74	1.50	1.00
I have refused to believe that the hurricane has happened.	.66	1.42	0.96
Restraint and Suppression			
I have forced myself to wait for the right time to do something.	.69	2.43	1.13
I have made sure not to make things worse by acting too soon.	.62	2.62	1.16
I have tried hard to prevent other things from interfering with my efforts at dealing with this.	.56	2.53	1.09
I have gone to movies or watched TV, to think about the situation less.	.54	2.31	1.28

Responses Related to the Impact of the Hurricane

The responses to the impact of the hurricane items were evaluated by a principle components factor analysis with varimax rotation. The items were required to load at or above .50 on a primary factor without loading above .35 on another factor. The results showed that 10 principle factors were present. We named the first factor *helpful personnel*; Factor 2, *self-denigration*; Factor 3, *receiving assistance*; Factor 4, *active rebuilding*; and Factor 5, *blaming government*. Factors 6 - 10 were not interpretable. Table 5 shows the factor loadings, means, and standard deviations for each item for Factors 1 - 5.

Table 5
Factor Loadings, Means, and Standard Deviations
for Responses Related to the Impact of Hurricane Items

Scale name and items	Loading	M	SD
Helpful personnel			
I believe that social workers have been helpful.	.80	3.39	1.30
I believe that the police have been helpful.	.71	3.12	1.34
I believe that insurance adjusters have been helpful.	.69	3.29	1.30
I believe that strangers have been helpful.	.66	3.44	1.30
I believe that government officials have been helpful.	.56	3.60	1.23

Table 5, Cont'd

Scale name and items	Loading	M	SD
Self-denigration			
I have done things that I do not like to get supplies.	.77	1.28	0.72
I believe that I am hurting more than other people.	.64	1.51	1.02
I have gone to a psychic or to a fortune teller.	.62	1.12	0.56
I have bribed someone to get the supplies that I need.	.62	1.22	0.65
I have avoided news reports about the hurricane and the clean-up.	.57	1.53	1.02
I have paid more to get supplies.	.52	1.72	1.08
I believe that it is my fault that there are not enough supplies.	.50	1.28	0.74
Receiving assistance			
I have known at least one person who has sought counseling due to the hurricane.	.73	1.68	1.15
I have spoken with a mental health professional about how I'm feeling.	.72	1.21	0.67
I believe that people who are feeling like I am should speak with a mental health professional.	.60	1.84	1.15
Active rebuilding			
I have helped others clean-up from the storm.	.59	3.44	1.22
I have taken on more responsibilities.	.57	3.24	1.33
I believe the military personnel have been helpful.	.56	4.53	0.89
I believe that my family has become closer.	.54	3.77	1.29
I have been busy rebuilding my life.	.50	2.94	1.34
Blaming government			
I believe that the government is favoring certain groups of people by giving them more supplies.	.76	2.17	1.36
I believe that the government is to blame for the situation.	.74	1.53	1.02
I believe that the scarcity of supplies could have been prevented if the government had planned better.	.59	2.73	1.44

Relationship between Psychological Distress and Other Variables

Correlations were performed to explore the relationship between distress, coping responses, use of mental health services, loss of property, and demographic variables. The correlation coefficients ranged from $-.26$ to $.63$. Table 6 shows that distress was significantly *positively correlated* with property loss, active coping and planning factor, seeking social support for emotional reasons factor, alcohol-drug disengagement factor, turning to religion factor, denial factor, self-denigration factor, receiving assistance factor,

active rebuilding factor, and blaming government factor; it was significantly *negatively correlated* with age; but it was *not significantly correlated* with gender, marital status, income, education, acceptance factor, use of humor factor, and helpful personnel factor.

Summary of Findings

1. Taking the hurricane warning seriously was significantly positively associated with higher education level, being married, and being older.
2. The majority of subjects were able to live in their home after the storm (81%), and 19% could not live in their home due to severe damage.
3. The subjects were without electricity for an average of 21 days, and they were without running water for an average of 6 days.
4. The subjects returned to work after an average of 16 days, and about one-quarter of the subjects lost their job due to the storm.
5. Less than one-fifth of the subjects were physically injured or had a family member or close friend who was physically injured during the hurricane or clean-up.
6. At least half of the sample lost trees or bushes on their property, home contents, furniture, and clothing.
7. About half of the sample was feeling easily annoyed or irritated and having headaches. About one-third of the sample was worrying too much about things, feeling low in energy, and had soreness in muscles. About one-quarter of the subjects had trouble falling asleep.
8. Psychological distress was significantly positively associated with property loss, active coping and planning, seeking social support for emotional reasons, alcohol-drug use, turning to religion, self-denigration, receiving assistance, actively rebuilding, and blaming the government; it was significantly negatively correlated with age; it was not significantly correlated with gender, marital status, income, education, acceptance, or use of humor.

Table 6

Correlations Between GSI and Other Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. GSI	—																			
2. Gender	.06	—																		
3. Age	-.17**	-.08	—																	
4. Marital status	-.05	.02	.52**	—																
5. Annual income	.04	-.08	-.23**	-.26**	—															
6. Education	-.04	-.06	.28**	.31**	-.24**	—														
7. Property loss	.18**	-.04	.01	-.05	-.01	.05	—													
8. Active coping	.15*	-.07	.10	.18**	-.13*	.30**	.14*	—												
9. Seeking social	.37**	.16*	-.01	.13*	-.07	.16**	.12*	.56**	—											
10. Acceptance	.09	.03	-.07	.05	-.20**	.22**	.08	.63**	.43**	—										
11. Alcohol-drug	.24**	-.13*	-.14*	-.09	.13*	-.08	.19**	-.01	.03	-.05	—									
12. Use of humor	.08	-.09	-.25**	-.20**	.12*	-.02	.06	.26**	.19**	.36**	.24**	—								
13. Religion	.22**	.26**	-.03	-.05	-.07	-.01	-.01	.17**	.31**	.18**	-.07	.03	—							
14. Denial factor	.32**	-.05	-.14*	-.09	.15*	-.18**	.03	.07	.25**	-.10	.13*	.01	.20**	—						
15. Restraint factor	.25**	.00	-.05	.00	.03	.00	.18**	.48**	.46**	.35**	.08	.15**	.24**	.30**	—					
16. Helpful factor	-.01	-.02	.00	.08	-.11	.15*	-.10	.36**	.30**	.40**	-.06	.15**	.18**	.00	.20**	—				
17. Self-denigration	.48**	-.08	-.21**	-.15*	.18**	-.19**	.12**	.05	.13*	-.10	.31**	.14**	.15*	.45**	.24**	-.05	—			
18. Assistance	.38**	-.11	.04	.11	.01	.13*	.18**	.41**	.47**	.21**	.16**	.15**	.13*	.26**	.31**	.18**	.36**	—		
19. Active rebuilding	.20**	.03	-.08	.07	-.10	.11	.14*	.53**	.41**	.53**	.02	.05	.18**	.06	.34**	.46**	.03	.23**	—	
20. Blame govern.	.14*	-.04	-.18**	-.16**	.07	-.16**	.07	.00	.00	-.02	.21**	.04	.02	.21**	.12*	-.08	.30**	.09	.10	—

* $p < .05$ ** $p < .01$

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