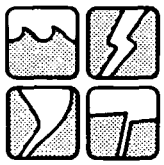

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RELIABILITY OF DELAYED SELF-REPORTS IN DISASTER RESEARCH

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Running Head: Reliability of Delayed Self-Reports

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Abstract

In studies of traumatic stress, researchers often find themselves asking questions about an event and its aftermath long after the crisis has passed. The purpose of this study was to assess the reliability of these delayed self-reports. In January, 1990, 65 residents of Charleston, SC were interviewed by telephone about their experiences following Hurricane Hugo, which had devastated the area on September 22, 1989. The interview included assessments of disaster-related losses, preparedness, social support received from others, and social support provided to others. In October, 1990, 53 of these persons (82% of the original sample) were reinterviewed and asked the exact same questions. For reports of losses and preparedness, accuracy of the later reports was excellent. Both the sample and individuals showed remarkable stability over time. For measures of social support, there was a sample tendency to recall more social support as time passed, but individuals generally retained their same rank order. Thus, these reports were also reliable.

Reliability of Delayed Self-Reports in Disaster Research

The methodological difficulties in disaster research are many. Funding mechanisms are slow, and researchers often find themselves asking questions about the event and its aftermath long after the disaster has passed. The purpose of this study was to assess the reliability of these delayed self-reports.

Our own interest in this topic stemmed from experiences in proposing a one- and two-year follow-up study to NIMH concerning the mental health impact of Hurricane Hugo. One clear methodological issue was the extent to which we could accurately assess the losses and social support exchanges that occurred around the time of the event. Very little data appeared to support a claim that disaster victims remember their experiences accurately over time. In fact, some evidence (Hopwood & Guidotti, 1988) suggested that systematic biases couid well be present. These investigators compared symptoms reported at the time of the event with symptoms recollected 6 months later among 22 victims of toxic exposure. There was a clear tendency for victims to recall more symptoms than they had reported initially. Although these findings raise caution for delayed accounts of traumatic experiences, we should also not overgeneralize from these respondents' abilities to recollect and distinguish among symptoms as similar as dizziness, lightheadedness, and eye discomfort.

In contrast, there is indirect evidence in research on autobiographical memory (Rubin, 1986) that delayed self-reports may be quite accurate under certain conditions that disaster studies inadvertently mimic. Disasters conform to the very types of events regarded as "markers" or "landmarks" in a person's temporal frame of reference that help to organize an autobiographical memory search (see Robinson, 1986; Whitten & Leonard, 1981). Studies reported by Loftus & Marburger (1983) in the article entitled, "Since the eruption of Mt. St. Helens, has anyone beaten you up?" constitute an excellent example of the use of "public landmarks" (e.g., eruption of a

volcano, New Year's day) to improve the accuracy of temporal judgments in reporting past experiences. Nonetheless, there is no direct empirical evidence to support the claim that disaster victims remember their experiences accurately over time.

The present study assessed the test-retest reliability of self-reported measures of disaster loss, preparedness, received social support, and provided social support using a 9-month interval between tests. Because the support measures tapped experiences over a 3-month interval (bounded by Hugo and New Year's Eve) the first interview took place in January, 1990; the second interview took place in October, 1990. The respondents (two-wave n of 53) all lived on the Charleston peninsula at the time Hugo struck, but their disaster-related losses varied in nature and severity. This variation should have strengthened the study's ability to detect inaccuracies in subsequent, delayed reports.

Methods

Sampling and Interviewing Procedures

The sample was selected to represent a reasonable cross-section of residents of the Charleston, SC peninsula. Six weeks after Hurricane Hugo struck, we toured the peninsula and chose 3 census tracts for further investigation. Criteria for selecting the 3 tracts were that damage should still be visible and that they should be occupied by demographically different subpopulations. One tract (5) was primarily occupied by whites of middle to upper-middle socioeconomic status (as judged by the quality of housing). The second tract (8) was heterogeneous, but predominantly poor. The third tract (17) was occupied primarily by blacks of middle class status.

Using the Charleston cross-reference directory, each tract was completely enumerated. A proportion of names was then selected (e.g., every 16th in Tract 8) so that the end result was a sampling frame consisting of approximately equal numbers of residents from each tract.

It is difficult to assess Wave 1 response rates because of considerable inaccuracy in the Charleston directory. Contact was attempted with 160 households. Of these numbers, 27 either turned out be nonworking or did not then or earlier belong to the name with which it was listed. No contact was made within 5 attempts for 36 of the remaining 133 persons. Of the 97 households successfully contacted, 4 of the designated respondents had died, 28 refused, and 65 were interviewed. Thus, the response rate was 70% of those contacted (and living) but only 41% of the original listing. All respondents but 5 had experienced some type of disaster loss.

The response rates among those contacted varied across the three tracts from 83% (Tract 5) to 71% (Tract 8) to 61% (Tract 17). Because the response rate was substantially higher in the predominantly middle to upper-middle SES tract (5), our sample may overrepresent higher SES persons.

The total number of interviews conducted was 65. Each interview, which averaged 17 minutes, was conducted by telephone and by the same interviewer. The characteristics of the sample are presented in Table I. As shown, the sample was diverse in race (37% black), sex (48% female), marital status (45% married), and age (one third each 20-34, 35-49, 50+). Half of the sample owned their homes, and half rented. The sample, overall, was well educated, with a mean of 14 years. This finding also suggests that higher SES persons may be overrepresented.

Of these 65 persons, 53 (82%) were interviewed again nine months later. As also shown in Table I, characteristics of the two-wave sample were quite comparable to those of the original sample. For this reason, it is not likely that attrition has influenced our findings.

After the first 15 interviews at Time 1, it became apparent that we had to revise the social support questions to make it clear that the support received or provided did not have to be

Table I. Sample Characteristics

	Original Sample		Two-Wave Sample	
	n	%	n	%
Race				
White	41	63	34	64
Black	24	37	19	36
Sex				
Male	34	52	28	53
Female	31	48	25	47
Marital Status				
Never Married	23	35	18	34
Married	29	45	23	43
Separated/Divorced	8	12	7	13
Widowed	5	8	5	9
Age	(M = 44, SD = 16)		(M = 45, SD = 16)	
20-34	20	31	16	31
35-49	21	33	17	33
50-64	13	20	11	21
65+	10	16	8	15
Education	(M = 14, SD = 3)		(M = 14, SD = 3)	
Less than 12	10	15	8	15
12 Years	8	12	6	11
13-15 Years	9	14	8	15
16+	38	59	31	59
Homeownership				
Rent	32	50	24	46
Own	32	50	28	54

"because" of Hurricane Hugo but could have been received or provided for any reason. The interviewer noticed that many respondents were confused; some were orienting their answers to concern Hugo only, while others were taking a broader perspective. Therefore, for any analyses using the social support scales, the sample size is 50, which excludes the first 15 persons interviewed. Of these 50 persons, 44 (88%) were reinterviewed at Time 2.

Measures

Disaster Loss. Hugo-related losses were assessed by a 14-item battery. The first 11 items concerned specific types of losses, subsequently grouped into 5 variables (each coded 1 if that loss was present, 0 otherwise). Injury reflected the presence of an injury to either the respondent or to any other household member. Structural damage referred to damage done to the outside of the respondent's dwelling or to any other building on the property. Property damage encompassed damage to trees or gardens, rugs, furniture, or appliances, or a car, truck, or boat. Loss of personal belongings encompassed losses of clothing or books or things of sentimental value such as photographs or keepsakes. Loss of income was measured by a single item, "Did you lose any income due to disruption of employment or closing a business?" The final item asked whether they suffered some other type of loss, primarily as a check on our own completeness. This question elicited 18 affirmative responses at Time 1 (28% of the sample) and 13 affirmative responses at Time 2 (25% of the sample). Most frequently mentioned were losses at places of work. Others included rental properties, summer homes, time out of school, food, and inconveniences.

The remaining three items in the loss battery were included as summary measures. Perceived total impact was based on answers to the question, "Which of the following statements best describes the total impact of Hurricane Hugo on your own property and belongings?" It was answered on a 5-point scale where 4 = enormous damage, 3 = much damage, 2 = some damage, and 1 = just a little damage; respondents with no losses received scores of 0. Impact compared

was based on answers to the question, "Compared to other residents of Charleston, were you hit harder than others (+1), affected about the same as others (0), or affected less than others (-1)?" Loss in dollars was the respondent's best estimate, including insured as well as uninsured losses. A fourth summary measure, scope, was the number of affirmative responses to the eleven items described previously.

Preparedness. There were two measures of preparedness. Evacuated was a 3-point scale where 0 = did not evacuate, 1 = left home, and 2 = left Charleston. Preparedness was the sum of 3 items assessing whether the respondents had taped or boarded the windows of their homes, had taken any other steps to prepare, or viewed themselves as more prepared than others in Charleston. Each affirmative response contributed one point to the scale score.

Received social support. A 12-item measure of received support was based on the Inventory of Socially Supportive Behaviors (ISSB), a scale that attempts to represent the "broad diversity of functions that characterize informal support systems" (Barrera, Sandler, & Ramsay, 1981). On the basis of a previous factor analysis (Barrera & Ainlay, 1983), four items each were selected from three ISSB subscales. The three subscales were guidance (receipt of advice or information); tangible support (concrete help such as money or transportation); and nondirective support (comfort or expression of caring). Questions were worded to emphasize that the help received could have been for any reason, not just Hurricane Hugo. All items had the same response options, 0 = never, 1 = once or twice, 2 = a few times, and 3 = many times. Therefore, each 4-item subscale had the same potential range (0-12) which heightens the descriptive value of the data.

Respondents were asked to think about the support they received in terms of two time intervals. The first (A) covered the first 4-5 weeks following the hurricane, or between Hugo and Halloween. The second (B) was "further down the road," between Halloween and New Year's Eve.

Thus, for each measure, there was an A scale and a B scale referring to the two time intervals. Means for the received support and provided support scales and subscales were consistently higher for the A interval than for the B interval, which may indicate that Hugo-related helping behaviors were concentrated in the first measurement interval. Nevertheless, the A scales and B scales were highly correlated; for the total scale, $r = .74$, $p < .001$.

Provided social support. Measures of provided support were created to be directly parallel to the measures of received support. Roles of recipient and provider were reversed; for example, "Did anyone give or loan you some money?" became "Did you give or loan anyone some money?" Thus, for provided support, there were also three subscales, guidance, tangible support, and nondirective support scored for two time intervals, A and B. As for received support, the A scales had higher means than the B scales but were highly correlated with them; for the total scale, $r = .75$, $p < .001$. In half of the questionnaires, the received support items preceded the provided support items; in half, the reverse was true.

Results

Loss and Preparedness

Table II presents sample frequencies on the measures of loss and preparedness. Time 1 frequencies are given for the original Time 1 sample and for the subset of respondents who completed both interviews. Time 2 frequencies, of course, are given only for the two-wave sample. In the original sample, all but 8% of those interviewed experienced some type of loss related to Hurricane Hugo (4% of the two-wave sample). Structural damage was the most common type of loss, and physical injury was the least common (reported by only 11-12%). Perceived total impact was normally distributed across the five-point scale. Most respondents felt that they experienced fewer losses than others in their community. With one exception, losses in dollars ranged from 0 to $75,000.

Table II also shows that the majority of respondents had evacuated, at least from their own homes, prior to the hurricane's arrival. Nonetheless, the fact that a third remained in their homes despite the efforts of city officials is somewhat striking. There was good dispersion on the preparedness scale, with most of the sample receiving scores in the 1-2 range.

Methodologically, it is important to note the comparability of the losses reported by the original and two-wave samples. Means and frequency distributions were virtually identical. Within the two-wave sample, the distributions of Time 2 responses were strikingly similar to the distributions of Time 1 responses. An exception to this general rule was a substantial mean difference for dollars lost. The median loss in dollars, however, was constant across sample and time. The change in means was primarily due to one "outlier" who reported losses of $200,000 at Time 1 (4 standard deviations above the mean) but only $50,000 at Time 2. This seemed too large a difference to attribute to unreliability (especially since at Time 2, this person had still been unable to return to her original residence because it was being rebuilt). Given the unfortunate but very reasonable possibility that her answer was improperly recorded at Time 2, we excluded her from the reliability analyses presented in Table III.

With the possible but unlikely exception of dollars lost, the consistency in the sample data is notable. This finding indicates that no systematic biases were present with regard to remembering fewer or greater losses over time.

Table III presents data relevant to assessing the accuracy of the delayed (Time 2) self-reports of disaster-related loss and preparedness. Here we are concerned with intrapersonal as opposed to sample consistency over time. Different measures of association are given. First is the

Table II. Sample Frequencies: Loss and Preparedness Measures

	Original Sample Time 1 (%)	Two-Wave Sample Time 1 (%)	Two-Wave Sample Time 2 (%)
Percent of Sample with:			
Injury in Household	12	11	11
Structural Damage	86	89	93
Property Damage	66	68	72
Loss of Personal Belongings	43	45	42
Loss of Income	32	32	28
Scope	M = 4.4	M = 4.5	M = 4.3
	SD = 2.2	SD = 2.1	SD = 2.0
None	8	4	2
Low (1-3 "yeses")	23	28	34
Moderate (4-6)	49	49	53
High (7-10)	20	19	11
Perceived Total Impact	M = 2.0	M = 2.1	M = 2.0
	SD = 1.2	SD = 1.1	SD = 1.1
None (0)	8	4	4
Little	32	34	33
Some	25	26	31
Much	23	23	20
Enormous (4)	12	13	12
Impact Compared	M = -0.6	M = -0.6	M = -0.6
	SD = 0.6	SD = 0.6	SD = 0.5
Less than others (-1)	69	65	61
Same as others (0)	25	29	37
More than others (+1)	6	6	2
Loss in Dollars	M = $17,209	M =$16,729	M = $13,804
	SD = 31,502	SD = 33,228	SD = 18,895
	Median = 5,000	Median = 5,000	Median = 5,000
0	11	7	10
100-1,000	19	20	20
1,100-9,000	33	40	28
10,000-25,000	20	15	28
36,000-75,000	16	15	15
200,000	2	2	0

table continues

Table II Continued

Evacuated			
No	34	34	34
Left home	20	23	23
Left Charleston	45	43	43
Preparedness	M = 1.7 SD = 0.9	M = 1.7 SD = 0.8	M = 1.8 SD = 0.9
None (0)	8	8	11
Low (1)	31	31	21
Moderate (2)	43	45	47
High (3)	18	16	21

simple percent of agreement across Time 1 and Time 2 responses. For example, 89% of respondents gave the same answers to questions concerning household injuries each time. Second is the proportion of affirmative responses at Time 1 that became negative at Time 2 expressed in actual n's. For example, of the 6 persons who reported injuries at Time 1, 3 did not at Time 2. Next is the proportion of negative responses at Time 1 that became affirmative at Time 2. For this same item, 3 of the 47 Time 1 "no's" said "yes" at Time 2. Finally, two statistical measures of association are given. The first is Cohen's kappa (Cohen, 1960). Originally developed as a measure of interrater agreement, it has since been applied as a more general measure of association when marginals (probabilities of a given response) are unequal (Fleiss, 1981; Hopwood & Guidotti, 1988). Values greater than 0.4 suggest good agreement. This measure is most useful for comparing one item to another that has a different probability of affirmative response. Continuing with the household injury example, it has a lower kappa than other items despite its high percentage of agreement because the probability of this loss occurring was quite low. Thus chance alone would predict high agreement across time. The second statistical measure of association was the product-moment correlation; this was phi for dichotomous measures, Cramer's V for categorical measures, and Pearson r for items with four of more categories.

The data presented in Table III provide evidence of excellent reliability. Percentages of agreement ranged from 82% (impact compared) to 93% (structural damage). All kappa coefficients were greater than .4. Given the restricted range of most variables, the product-moment correlations were also substantial. The test-retest correlation (.82) for scope was particularly notable. This finding indicates that the battery tended to elicit a consistent number of "yes" responses even when different items were endorsed.

Table III. Reliability of Loss and Preparedness Measures (Two-Wave Sample).

Concordance of Response on Nominal Measures

	% Same T1 - T2	T2 "no" of T1 "yes"	T2 "yes" of T1 "no"	k	Phi or V
Injury in Household	88.7	3/6	3/47	.44	.44***
Structural Damage	92.5	1/47	3/6	.56	.57***
Property Damage	92.4	1/36	3/17	.82	.82***
Loss of Belongings	84.9	5/24	3/29	.69	.70***
Loss of Income	88.7	4/17	2/36	.73	.73***
Impact Compared[a]	82.0	6/34	3/16	.61	.78***
Evacuated[b]	86.8	5/30	2/23	.80	.78***

Time 1 - Time 2 Correlations on Continuous Measures

	V	r
Scope	.63***	.82***
Perceived Total Impact	.67***	.60***
Loss in Dollars	.84***	.73***
Preparedness	.43***	.60***

[a] Because of the low frequency in the "more" category, this variable was recoded into dichotomous form. The second column represents the proportion of the "less" category changing their responses and the third column represents the proportion of the "same or more" category changing their response.

[b] This variable had 3 categories. The second column splits into 2/18 (proportion of the "stayed home" category changing their response) and 3/12 (proportion of the "left home" category changing their response). The third column is the proportion of the "left Charleston" category changing to another category. Cramer's V is given instead of Phi.

Social Support Measures

Table IV presents descriptive statistics and reliability coefficients for the social support measures (A scales only). Here, the original sample consists only of the 50 respondents interviewed after the scales were revised (see Sampling and Interviewing Procedures). The table presents the Time 1 means of the original sample and both the Time 1 and Time 2 means of the two-wave sample. As for the loss measures, the Time 1 responses of the original and two-wave samples were quite comparable, thereby reducing the threat that attrition could have influenced these findings. Within the two-wave sample, however, systematic differences between Time 1 and Time 2 responses were evident. At Time 2, respondents tended to remember having received or provided greater social support after the crisis than they had reported at the earlier interview. For 3 of these measures (all received support scales), the Time 1 - Time 2 difference achieved statistical significance: for the total scale, t (43) = 3.30, $p < .002$; for guidance, t (38) = 4.63, $p < .001$; for nondirective support, t (41) = 2.68, $p < .02$. Thus, unlike recollections of losses and preparedness, there was some systematic bias in the delayed reports of received social support.

For assessing the test-retest reliability of these measures, the internal consistency of each scale is of particular importance. That is, any unreliability evidenced at a given point in time will serve to attenuate reliability that can be demonstrated over time (Pedhazur, 1982). For this reason, Table IV also presents the Time 1 alphas for each scale. With the exception of received tangible support, all scales demonstrated good to excellent internal consistency (alphas of .69 to .80) The four items accessing tangible support, adapted from Barrera et al.'s (1981) general scale of received support, may not have been congruent with the particular needs of disaster victims, and thus elicited responses that were not internally consistent (alpha = .29).

Table IV. Descriptive Statistics and Reliability Coefficients for Social Support Measures.

	Original Sample		Two-Wave Sample					
	Time 1		Time 1		Time 2		Time 1	T-R
	M	SD	M	SD	M	SD	Alpha	r
Received Support	15.1	6.3	14.8	6.3	17.1	6.8	.76	.75
Guidance	4.4	3.1	4.2	3.0	5.2	2.9	.69	.84
Tangible	3.1	2.1	3.1	2.1	3.3	2.5	.29	.60
Nondirective	6.8	3.8	7.6	3.4	8.5	3.1	.80	.70
Provided Support	17.9	7.5	17.5	7.5	18.6	6.2	.84	.62
Guidance	5.1	3.3	5.2	3.4	5.7	2.6	.82	.37
Tangible	4.4	3.1	4.2	3.1	4.3	2.5	.68	.82
Nondirective	8.4	3.3	8.1	3.3	8.7	2.9	.59	.66

All coefficients significant at $p < .001$.

Given the long interval between tests (9 months), the test-retest (T-R) correlations were quite high. With one exception, the correlations were in the .60 to .85 range. The T-R correlations of the received support measures (.60 to .84) were somewhat higher than the T-R correlations of the provided support measures (.37 to .75). The .37 correlation between Time 1 and Time 2 measures of provided guidance was troubling. Much of this unreliability could be attributed to two respondents: the person who received the highest score at Time 1 received a below average score at Time 2, whereas the person who received the highest score at Time 2 had a below average score at Time 1. Without these two persons, the T-R coefficient increased to .51 -- better, but still indicative of some reliability problems for this particular subscale. Otherwise, however, the correlations were of adequate strength to evidence reliability over time. Thus, although sample means tended to be higher at Time 2, individuals within the sample generally maintained their same rank order at each timepoint. Such biases therefore should have minimal impact on the correlational analyses characteristic of traumatic stress research.

Discussion

It is not surprising that people remember an event as newsworthy as was Hurricane Hugo. Autobiographical memory research (e.g., Robinson, 1986) would even suggest that, in the years to come, Hugo will become a major "landmark" in these persons' lives. In certain parts of the United States, for example, it is not uncommon to hear older people describe their youths in terms of before and after the '37 flood. What is more notable here is the striking accuracy with which people remembered the details of the event; generally, our respondents reported the same losses at Time 2 as they had at Time 1.

In life-events research, delayed accounts have long been viewed as problematic because memories of events may fade (Cohen, 1988; Funch & Marshall, 1984; Jenkins, Hurst, & Rose, 1979). Our findings do not dispute the validity of these concerns as they apply to research on

events of a more "ordinary" variety, such as retirement or relocation. Nonetheless, our findings do imply that such concerns may be overstated when the research pertains to more "extraordinary" events, such as natural disaster. This conclusion is further supported by Funch and Marshall's (1984) finding that delayed reports of highly salient events (e.g., death of a spouse) were notably more reliable (indeed almost perfectly so) than were delayed reports of less salient events (e.g., illness in the family). Moreover, as implied by traumatic stress theory, it is the very vividness or accessibility of traumatic events that distinguishes them from other life events. Clinically, the intrusiveness of traumatic events has been of more concern than the ease with which they are forgotten (Horowitz, 1976).

Findings concerning the reliability of delayed accounts of social support were more mixed. At Time 2, respondents tended to remember having received greater social support after the crisis than they had reported at the earlier interview. Some research suggests that it may not be the later interview that was inaccurate here. Early accounts may have been deflated if victims received less help than they thought they would in situations such as this. This appears to happen in the context of collective trauma where many victims simultaneously need help and resources are sparse (Kaniasty, Norris, & Murrell, 1990; Solomon, 1986). On the other hand, research also has documented the omnipresence of positivity bias when individuals are asked to assess their personal and environmental resources (e.g., Taylor & Brown, 1988). From this perspective, it would be the later report that was more vulnerable; the further one moves from the event, the more likely that personal factors contribute to the reports (e.g., Hobfoll & Lerman, 1989). More research of this issue would be useful.

The threat this shift poses may be minimal. Although sample means tended to be higher at Time 2, individuals within that sample generally maintained their same rank order at each

timepoint. Reliability coefficients for the social support measures were generally quite substantial. With one exception, they were no lower than .60 and as high as .84.

In closing, we should mention some weaknesses of this study. This was a "pilot study" and, as such, suffered from some of the flaws characteristic of them. We had to make some changes in the interview schedule shortly after data collection had begun. One subscale, received tangible support, did not work well with this population of victims. Our funding was minimal, which imposed limits both on the length of the interview and on the number of interviews that could be conducted.

Two more serious limitations of the study must also be acknowledged. Unfortunately, both of these biases could have served to enhance this sample's accuracy in reporting past experiences. The first limitation follows from the high mean level of education observed in this sample. These persons may have been better able to remember their experiences accurately over time than would have a less educated sample (Funch & Marshall, 1984). More than a quarter of our respondents, however, did have only a high school education or less; and the sample was quite diverse in terms of other demographic characteristics, such as sex, race, and age. Unfortunately, our sample size was not sufficient for assessing reliability within demographic subgroups. The second limitation concerns the possibility of testing effects, that is, the potential of a given interview to enhance memory at a later time. However, the long interval between tests (9 months) should have minimized this threat.

Nonetheless, within the limits of its methodology, this study indicates that disaster victims remember their experiences quite accurately over time. This is a simple point, but one that should be reassuring to researchers in this field.

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