Research Article

Experiencing a Natural Disaster Temporarily Boosts Relationship Satisfaction in Newlywed Couples

Hannah C. Williamson[1] , Thomas N. Bradbury[2], and Benjamin R. Karney[2]

[1]Department of Human Development and Family Sciences, University of Texas at Austin, and
[2]Department of Psychology, University of California, Los Angeles

Abstract

How do natural disasters affect intimate relationships? Some research suggests that couples are brought closer together after a disaster, whereas other research suggests that relationships become more strained in the aftermath. Yet all of this work is limited by a lack of predisaster data that would allow for examination of how relationships actually change. The current study is the first to use longitudinal data collected before and after a natural disaster to examine its effect on relationship outcomes. Using a sample of 231 married couples in Harris County, Texas, who experienced Hurricane Harvey, we found that spouses experienced significant increases in satisfaction from before to after the hurricane, but the increase was temporary; couples decreased in satisfaction after the initial boost. Thus, couples appear to grow closer in the immediate aftermath of a natural disaster but then revert to their prehurricane levels of functioning as the recovery period continues.

Natural disasters have been increasing in frequency and severity over recent decades (Hoeppe, 2016; Oliver-Smith, 2018; Webster et al., 2005), and there have been attendant increases in economic damages (Coronese et al., 2019). To navigate the many challenges brought about by these collective traumas, individuals rely heavily on those closest to them for support (Bonanno et al., 2010), thus highlighting the need to understand how disaster-related stress and trauma affect these social bonds. Prevailing theoretical accounts of how natural disasters affect couples' relationships yield competing predictions: Disasters may enhance relationships by drawing partners together as their interdependence and needs become salient (e.g., attachment theory and terror management theory), or disaster-related strains may compromise relationships by undermining couple functioning (e.g., theories of stress spillover). We aimed to reconcile these competing views, and in an effort to overcome retrospective biases that are evident in

virtually all prior studies on this topic, we report on changes in couples' relationships using multiple waves of longitudinal data collected before and after couples experienced a hurricane.

Although understanding of the specific effects of natural disasters on relationships is somewhat underdeveloped, numerous conceptual models focus on the effects of stress on relationships more broadly and assert that relationships will suffer when external demands are too great (e.g., Bodenmann, 1995; Karney & Bradbury, 1995b). Consistent with this view, findings have shown that stress originating from sources external to couples is consistently and robustly linked with lower levels of relationship satisfaction (for reviews,

Corresponding Author:
Hannah C. Williamson, University of Texas at Austin, Department of Human Development and Family Sciences
Email: hwilliamson@utexas.edu

see Karney & Neff, 2013; Randall & Bodenmann, 2017; Story & Bradbury, 2004), supporting the prediction that exposure to a natural disaster will harm couples' relationships.

Critically, however, there is good reason to believe that the effects of external stressors sampled in prior research with couples—that is, relatively minor everyday stressors and hassles that arise at work or involve children, finances, and long commutes—will differ qualitatively from those caused by life-altering natural disasters. Major life events that are abrupt in their onset and severe in their consequences may in fact prove beneficial to couples to the extent that those events instigate increased closeness between partners. Attachment theory, for example, maintains that environmental threats will motivate proximity-seeking behaviors and support provision between partners (Hazan & Shaver, 1994); specifically, partners' heightened states of need in the wake of a disaster will generate new opportunities for practical assistance and disclosures of vulnerability and, in turn, greater appreciation for their relationship (Reis & Shaver, 1988). A different conceptual model, terror management theory, argues that disasters provide unambiguous cues to mortality that are believed to subsequently increase the desire to affiliate with close others (Pyszczynski et al., 1999).

Existing research does not yet resolve or integrate these competing theoretical viewpoints. Disasters appear to produce increases in tension, conflict, and intimate partner violence but have also been linked with increased relationship satisfaction and positive communication (Fredman et al., 2010; Harville et al., 2011; Lowe et al., 2012; Whisman, 2014), raising the prospect that both positive and negative responses are possible following natural disasters. Our primary aim in the present research was to examine how one specific incident—Hurricane Harvey, which struck Harris County, Texas, in August 2017—contributed to changes in relationship satisfaction in the early years of marriage.

In one of the most robust findings in the marital literature, couples on average enter their marriage highly satisfied and then experience a small, continuous decline in relationship satisfaction as time passes (Karney & Bradbury, 1995a; Kurdek, 1998; VanLaningham et al., 2001). Experiencing a disaster may alter this typical developmental trajectory in two primary ways. First, an acute change in satisfaction may occur in the immediate aftermath of the disaster; the prior trajectory is altered by a sudden inflection upward (as predicted by attachment and terror management models) or downward (as predicted by models of stress in relationships) in satisfaction. Second, the trajectory may be altered in the long term; the rate of change in satisfaction over time is different after the event. It is possible,

Statement of Relevance

Natural disasters are traumatic events that can devastate entire communities, making it important to understand how they affect the social relationships that enable individuals to survive and thrive. Past research has reached mixed conclusions about whether natural disasters draw intimate partners together or push them apart. In a longitudinal study of married couples who lived through Hurricane Harvey, which hit Houston, Texas, in August 2017, we discovered that spouses experienced a temporary increase in relationship satisfaction immediately after the hurricane but then declined in satisfaction over the following year. Although natural disasters may lead partners to team up and value their relationships more than usual, at least initially, those gains typically subside as time passes.

for example, that relationship quality changes in the immediate aftermath of the hurricane and then remains at the new level (whether high or low) for some time thereafter. However, models of hedonic adaptation (Diener et al., 2009) predict instead that any immediate change in satisfaction will be dampened with time as couples gradually return to their baseline levels of functioning.

Additionally, preexisting characteristics of the couple may moderate any disaster-induced changes in satisfaction. At the population level, hurricanes have been shown to increase rates of marriage and divorce relative to prehurricane rates (Cohan & Cole, 2002; Xu & Feng, 2016), suggesting that natural disasters magnify psychological experiences within relationships: Couples who were satisfied with their relationship prior to the hurricane might be drawn closer together, whereas couples who were unsatisfied with their relationship prior to the hurricane might be pushed toward further dissatisfaction.

Properly testing these possible outcomes requires repeated waves of longitudinal data collected before and after a natural disaster. The current study is the first, to our knowledge, to do so, using longitudinal pre- and postdisaster data collected from 231 newlywed couples who experienced Hurricane Harvey. Harvey, the first major hurricane to make landfall in the United States in more than a decade, caused extensive damage in Harris County, Texas; 300,000 structures were flooded, 336,000 customers lost power, 40,000 people were evacuated or fled to temporary shelters, and 30,000 water rescues were conducted. In the end, Harvey caused $125 billion in damage, making it the

second costliest hurricane in U.S. history (Blake & Zelinsky, 2018).

Our sample consisted of newlywed couples living in Harris County who provided data at six time points (three before the hurricane and three after the hurricane) over the course of 4 years. We used growth-curve modeling with a piecewise function to examine how trajectories of relationship satisfaction changed from before to after the hurricane, focusing specifically on two primary questions. First, are there acute changes upward or downward in satisfaction, and if so, do such changes endure, or do the couples revert to predisaster levels of relationship functioning? Second, do baseline levels of relationship functioning predict how relationship satisfaction changes in response to the disaster? With this second question, we controlled for theoretically important covariates, including the extent to which individuals were exposed to negative effects of the hurricane and prehurricane levels of chronic stress and social support, which may contribute to couples' response to the hurricane (Kaniasty, 2020; McGuire et al., 2018; Norris & Uhl, 1993).

Method

Sampling

Procedures were designed to obtain a diverse sample of newlywed couples in their first marriage to participate in an observational study of relationship development in newlywed marriage. Recruitment was targeted toward couples living in socioeconomically diverse neighborhoods in Harris County, Texas, the third most populous county in the United States and a region with a diverse population. Recently married couples were identified through marriage license applications obtained from the Harris County Clerk's Office between 2014 and 2015 (prior to the legalization of same-sex marriage in Texas, resulting in only different-sex couples). Addresses were matched with census data to identify applicants living in census block groups in which no less than 30% of the households were categorized as living in poverty (Office of the Assistant Secretary for Planning and Evaluation, 2014, 2015). We identified 4,916 couples through addresses listed on their marriage licenses and screened them on the telephone or in person to ensure that they had married, neither partner had been previously married, both partners could speak English or Spanish, and neither partner was younger than 18 years. Among the couples we attempted to screen, 3,535 could not be reached, 224 were reached and refused screening, and 1,157 agreed to be screened for eligibility. Of those, 506 couples were deemed eligible, and 401 of them agreed to participate in the study; 231 couples actually participated

before the close of the baseline period. The study was approved by the RAND Corporation Institutional Review Board.

Participants

The sample comprised 231 couples in their first marriage who were within 12 months of their wedding at baseline ($M = 5.5$ months, $SD = 2.0$). Sample size was determined by the number of couples who could be successfully recruited and enrolled during the predefined baseline period. Wives ranged in age from 18 to 56 years ($M = 28.35$, $SD = 7.52$), and husbands ranged in age from 18 to 53 years ($M = 29.16$, $SD = 7.33$). Fifty-three percent of wives and 52% of husbands were Hispanic, 35% of wives and 32% of husbands were Black, 9% of wives and 10% of husbands were White, and 3% of wives and 6% of husbands identified as "other/multiracial." Approximately 65% of couples had children at baseline; the median age of these couples' youngest child was 3.0 years. Average household income was $43,891 ($SD = $34,522). The modal education level was a high school degree or some college (61.5% of husbands and 64.5% of wives); 26.8% of husbands and 19.9% of wives had less than a high school degree, and 11.7% of husbands and 15.6% of wives had a college degree or higher.

Of the 231 couples who entered the study, 167 (72%) provided data at four or more time points (of six possible); 64 couples (28%) did not provide data from either spouse at any of the posthurricane time points. Because the analytic procedure (described below) can accommodate missing data, the full sample of 231 was retained in the analyses. However, we also ran all analyses without the 64 couples who did not have posthurricane data to ensure robustness of the results. The pattern of results remained the same across analyses (the full results are reported in the Supplemental Material available online).

Analyses comparing the 64 couples who did not participate in posthurricane data collection with the rest of the sample indicate that husbands' baseline relationship satisfaction did not significantly differ, $t(229) = 0.79$, $p = .431$, but wives' baseline relationship satisfaction did, $t(229) = 2.42$, $p = .016$; specifically, wives were less satisfied in couples who did not provide posthurricane data ($M = 43.18$ vs. $M = 40.07$). This difference was accounted for by including baseline relationship satisfaction as a Level 2 covariate and assessing whether it predicted patterns of change in relationship satisfaction.

Procedure

Prehurricane data collection. At baseline (Time 1), couples were visited in their homes by two interviewers who took spouses to separate areas to describe the study,

obtain informed consent, and verbally administer self-report measures. Participants also completed other data-collection procedures not relevant to the current study. Interviewers returned 9 months (Time 2) and 18 months (Time 3) later and conducted the same interview protocol. Couples who reported that they had divorced or separated did not complete the interview. Data collection for Time 1 to Time 3 occurred from February 2015 through August 2017, ending when Hurricane Harvey made landfall in Harris County.

Posthurricane data collection. The posthurricane assessments were designed as a more limited follow-up; thus, procedures for these assessments differed from the previous three assessments in two respects. First, these assessments did not include a home visit; because many participants experienced damage to their home and/or left the Houston area, we contacted all couples via telephone and verbally administered self-report questionnaires. Second, time points were spaced by approximately 6 months rather than 9 months. Time 4 occurred approximately 6 months after the hurricane, Time 5 occurred approximately 12 months after the hurricane, and Time 6 occurred approximately 18 months after the hurricane.

Measures

Relationship satisfaction. Husbands' and wives' relationship satisfaction, conceptualized as each spouse's global sentiment toward the relationship, was measured at each time point with 10 items from the Couples Satisfaction Index (the 16-item version without the six semantic-differential items; Funk & Rogge, 2007). The items assessed global satisfaction (e.g., "My relationship with my partner makes me happy") and were rated on a 6-point scale (with the exception of one item rated on a 7-point scale); higher scores indicate higher levels of satisfaction. The 10 relationship-satisfaction items were summed to form the scale score at each time point (possible range = 0–51). Across assessments, Cronbach's α ranged from .91 to .96 for husbands and .93 to .98 for wives.

Hurricane exposure. The extent to which individuals experienced negative effects of the hurricane was measured with 18 dichotomous items that indexed events such as having to evacuate their home, being physically injured, having to be rescued, and experiencing damage to their home. Table S1 in the Supplemental Material presents all items in the index and their frequencies. For most participants, these questions were administered at the first posthurricane time point (Time 5); however, 13 participants could not be reached at Time 5 but did participate at Time 6 or Time 7 and responded to the hurricane-exposure items at that time. Cronbach's α was not calculated because this measure is an index of discrete events.

Chronic stress. Participants' experience of chronic stress was measured at Time 3 with a 10-item scale. Participants were asked, "Thinking about the time since we last interviewed you, how much has _____ been a source of stress for you?" The blank in the question was filled in with options such as "your living situation," "work," "your finances," and "your relationship with your own family." Response options were *not at all* (0), *somewhat* (1), *extremely* (2), and *does not apply*. Because participants did not all respond to the same number of items, all valid responses were averaged to form the scale score for each individual with a possible range of 0 to 2. Cronbach's α was .76 for husbands and .71 for wives.

Social support. The availability of social support was assessed at Time 3 with a four-item scale. Participants were asked whether they have *no one you can count on* (0), *too few people* (1), and *enough people you can count on* (2) if they were to "feel low and need someone to listen to your problems," "need help with errands," "need extra money to cover expenses or pay bills," and "need help with child care" (the last item was asked only of parents). Because participants did not respond to the same number of items, all valid responses were averaged to form the scale score for each individual with a possible range of 0 to 2. Cronbach's α was .83 for husbands and .84 for wives.

Analytic plan

Changes in relationship satisfaction over time were estimated using dyadic growth-curve modeling in a multi-level modeling framework in Stata (Version 14; StataCorp, 2015). Husbands' and wives' data were estimated simultaneously within the same equations using the dual-intercept-and-slope model outlined by Raudenbush et al. (1995), which accounts for interdependence in the dyadic data while allowing for estimation of separate parameters for husbands and wives. We handled missing data using full-information maximum likelihood estimation.

Time was centered on August 25, 2017, the day Hurricane Harvey first made landfall in Harris County. The time (in years) before or after this date that each interview took place was calculated for each individual on a continuous scale, taking on values between −2.5 and 1.75. Time was then coded using procedures described by Mitchell (2012) to allow for estimation of a piecewise regression function with parameters for a prehurricane slope, a jump discontinuity, and a posthurricane slope.

Growth-curve analytic techniques allow for a two-level data analysis. Level 1 estimated within-subjects trajectories of change for a variable. We used the following Level 1 equation:

Table 1. Descriptive Statistics for All Variables

Variable	Husbands				Wives			
	n	M	SD	Cronbach's α	n	M	SD	Cronbach's α
Time 1 relationship satisfaction	231	43.12	7.93	.91	231	42.32	8.84	.94
Time 2 relationship satisfaction	194	42.38	8.48	.93	195	41.50	8.74	.93
Time 3 relationship satisfaction	161	40.76	9.67	.95	165	39.04	11.03	.96
Time 4 relationship satisfaction	140	44.39	7.93	.94	162	40.57	10.31	.96
Time 5 relationship satisfaction	131	40.95	10.55	.95	147	39.53	11.93	.97
Time 6 relationship satisfaction	131	41.51	9.90	.96	145	39.48	12.43	.98
Hurricane exposure	149	3.87	2.54		170	4.28	2.94	
Time 3 chronic stress	161	0.45	0.36	.76	162	0.61	0.38	.71
Time 3 social support	161	1.37	0.56	.83	164	1.37	0.56	.84

$$Y_{ti} \text{ (relationship satisfaction)} = \text{wives}[\pi_{w0i} + \pi_{w1i}$$
$$\text{(prehurricane slope)} + \pi_{w2i} \text{ (jump)} + \pi_{w3i}$$
$$\text{(posthurricane slope)}] + \text{husbands}[\pi_{b0i} + \pi_{b1i}$$
$$\text{(prehurricane slope)} + \pi_{b2i} \text{ (jump)} + \pi_{b3i}$$
$$\text{(posthurricane slope)}] + e_{tij},$$

where "prehurricane slope" is the individual's rate of change from Time 1 to Time 3, "jump" is the amount the individual changed from immediately before to immediately after the hurricane, and "posthurricane slope" is the individual's rate of change from Time 4 to Time 6.

Level 2 examined between-subjects differences in these parameters using individual-level predictors. We used the following Level 2 equations:

$$\pi_{w0i} = \beta_{w00} + \mu_{w0i}$$
$$\pi_{w1i} = \beta_{w10} + \text{wife predictor} + \mu_{w1i}$$
$$\pi_{w2i} = \beta_{w20} + \text{wife predictor} + \mu_{w2i}$$
$$\pi_{w3i} = \beta_{w30} + \text{wife predictor} + \mu_{w3i}$$
$$\pi_{b0i} = \beta_{b00} + \mu_{b0i}$$
$$\pi_{b1i} = \beta_{b10} + \text{husband predictor} + \mu_{b1i}$$
$$\pi_{b2i} = \beta_{b20} + \text{husband predictor} + \mu_{b2i}$$
$$\pi_{b3i} = \beta_{b30} + \text{husband predictor} + \mu_{b3i}$$

Hurricane exposure, chronic stress, social support, and baseline relationship satisfaction were tested as predictors in separate analyses.

Results

Descriptive statistics

Table 1 provides descriptive statistics for all study variables. Consistent with previous research, results showed that the current sample of newlywed couples was highly satisfied with their relationships at the start of the study (husbands: $M = 43.12$, $SD = 7.93$; wives: $M = 42.32$, $SD = 8.84$; out of a possible score of 51). Participants reported a moderate level of hurricane exposure; each person experienced approximately four negative effects of the hurricane on average (husbands: $M = 3.87$, $SD = 2.54$; wives: $M = 4.28$, $SD = 2.94$).

Main effects of relationship-satisfaction trajectory

Results of the piecewise multilevel model (shown in Fig. 1) were consistent with previous research, indicating that husbands and wives were significantly declining in relationship satisfaction on average across the first 2.5 years of their marriage, prior to Hurricane Harvey (for husbands, slope: $b = -1.00$, $p = .011$, 95% confidence interval [CI] = [−1.78, −0.23], $r = -.17$; for wives, slope: $b = -2.40$, $p < .001$, 95% CI = [−3.21, −1.59], $r = -.38$). Wives were declining in relationship satisfaction significantly faster than husbands, $\chi^2(1, N = 231) = 5.93$, $p = .015$.

From before to after the hurricane, husbands and wives significantly increased in relationship satisfaction, experiencing a jump of 3.29 and 2.54 points, respectively ($p < .001$, 95% CI = [1.45, 5.13], $r = .23$ and $p = .005$, 95% CI = [0.78, 4.29], $r = .19$, respectively). Husbands and wives did not differ in the magnitude of their jump in satisfaction, $\chi^2(1, N = 231) = 0.34$, $p = .561$.

After the hurricane, husbands (slope: $b = -2.47$, $p = .001$, 95% CI = [−3.92, −1.03], $r = -.22$) and wives (slope: $b = -1.47$, $p = .045$, 95% CI = [−2.91, −0.03], $r = -.13$) began declining again in relationship satisfaction at a rate that was not significantly different from their prehurricane slope—husbands: $\chi^2(1, N = 231) = 3.08$, $p = .080$; wives: $\chi^2(1, N = 231) = 1.22$, $p = .269$. Husbands and wives did not differ in their rate of change in relationship satisfaction after the hurricane, $\chi^2(1, N = 231) = 0.93$, $p = .334$.

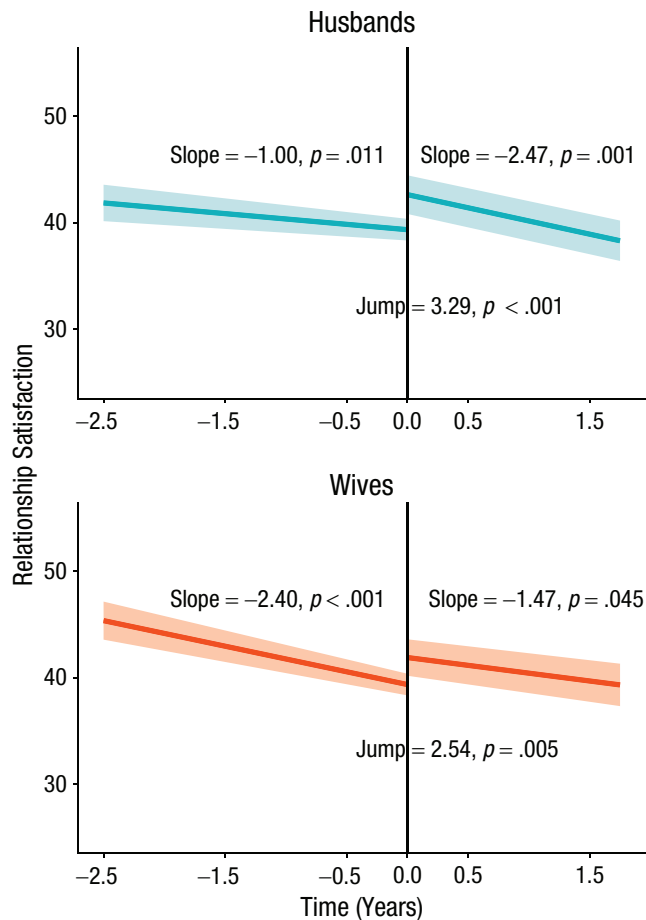Next, we examined whether hurricane exposure, prehurricane chronic stress, prehurricane social support,

Fig. 1. Results of piecewise growth-curve analysis showing pre- and posthurricane slopes for relationship satisfaction, as well as the jump in satisfaction at the time the hurricane occurred (0.0 on the *x*-axis). Results are shown separately for husbands and wives. Shaded areas depict 95% confidence intervals. Slope coefficients are unstandardized. *N* = 231 couples.

and baseline relationship satisfaction were significant predictors of relationship-satisfaction trajectories and whether the main effects described above changed when controlling for these factors. Each of the four variables was entered separately into Level 2 of the multilevel model as a predictor of the three parameters of the piecewise regression (prehurricane slope, pre- to posthurricane jump, posthurricane slope) using the equations described above.

Predictors of relationship-satisfaction trajectory

Level of hurricane exposure, chronic stress, and social support did not significantly predict the jump in satisfaction from before to after the hurricane or the posthurricane slope for husbands and wives (see Table 2). Thus, the effect of the hurricane on relationship satisfaction was observed regardless of the extent of direct negative effects of the hurricane, the chronic stress that couples were experiencing before the hurricane, and the social support that couples reported prior to the hurricane.

However, results (shown in Fig. 2) indicate that baseline relationship satisfaction was significantly associated with the jump in satisfaction from before to after the hurricane for husbands and wives (husbands: $b = -0.44$, $p < .001$, 95% CI = [−.69, −.20], $r = -.23$; wives: $b = -0.45$, $p < .001$, 95% CI = [−0.68, −0.23], $r = -.26$). Baseline relationship satisfaction was not significantly associated with the posthurricane slope for husbands or wives.

Tests of simple slopes (shown in Table 3) indicate that couples with lower initial levels of relationship satisfaction experienced the biggest jump in relationship satisfaction from before to after the hurricane; those with an initial level of relationship satisfaction 1 standard deviation below the sample mean experienced a significant jump of 7.02 points for husbands ($p < .001$, 95% CI = [4.17, 9.88], $r = .32$) and 7.88 points for wives ($p < .001$, 95% CI = [4.95, 10.82], $r = .32$), whereas couples with an initial level of relationship satisfaction 1 standard deviation above the sample mean experienced a nonsignificant jump of 0.07 points for husbands and −0.10 points for wives.

Discussion

Results of the current study provide a longitudinal perspective on couples' response to natural disasters that helps organize previous mixed results in several ways. First, the initial postdisaster period was characterized by a more positive perspective on the relationship compared with the prehurricane period, consistent with existing research that has found high levels of relationship satisfaction after a natural disaster (Fredman et al., 2010). Other recent research has also found that uncontrollable, large-scale, external stressors led to an increase in pro-relationship behaviors and cognitions (Clavél et al., 2017; Williamson, 2020). These results are consistent with predictions made by attachment theory and terror management theory (Hazan & Shaver, 1994; Pyszczynski et al., 1999), but the underlying mechanisms are still unknown. The positive effects may be attributable to the shared nature of the stressor, which could trigger a positive response toward the partner who is also a victim. Indeed, the literature on psychological responses to natural disasters has documented an increased level of "postcrisis benevolence and community cohesion" among members of communities who experience this collective trauma (Bonanno et al., 2010, p. 25). Overall, results from the current study, combined with existing results, indicate that large, external

Table 2. Hurricane Exposure, Chronic Stress, and Social Support as Predictors of Relationship-Satisfaction Trajectory

Group and variable	Hurricane exposure			Chronic stress			Social support		
	b	p	95% CI	b	p	95% CI	b	p	95% CI
Husbands									
Intercept	44.21	< .001	[41.49, 46.94]	42.87	< .001	[40.38, 45.35]	42.87	< .001	[40.38, 45.35]
Predictor	−0.57	.074	[−1.20, 0.05]	−5.17	.033	[−9.93, −0.41]	−5.17	.033	[−9.93, −0.41]
Prehurricane slope	0.15	.856	[−1.46, 1.76]	−0.38	.598	[−1.79, 1.03]	−0.38	.598	[−1.79, 1.03]
Jump	2.35	.187	[−1.14, 5.84]	3.14	.057	[−0.10, 6.37]	3.14	.057	[−0.10, 6.37]
Posthurricane slope	−3.09	.022	[−5.73, −0.45]	−2.80	.024	[−5.25, −0.36]	−2.80	.024	[−5.25, −0.36]
Prehurricane Slope × Predictor	−0.27	.130	[−0.62, 0.08]	−1.71	.178	[−4.20, 0.78]	−1.71	.178	[−4.20, 0.78]
Jump × Predictor	0.23	.553	[−0.53, 0.99]	1.91	.493	[−3.55, 7.37]	1.91	.493	[−3.55, 7.37]
Posthurricane Slope × Predictor	0.11	.701	[−0.47, 0.70]	−0.05	.982	[−4.09, 4.00]	−0.05	.982	[−4.09, 4.00]
Wives									
Intercept	41.48	< .001	[38.96, 44.00]	44.57	< .001	[41.67, 47.46]	44.57	< .001	[−14.95, −6.16]
Predictor	−0.52	.065	[−1.07, 0.03]	−10.55	< .001	[−14.95, −6.16]	−10.55	< .001	[−1.88, 1.69]
Prehurricane slope	−2.04	.006	[−3.51, −0.57]	−0.10	.917	[−1.88, 1.69]	−0.10	.917	[−1.98, 5.55]
Jump	0.86	.591	[−2.28, 4.00]	1.79	.352	[−1.98, 5.55]	1.79	.352	[−3.11, 2.49]
Posthurricane slope	0.05	.965	[−2.40, 2.50]	−0.31	.828	[−3.11, 2.49]	−0.31	.828	[−7.12, −2.07]
Prehurricane Slope × Predictor	−0.04	.796	[−0.33, 0.25]	−4.59	< .001	[−7.12, −2.07]	−4.59	< .001	[−2.98, 7.56]
Jump × Predictor	0.28	.374	[−0.34, 0.90]	2.29	.395	[−2.98, 7.56]	2.29	.395	[−5.92, 1.97]
Posthurricane Slope × Predictor	−0.36	.138	[−0.85, 0.12]	−1.98	.326	[−5.92, 1.97]	−1.98	.326	[−14.95, −6.16]

Note: $N = 231$ couples. Values for husbands and wives were estimated in the same model; thus, each major column (hurricane exposure, chronic stress, and social support) presents the results from a single multilevel model. CI = confidence interval.
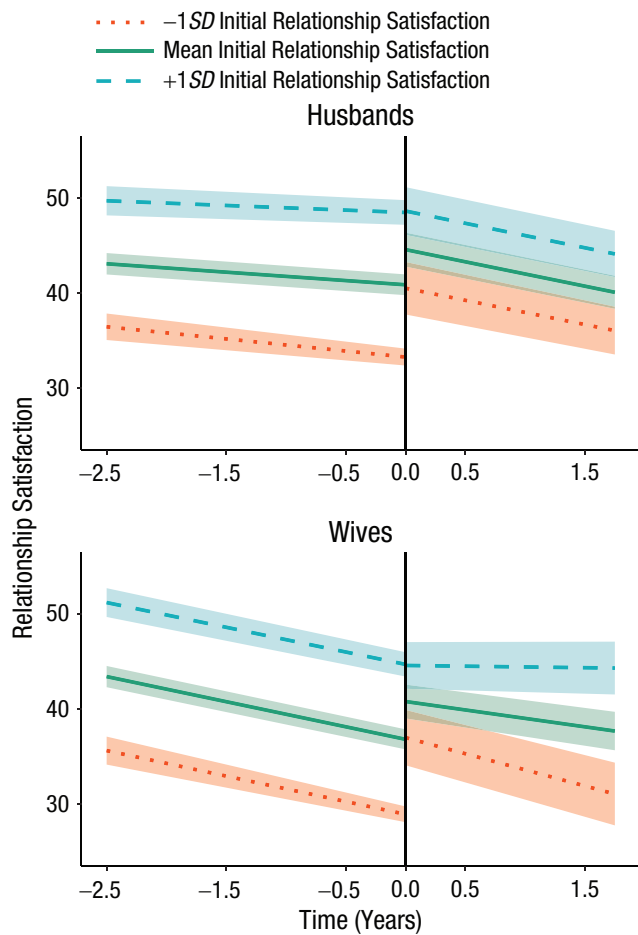
Fig. 2. Results of piecewise growth-curve analysis of relationship satisfaction over time with initial relationship satisfaction as a Level 2 predictor. Results are shown separately for husbands and wives. Shaded areas depict 95% confidence intervals. Slope coefficients are unstandardized. $N = 231$ couples.

stressors generate positive rather than negative responses from couples, and future research on the effects of stress on relationships would benefit from differentiating stressors on dimensions of magnitude, controllability, and chronicity.

However, as the initial impact of the hurricane wore off, so too did the increase in satisfaction; we observed a decline in satisfaction that began at the first posthurricane time point and continued through the following year. The posthurricane decline is consistent with a temporary boost in satisfaction, followed by hedonic adaptation, whereby couples return to their predisaster level of relationship functioning. Thus, as life gradually returns to normal, couples may find that old problems and concerns resurface, and their brief ability to overlook them has diminished. Couples may also experience the decline in satisfaction, after a temporary boost, as a particularly negative time in the relationship. Indeed, previous research that documented perceptions of negative relationship outcomes after a hurricane collected data in this same 1- to 2-year postdisaster time period (Harville et al., 2011; Lowe et al., 2012). Thus, a priority for future research is to identify the length of the recovery period for couples after natural disasters because this may be the ideal time to help them recover (psychologically and logistically) from the effects of a hurricane.

Finally, preexisting relationship qualities play a role in how couples respond to natural disaster. Couples with lower initial levels of relationship satisfaction experienced an increase of 7 points in relationship satisfaction from before to after the hurricane, whereas couples with higher initial levels of relationship satisfaction experienced no change. This result is not

Table 3. Simple Slopes by Initial Relationship Satisfaction

Group and variable	-1 SD initial relationship satisfaction				Mean initial relationship satisfaction				$+1$ SD initial relationship satisfaction			
	b	p	95% CI	r	b	p	95% CI	r	b	p	95% CI	r
Husbands												
Prehurricane slope	-1.28	.001	$[-2.03, -0.52]$	$-.22$	-0.88	.026	$[-1.66, -0.11]$	$-.15$	-0.49	.323	$[-1.47, 0.48]$	$-.07$
Jump	7.25	< .001	[4.34, 10.15]	.32	3.70	.001	[1.60, 5.80]	.23	0.15	.916	$[-2.68, 2.98]$	.01
Posthurricane slope	-2.55	.030	$[-4.85, -0.25]$	$-.14$	-2.56	.001	$[-4.09, -1.04]$	$-.22$	-2.58	.019	$[-4.73, -0.43]$	$-.15$
Wives												
Prehurricane slope	-2.68	< .001	$[-3.44, -1.92]$	$-.46$	-2.64	< .001	$[-3.40, -1.88]$	$-.45$	-2.60	< .001	$[-3.57, -1.64]$	$-.35$
Jump	8.07	< .001	[5.05, 11.10]	.34	3.98	< .001	[1.91, 6.05]	.25	-0.11	.937	$[-2.88, 2.66]$	$-.01$
Posthurricane slope	-3.39	.009	$[-5.95, -0.84]$	$-.17$	-1.77	.025	$[-3.33, -0.22]$	$-.15$	-0.16	.885	$[-2.30, 1.98]$	$-.01$

Note: Effect-size r is equal to $Z/\sqrt{N}$. CI = confidence interval. $N = 231$ couples.

consistent with the exacerbation effect first described in the population-level article by Cohan and Cole (2002), which found that rates of marriages, births, and divorces all increased after a hurricane. Instead, we found the opposite effect: Couples with the worst predisaster functioning benefited the most. We interpret this result with caution, however, because it is possible that it is due to a ceiling effect. Couples with the highest baseline relationship satisfaction had fallen to only a few points below the maximum on the satisfaction scale by the last prehurricane time point and were therefore limited in how much they were able to increase in satisfaction.

Several other factors limit the interpretation and generalizability of these results. First, all couples were newlyweds at the start of the study, so results may not generalize to more established married couples or to couples who are dating or cohabiting. Second, the data-collection mode changed from face-to-face interviews at the prehurricane time points to telephone interviews at the posthurricane time points. Although this change in data-collection mode may have influenced the observed changes in relationship satisfaction, we believe that this is unlikely because previous studies have found no differences in rates of disclosure, even of sensitive topics, between face-to-face and telephone interviews (Greenfield et al., 2000; Rosenbaum et al., 2006; Sobin et al., 1993). Additionally, an experimental study that tested the effect of interview mode by interviewing all participants face to face and then randomly assigning them to face-to-face or telephone follow-ups found no differences in data quality or substantive responses (Nandi & Platt, 2017). Our study followed this same design of establishing rapport and trust with the participants through multiple in-person visits prior to using telephone follow-ups. Finally, alternative analytic methods such as latent growth mixture modeling may have revealed different trajectories underlying the average trends we report here.

A strength of the current study is the use of a diverse sample of couples who are a close match for the racial and ethnic makeup of individuals living in poverty in Harris County (U.S. Census Bureau, 2012). Low-income and ethnic/racial-minority individuals are more likely to live in disaster-prone neighborhoods and less likely to possess resources to aid in recovery (Arcaya et al., 2020). Thus, we recruited a sample of people who are most vulnerable to natural disasters in the United States. At the same time, our approach leaves open the question of whether the results generalize to more socioeconomically advantaged couples.

Overall, results of our research indicate that the effect of a major stressor such as a natural disaster on couples' relationship functioning is best understood longitudinally. In the short term, couples experience a temporary increase in relationship satisfaction from their predisaster levels. In the longer term aftermath, couples experience a decline in relationship satisfaction that is consistent with hedonic adaptation that returns them to their predisaster functioning.

Transparency

ORCID iD

Hannah C. Williamson ⬗ https://orcid.org/0000-0002-4816-3621

Supplemental Material

Additional supporting information can be found at http://journals.sagepub.com/doi/suppl/10.1177/09567976211015677

References

Arcaya, M., Raker, E. J., & Waters, M. C. (2020). The social consequences of disasters: Individual and community change. *Annual Review of Sociology*, *46*(1), 671–691. https://doi.org/10.1146/annurev-soc-121919-054827

Blake, E. S., & Zelinsky, D. A. (2018). *Hurricane Harvey* (National Hurricane Center Tropical Cyclone Report No. AL092017). National Hurricane Center.

Bodenmann, G. (1995). A systemic-transactional conceptualization of stress and coping in couples. *Swiss Journal of Psychology*, *54*(1), 34–49.

Bonanno, G. A., Brewin, C. R., Kaniasty, K., & La Greca, A. M. (2010). Weighing the costs of disaster: Consequences, risks, and resilience in individuals, families, and communities. *Psychological Science in the Public Interest*, *11*(1), 1–49. https://doi.org/10.1177/1529100610387086

Clavél, F. D., Cutrona, C. E., & Russell, D. W. (2017). United and divided by stress: How stressors differentially influence social support in African American couples over time. *Personality and Social Psychology Bulletin*, *43*(7), 1050–1064. https://doi.org/10.1177/0146167217704195

Cohan, C. L., & Cole, S. W. (2002). Life course transitions and natural disaster: Marriage, birth, and divorce following Hurricane Hugo. *Journal of Family Psychology*, *16*(1), 14–25. https://doi.org/10.1037//0893-3200.16.1.14

Coronese, M., Lamperti, F., Keller, K., Chiaromonte, F., & Roventini, A. (2019). Evidence for sharp increase in the economic damages of extreme natural disasters. *Proceedings of the National Academy of Sciences, USA*, *116*(43), 21450–21455. https://doi.org/10.1073/pnas.1907826116

Diener, E., Lucas, R. E., & Scollon, C. N. (2009). Beyond the hedonic treadmill: Revising the adaptation theory of well-being. In E. Diener (Ed.), *The science of well-being: The collected works of Ed Diener* (pp. 103–118). Springer. https://doi.org/10.1007/978-90-481-2350-6_5

Fredman, S. J., Monson, C. M., Schumm, J. A., Adair, K. C., Taft, C. T., & Resick, P. A. (2010). Associations among disaster exposure, intimate relationship adjustment, and PTSD symptoms: Can disaster exposure enhance a relationship? *Journal of Traumatic Stress*, *23*(4), 446–451. https://doi.org/10.1002/jts.20555

Funk, J. L., & Rogge, R. D. (2007). Testing the ruler with item response theory: Increasing precision of measurement for relationship satisfaction with the Couples Satisfaction Index. *Journal of Family Psychology*, *21*(4), 572–583. https://doi.org/10.1037/0893-3200.21.4.572

Greenfield, T. K., Midanik, L. T., & Rogers, J. D. (2000). Effects of telephone versus face-to-face interview modes on reports of alcohol consumption. *Addiction*, *95*(2), 277–284. https://doi.org/10.1046/j.1360-0443.2000.95227714.x

Harville, E. W., Taylor, C. A., Tesfai, H., Xiong, X., & Buekens, P. (2011). Experience of Hurricane Katrina and reported intimate partner violence. *Journal of Interpersonal Violence*, *26*(4), 833–845. https://doi.org/10.1177/0886260510365861

Hazan, C., & Shaver, P. R. (1994). Attachment as an organizational framework for research on close relationships. *Psychological Inquiry*, *5*(1), 1–22. https://doi.org/10.1207/s15327965pli0501_1

Hoeppe, P. (2016). Trends in weather related disasters: Consequences for insurers and society. *Weather and Climate Extremes*, *11*, 70–79. https://doi.org/10.1016/j.wace.2015.10.002

Kaniasty, K. (2020). Social support, interpersonal, and community dynamics following disasters caused by natural hazards. *Socio-Ecological Psychology*, *32*, 105–109. https://doi.org/10.1016/j.copsyc.2019.07.026

Karney, B. R., & Bradbury, T. N. (1995a). Assessing longitudinal change in marriage: An introduction to the analysis of growth curves. *Journal of Marriage and Family*, *57*(4), 1091–1108. https://doi.org/10.2307/353425

Karney, B. R., & Bradbury, T. N. (1995b). The longitudinal course of marital quality and stability: A review of theory, methods, and research. *Psychological Bulletin*, *118*(1), 3–34. http://doi.org/10.1037/0033-2909.118.1.3

Karney, B. R., & Neff, L. A. (2013). Couples and stress: How demands outside a relationship affect intimacy within the relationship. In J. A. Simpson & L. Campbell (Eds.), *The Oxford handbook of close relationships* (pp. 664–684). Oxford University Press.

Kurdek, L. A. (1998). The nature and predictors of the trajectory of change in marital quality over the first 4 years of marriage for first-married husbands and wives. *Journal of Family Psychology*, *12*(4), 494–510. https://doi.org/10.1037/0893-3200.12.4.494

Lowe, S. R., Rhodes, J. E., & Scoglio, A. A. J. (2012). Changes in marital and partner relationships in the aftermath of Hurricane Katrina: An analysis with low-income women. *Psychology of Women Quarterly*, *36*(3), 286–300. https://doi.org/10.1177/0361684311434307

McGuire, A. P., Gauthier, J. M., Anderson, L. M., Hollingsworth, D. W., Tracy, M., Galea, S., & Coffey, S. F. (2018). Social support moderates effects of natural disaster exposure on depression and posttraumatic stress disorder symptoms: Effects for displaced and nondisplaced residents. *Journal of Traumatic Stress*, *31*(2), 223–233. https://doi.org/10.1002/jts.22270

Mitchell, M. N. (2012). *Interpreting and visualizing regression models using Stata*. Stata Press.

Nandi, A., & Platt, L. (2017). Are there differences in responses to social identity questions in face-to-face versus telephone interviews? Results of an experiment on a longitudinal survey. *International Journal of Social Research Methodology*, *20*(2), 151–166. https://doi.org/10.1080/13645579.2016.1165495

Norris, F. H., & Uhl, G. A. (1993). Chronic stress as a mediator of acute stress: The case of Hurricane Hugo. *Journal of Applied Social Psychology*, *23*(16), 1263–1284. https://doi.org/10.1111/j.1559-1816.1993.tb01032.x

Office of the Assistant Secretary for Planning and Evaluation. (2014). *2014 poverty guidelines*. https://aspe.hhs.gov/2014-poverty-guidelines

Office of the Assistant Secretary for Planning and Evaluation. (2015). *2015 poverty guidelines*. https://aspe.hhs.gov/2015-poverty-guidelines

Oliver-Smith, A. (2018). Disasters and large-scale population dislocations: International and national responses. In D. Benouar (Ed.), *Oxford research encyclopedia of natural hazard science*. https://doi.org/10.1093/acrefore/9780199389407.013.224

Pyszczynski, T., Greenberg, J., & Solomon, S. (1999). A dual-process model of defense against conscious and unconscious death-related thoughts: An extension of terror management theory. *Psychological Review*, *106*(4), 835–845. https://doi.org/10.1037/0033-295X.106.4.835

Randall, A. K., & Bodenmann, G. (2017). Stress and its associations with relationship satisfaction. *Current Opinion in Psychology*, *13*, 96–106. https://doi.org/10.1016/j.copsyc.2016.05.010

Raudenbush, S. W., Brennan, R. T., & Barnett, R. C. (1995). A multivariate hierarchical model for studying psychological change within married couples. *Journal of Family Psychology*, *9*(2), 161–174. http://doi.org/10.1037/0893-3200.9.2.161

Reis, H. T., & Shaver, P. R. (1988). Intimacy as an interpersonal process. In S. W. Duck (Ed.), *Handbook of personal relationships: Theory, research and interventions* (pp. 367–389). Wiley.

Rosenbaum, A., Rabenhorst, M. M., Reddy, M. K., Fleming, M. T., & Howells, N. L. (2006). A comparison of methods for collecting self-report data on sensitive topics. *Violence and Victims*, *21*(4), 461–471. https://doi.org/10.1891/vivi.21.4.461

Sobin, C., Weissman, M. M., Goldstein, R. B., Adams, P., Wickramaratne, P., Warner, V., & Lish, J. D. (1993). Diagnostic interviewing for family studies: Comparing telephone and face-to-face methods for the diagnosis of lifetime psychiatric disorders. *Psychiatric Genetics*, *3*(4), 227–233. https://doi.org/10.1097/00041444-199324000-00005

StataCorp. (2015). *Stata statistical software* (Version 14) [Computer software]. StataCorp.

Story, L. B., & Bradbury, T. N. (2004). Understanding marriage and stress: Essential questions and challenges. *Clinical Psychology Review*, *23*(8), 1139–1162. https://doi.org/10.1016/j.cpr.2003.10.002

U.S. Census Bureau. (2012). *Summary population and housing characteristics: 2010* (Report No. CPH-1). https://www.census.gov/library/publications/2012/dec/cph-1.html

VanLaningham, J., Johnson, D. R., & Amato, P. (2001). Marital happiness, marital duration, and the U-shaped curve: Evidence from a five-wave panel study. *Social Forces*, *79*(4), 1313–1341. https://doi.org/10.1353/sof.2001.0055

Webster, P. J., Holland, G. J., Curry, J. A., & Chang, H.-R. (2005). Changes in tropical cyclone number, duration, and intensity in a warming environment. *Science*, *309*, 1844–1846. https://doi.org/10.1126/science.1116448

Whisman, M. A. (2014). Dyadic perspectives on trauma and marital quality. *Psychological Trauma: Theory, Research, Practice, and Policy*, *6*(3), 207–215. https://doi.org/10.1037/a0036143

Williamson, H. C. (2020). Early effects of the COVID-19 pandemic on relationship satisfaction and attributions. *Psychological Science*, *31*(12), 1479–1487. https://doi.org/10.1177/0956797620972688

Xu, X., & Feng, J. (2016). Earthquake disasters, marriage, and divorce: Evidence from China 2000-2011. *Disaster Prevention and Management*, *25*(1), 59–74. https://doi.org/10.1108/DPM-05-2015-0096