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Effects of Hurricane Harvey on Trajectories of Hostile Conflict among Newlywed Couples

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Abstract

Natural disasters have been purported to increase, and decrease, hostile conflict in intimate relationships, but heavy reliance on retrospective designs prohibits strong tests of these contrasting perspectives. The current study aims to resolve this ambiguity using a sample of newlywed couples from Houston, TX who reported their levels of hostile conflict three times before and three times after experiencing Hurricane Harvey. Latent growth curve piecewise regression models showed that robust declines in conflict prior to the hurricane were slowed after the hurricane hit, such that post-hurricane conflict slopes flattened and became non-significant. Thus, by disrupting natural declines in conflict that occur in the early years of marriage, Hurricane Harvey appears to have been detrimental for couples. Factors examined in relation to hostile conflict (including personality traits, adverse childhood events, stress, and relationship satisfaction) were similar in their predictive power prior to and following the hurricane, suggesting that the hurricane did not markedly alter which couples were most prone to hostile interactions. Implications for understanding relationships in the context of natural disasters are outlined.

Keywords: Hostile conflict, natural disaster, newlywed couples, piecewise regression, risk.

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When couples are confronted by a large-scale natural disaster such as a flood, an earthquake, or a hurricane, do partners increase or decrease in their inclinations toward hostile conflict? On one hand, hostile conflict, including behaviors such as insulting or swearing at a partner, threatening, or pushing, grabbing, or shoving a partner, might be expected to increase under such taxing circumstances, to the extent that disaster-related stress threatens partners' sense of security, undermines emotion regulation and couple functioning, and disrupts work and family routines. Alternatively, we might expect hostile conflict to decrease in the face of a major catastrophe, as partners respond to one another's disclosures of anxiety and fear, coordinate efforts as they strive to regain a sense of stability, recognize the impact of the stress on their partner, and come to realize the value of depending on each other for support. Reconciling these competing perspectives is important because hostile conflict does not only predict relationship termination (Lawrence & Bradbury, 2007) but also individual health and wellbeing (Coker et al., 2002). Thus, we use a sample of newlywed couples who provided data three times before and three times after Hurricane Harvey, in an attempt to extend a literature that to date has relied heavily on retrospective data and on data from individuals rather than couples.

Outside the context of natural disasters, couples exposed to higher rates of various forms of stress — relating to finances (Neff et al., 1995), parenting (Probst et al., 2008), and racial discrimination (Trail et al., 2012) — also display higher levels of hostile conflict. Much less work draws upon exposure to disasters more specifically, though a nationally-representative sample of women assessed two years after the 2010 earthquake in Haiti reported higher levels of hostile conflict with their partners than a comparable sample assessed 4-5 years before the earthquake, with greater effects evident in regions with greater earthquake damage (Weitzman &

Behrman, 2016). Similarly, women experiencing more disruption and damage due to Hurricane Katrina retrospectively reported more frequent acts of verbal conflict, physical aggression, and extreme acts of abuse in their relationships (Harville et al., 2011). Qualitative assessments of women exposed to Australia's 2009 Black Saturday brushfires suggest similar effects (Parkinson, 2019), as do analyses conducted following the 2004 Indian Ocean Tsunami (Rao, 2020). Taken together, evidence to date is consistent with the possibility that natural disasters contribute to increases in hostile conflict, with the caveat that most work is retrospective and, to our knowledge, prospective analyses on a single group of couples has yet to be undertaken.

While the personal and interpersonal disruption caused by natural disasters is irrefutable, the possibility remains that relationships enable couples to withstand their effects, even to the point where partners draw closer together after a disaster strikes. For instance, people who have experienced a major fire, flood, earthquake, or other natural disaster are viewed by their partners as engaging in more frequent positive exchanges than people who were spared these experiences, consistent with the idea that "people who experience natural disasters often bond together and support each other, thereby contributing to a general pattern of more frequent positive interactions" (Whisman, 2014, p. 212). Along similar lines, prospective data collected once before and twice after the arrival of COVID-19 in the United States revealed that people became less likely to view their partners' actions (e.g., critical remarks, being cool and distant) as selfish, motivated by malevolent intent, and worthy of blame as time passed (Williamson, 2020). This finding suggests that heightened awareness of life-altering stressors can shift partners' appraisals for the reasons behind one another's actions, leading to more benign interpretations for actions that might otherwise instigate harsh exchanges (see Fincham & Bradbury, 1991). Finally, in-depth interviews conducted with low-income women who survived Hurricane Katrina

demonstrate that while many report increased strains resulting from changes in employment and living circumstances, some also mention ways in which they grew more committed in their relationship or more effective in how they communicated with their partner ("*I always have the picture of those people at the Superdome in my head. Every time I get in a disagreement, I always say how lucky my family is and I should be thankful. So, that just takes the anger out of you sometimes";* Lowe et al., 2012, p. 294). In short, while prospective data are again sparse, suggestive evidence points to the possibility that experiencing a natural disaster can yield benefits for people in relationships, reducing hostile conflict in turn. Such reductions are particularly plausible in the current study, as the sample is comprised of recently-married first-time newlyweds who are globally satisfied, on average, with their relationships.

We aim to reconcile these two competing predictions regarding the effects of natural disasters on relationships by drawing upon reports of hostile conflict collected from 151 newlywed couples from low-income communities of Harris County, TX three times before and three times after residents experienced Hurricane Harvey, in August 2017. The second costliest hurricane in US history, Hurricane Harvey caused $125B in damage and resulted in the flooding of 300,000 buildings, loss of power for 336,000 customers, and evacuations of 40,000 people (Blake & Zelinsky, 2018). Having access to three waves of pre-Harvey data is especially valuable as this allows us to trace trajectories of hostile conflict over the early stage of marriage and, in principle, replicate the surprising finding that negatively-charged interactions *decrease* during the early newlywed phase even as partners grow less satisfied with their relationship (Lawrence & Bradbury, 2007). We therefore examine, using dyadic piecewise regression models, whether Hurricane Harvey subsequently increases hostile conflict (that is, decelerates the rate at which this natural decline is occurring prior to the hurricane) or whether this incident

decreases hostile conflict (that is, accelerates the rate at which the normative pre-hurricane decline is occurring). Piecewise regression models, which can examine two segments separated by a breakpoint, allow us to quantify the abrupt change in our outcome of interest as result of Hurricane Harvey. Additionally, by collecting data from both members of a couple, we are able to use both partners as reporters of hostile conflict within the relationship, thereby improving reliability and validity of these estimates. Collecting dyadic data also allows us to account for the interpersonal and interdependent nature of hostile conflict, wherein the data from one partner, by definition, are related to data from the other partner, through statistical analysis (i.e., Actor-Partner Interdependence Model [APIM], see Kenny et al., 2006). Lastly, situating our study within a sample of couples who find themselves at greater socioeconomic disadvantage is particularly valuable as these couples not only find themselves at higher risk for relationship conflict (Capaldi et al., 2012) but also may be particularly vulnerable to the challenges associated with the experience of a natural disaster.

While these analyses will shed light on whether and how hostile conflict might change as a function of Hurricane Harvey, they say little about whether the *predictors* of these exchanges differ due to the hurricane. Several stable features of relationships are known correlates of hostile conflict — most notably partners' personality traits and early life adversities, stress, and satisfaction (e.g., Hammett et al., 2020) — and, prior to the hurricane, we expect to replicate these effects. Following the hurricane, however, we might either (a) find a similar correlational structure or (b) discover that at least some correlates grow more predictive when couples are actively contending with the hurricane and its aftermath. For example, indicators of adverse events in childhood or higher levels of chronic stress prior to the hurricane might become more robust as correlates of conflict following the hurricane. We aim to resolve these two possibilities,

using an array of instruments and procedures administered in our baseline assessment.

Method

Sampling

Procedures were designed to obtain a sample of first-married newlywed couples living in neighborhoods with high concentrations of disadvantage in Harris County, Texas. Recently married couples were identified through marriage license applications obtained from the Harris County Recorder's Office between 2014 and 2015. Data were collected prior to the legalization of same-sex marriage in Texas, resulting in all mixed-gender couples. Addresses were matched with census data to identify applicants living in census block groups with no less than 30% of the households categorized as living in poverty (US Census Bureau, 2017). Couples in these block groups were screened to ensure that they were married, neither partner had been previously married, both partners could speak English or Spanish, and neither partner was under the age of 18. A total of 4,916 couples were identified through addresses listed on their marriage licenses. Among the couples identified, 3,535 could not be reached and 1,157 agreed to be screened. Of those, 506 couples were screened as eligible, and 401 agreed to participate, with 231 couples providing data within the recruitment window. The study was approved by the [BLINDED] IRB.

Participants

At baseline, husbands and wives averaged 29.5 ($SD = 7.5$) and 28.1 ($SD = 7.4$) years of age, respectively. Fifty-two percent of husbands and 53% of wives were Hispanic/Latino. Of the remaining participants, husbands and wives were either Black (32% and 35%, respectively), White (10% and 9%), or Other/Multiracial (6% and 3%). Average relationship length was 4.7 years. Approximately 60% of couples had children, and household income averaged $40,885 ($SD = $29,146$). On average, the highest level of formal education was completion of high school

diploma (60% of husbands, 54% of wives) or college (12% of husbands, 16% of wives).

Procedure

Prior to Hurricane Harvey, couples were visited in their homes by two interviewers who took spouses to separate areas to obtain informed consent and to orally administer self-report measures at baseline ($N = 231$), 9-months ($N = 193$), and 18-months ($N = 157$). Couples were compensated for their participation ($100, $140, and $180 per couple at Time 1, 2, and 3, respectively). Couples who had divorced or separated did not complete the interview. Data collection for T1-T3 occurred from February 2015 through August 2017, ending when Hurricane Harvey made landfall in Harris County. The post-hurricane assessments differed from the first three assessments in two respects. First, all couples were contacted via telephone and orally administered self-report questionnaires. Second, time points were spaced by approximately 6 months rather than 9 months. T4 occurred shortly after the hurricane had hit and T5 and T6 occurred approximately 6 and 12 months later.

Measures

Hostile Conflict. Couples' hostile conflict was assessed at each time point using an adapted version of the revised Conflict Tactics Scales (CTS-R; Straus & Douglas, 2004) with seven acts of hostile conflict during the past nine months (insulting or swearing; stomping out of the room or leaving the house during an argument; threatening to hit; throwing something; pushing, grabbing, or shoving; slapping, hitting, biting, or punching; beating up). For each item, participants were asked if they had engaged in the act described (i.e., perpetration) and if their spouse had engaged in the act described (i.e., victimization). If they responded positively to the item, participants were asked to indicate the number of times each event had occurred, with 1 = Once or twice, 2 = Several times, and 3 = Often. To control for underreporting, we used

maximum reported perpetration scores (created by comparing individual reports of perpetration and partner reports of victimization and using the higher of the two)— resulting in one summed husband- and one summed wife-perpetrated hostile conflict score, each with a possible range of 0-21. Cronbach's alpha ranged from .63-.78 for husbands and .67-.82 for wives.

Baseline Risk Predictors. Baseline predictors tapped domains of vulnerability, stress, and adaptation (as derived from the VSA model; Karney & Bradbury, 1995). Low levels of self-esteem (4 items adapted from Rosenberg, 1979; α = .62 and .63 for husbands and wives, respectively), neuroticism (8 items Goldberg, 2010; α_H = .83, α_W = .81), and Adverse Childhood Experiences (ACE; 14 items adapted from Felitti et al., 1998; α_H = .83, α_W = .86) were used to assess partners' enduring vulnerabilities. Perceived stress (12 items adapted from Hammen et al., 1987; α_H = .80, α_W = .71) was used to assess couples' baseline experiences of stress. Relationship satisfaction (10 items adapted from Funk & Rogge, 2007; α_H = .91, α_W = .94) was used to assess adaptive processes.

Analytic Plan

Structural equation modeling (SEM) analyses were conducted in Mplus Version 8. Couples who did not have at least one post-hurricane hostile conflict data point were excluded from the analyses, resulting in a final analytic sample of N = 151.[1] All other missing data were handled by using maximum likelihood estimation with robust standard errors (MLR) in Mplus. To examine how trajectories of hostile conflict change from before to after the hurricane, we tested a piecewise Latent Growth Curve Model (LGCM) with the knot set at T4, the time point closest to Hurricane Harvey's landfall in Harris County. The LGCM was specified to account for unequal spacing of data collection (i.e., 27, 18, and 9 months pre-Harvey and 6 and 18 months

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[1] T1 hostile conflict levels for husbands who completed T6 were significantly lower than for husbands who did not complete T6 ($F(1, 229)$ = 6.42, p = .01). There were no significant differences for wives ($F(1, 229)$ = 2.96, p = .09).

post-Harvey). Hostile conflict scores at T1-T6 were used to estimate one husband and one wife hostile conflict intercept and two (pre-hurricane and post-hurricane) husband and wife hostile conflict slope variables. Intercept and slope variables were allowed to correlate. Additionally, to account non-independence of partners' data, husband and wife variables were allowed to correlate in all models (see Kenny et al., 2006). For a visual depiction, see Figure 1. We used Wald tests to assess whether the pre- and post-hurricane hostile conflict slopes' means and variances were statistically different from one another. To determine overall model fit, we assessed the root mean square error of approximation (RMSEA; Steiger, 1990) and the Standardized Root Mean Residual (SRMR; Hu & Bentler, 1999).

All data have been made publicly available at figshare and can be accessed at https://figshare.com/s/e73c65654d1bbff4d301 (Author, Year). Materials and analysis code for this study are available by emailing the corresponding author. This study was not preregistered.

Results and Discussion

Descriptive Statistics

Table 1 provides descriptive statistics of husbands' and wives' hostile conflict across all time points and baseline risk variables. The current sample of newlyweds experienced relatively low levels of hostile conflict – largely driven by psychological forms – at the start of the study (husbands: $M = 2.85$, $SD = 2.5$; wives: $M = 2.95$, $SD = 3.11$; out of a possible score of 21).

Piecewise Regression of Hostile Conflict Trajectories Pre- and Post-Hurricane

Results of the piecewise LGCM (see Table 2) show declines in hostile conflict during the 2.5 years of their marriage prior to Hurricane Harvey (husbands: slope = -0.03, $p < .001$; wives: slope = -0.03, $p < .001$), as commonly observed during the newlywed phase (e.g., Lawrence & Bradbury, 2007). However, after Hurricane Harvey, this rate of decline slows: Hostile conflict

slopes become statistically non-significant and different from pre-hurricane slopes, for husbands (slope = 0.01, p = .38; Wald = 6.38, p = .01) and wives (slope = 0.01, p = .68; Wald = 5.70, p = .02). These results are in line with some prior research using retrospective data showing that hostile conflict may not increase after the experience of a disaster (Frasier et al., 2004).[2]

Correlations between Baseline Risk Predictors and Hostile Conflict

To examine whether the predictive significance of baseline risk on hostile conflict declines in light of a major disaster, we ran bivariate correlations between vulnerability, stress, and adaptation predictors at Time 1 and hostile conflict at Time 1 through 6. As shown in Table 3, husbands who were higher in neuroticism, ACE, stress, and dissatisfaction tended to engage in higher levels of hostile conflict pre-hurricane and husbands who were higher in low self-esteem, neuroticism, and dissatisfaction tended to engage in higher levels of hostile conflict post-hurricane. Similarly, wives who were higher in any of the risk factors examined tended to experience higher levels of hostile conflict pre- as well as post-hurricane. Although there were more significant associations between baseline risk and hostile conflict pre-hurricane (10/15 vs 7/15 significant associations for husbands and 14/15 vs 12/15 significant associations for wives), r-to-z transformations comparing the strength of median pre- vs post-hurricane correlations were not statistically significant (absolute z values ranged from 0.28 to 1.17 for husbands and from 0.27 to 1.04 for wives, all ns). These findings show that the power of baseline risk variables as assessed at the outset of marriage remain, even after couples are faced with a major disaster, and

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[2] Exploratory results showed that the extent to which partners experienced hurricane-related negative effects (assessed via a cumulative "hurricane exposure" index) did not moderate the association between pre-hurricane and post-hurricane conflict slopes, for husbands ($b = 0.13$, p = .20) or for wives ($b = 0.01$, p = .95). These results indicate that the effect of the hurricane on conflict is observed regardless of the extent of direct exposure to the hurricane. Given that rates of hurricane exposure were relatively low, with less than 3 out of 18 possible events on average, it may be that the current sample did not capture couples most severely impacted.

that the occurrence of a disaster does not markedly alter the correlates of hostile conflict.

General Discussion

We aimed to resolve ambiguity over whether natural disasters increase (e.g., Harville et al., 2011) or decrease (e.g., Whisman, 2014) relational conflict and hostility by collecting multiple waves of dyadic data before and after Hurricane Harvey, thus overcoming limitations of prior cross-sectional and retrospective designs and incorporating the perspectives of both partners in our assessments. We replicate prior work showing that couples on average experience declines in hostile conflict early in marriage (Lawrence & Bradbury, 2007), while also demonstrating that the onset of Hurricane Harvey disrupted this auspicious trend, as declines in hostile conflict were slowed and rates of change fell to non-significance. Thus, Hurricane Harvey did not generate true increases in hostile conflict, but its effects were nevertheless detrimental for couples as the disaster slowed a naturally-occurring progression toward reduced hostility. The fact that hostile conflict remained flat, even through the 12-month post-hurricane assessment, underscores the enduring effect of the hurricane on reported couple dynamics, and the fact that baseline correlates of conflict were comparable from before to after the disaster suggests that the post-hurricane behaviors were not qualitatively distinct from those displayed before the disaster.

Some limitations should be considered when interpreting the current findings. First, although the use of prospective data is a major strength of this research, hostile conflict was assessed via self-report, which may result in bias and under-reporting. Second, it remains unclear whether our findings will generalize to same-sex couples, couples in more established relationships, and couples with more severe levels of hostile conflict than those observed here. Third, while collection of six waves of data does enable a general understanding of post-disaster relationship trajectories, the design lacks precision. More frequent assessments before and after

the hurricane would likely yield a more informative temporal portrait of how couples respond to major stressors. Moreover, the spacing of assessments varied pre- (9-mo intervals) versus post-hurricane (6-mo intervals), posing challenges to the interpretation of mean levels of pre- and post-conflict levels (as portrayed in Table 1). Because partners were asked to reflect on a shorter period of time during the last three assessments, as compared to the first three assessments, post-hurricane IPA means may in fact be comparably higher than can be glanced from looking at mean levels alone. Of note, the piecewise LGCM accounted statistically for this unequal spacing, making conclusions drawn with regards to our main analyses (see Table 2) more interpretable. Finally, the present analysis focuses on average levels of hostile conflict in the sample over time and sheds no light on the manner in which couples deviate from the general pattern observed here. Our study is underpowered to examine moderators of response to Hurricane Harvey, and future efforts will benefit from identifying the factors that render couples more and less vulnerable to disaster-related deterioration in relationship functioning.

This research may have implications for couples, policy makers, and clinicians. Although the current results did not provide evidence for increases in hostile conflict following couples' experience of a natural disaster, Hurricane Harvey slowed the natural trajectory of conflict reduction that was observed pre-disaster. These findings underscore the need for disaster assistance. Moreover, our findings show that the same baseline factors that predispose couples to hostile conflict without exposure to a disaster may be used to identify those at highest risk in the aftermath of a disaster. As such, post-disaster clinical and policy efforts providing (e.g., financial) support for couples, and socioeconomically disadvantaged couples in particular, who present with a history of individual and dyadic stress may be warranted.

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Table 1. Descriptive Statistics of All Study Variables for the Final Sample

Variable	Husbands					Wives				
	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max
T1 Hostile Conflict	151	2.29	2.47	0.00	13.00	151	2.95	3.11	0.00	16.00
T2 Hostile Conflict	142	2.28	2.81	0.00	17.00	142	2.69	3.34	0.00	18.00
T3 Hostile Conflict	123	2.00	2.50	0.00	13.00	123	2.49	3.25	0.00	20.00
T4 Hostile Conflict	138	1.36	1.80	0.00	11.00	138	1.80	2.13	0.00	12.00
T5 Hostile Conflict	128	1.91	2.41	0.00	13.00	128	2.40	3.07	0.00	17.00
T6 Hostile Conflict	128	1.63	1.92	0.00	11.00	128	2.02	2.48	0.00	14.00
Hurricane Exposure	142	3.94	2.56	0.00	12.00	150	4.24	2.97	0.00	14.00
T1 Low Self-Esteem	151	6.91	1.95	4.00	11.00	151	6.94	2.02	4.00	13.00
T1 Neuroticism	151	9.20	5.23	0.00	23.00	151	13.14	4.96	0.00	23.00
T1 ACE	151	2.45	2.93	0.00	14.00	151	3.08	3.27	0.00	13.00
T1 Stress	151	4.99	3.67	0.00	16.00	151	6.22	3.54	0.00	15.27
T1 Satisfaction	151	43.51	7.80	9.00	51.00	151	43.30	8.06	11.00	51.00

Note. T1 = Time 1, T2 = Time 2, etc. ACE = Adverse Childhood Experiences. At Time 1, 21.9% of husbands and 31.1% of wives reported perpetrating physical conflict and 71.5% of husbands and 78.1% of wives reported perpetrating psychological conflict.

Table 2. Results of Piecewise Regression of Hostile Conflict Trajectories Pre- and Post-Hurricane Harvey

Variable	Means		Wald	Variances		Wald
	Estimate	S.E.		Estimate	S.E.	
Husband Conflict						
Intercept	1.60***	0.17		3.80***	0.56	
Pre-Harvey Slope	-0.03***	0.01	6.38*	<0.01***	<0.01	1.01
Post-Harvey Slope	0.01	0.01		0.01*	<0.01	
Wife Conflict						
Intercept	2.05***	0.21		5.25***	0.83	
Pre-Harvey Slope	-0.03***	0.01	5.70*	<0.01***	<0.01	0.39
Post-Harvey Slope	0.01	0.01		<0.01	0.01	

***$p < .001$, **$p < .01$, *$p < .05$.

Note. Unstandardized results shown. Model Fit Information: RMSEA = .16, SRMR = .07.

Table 3. Correlations between Risk Variables and Hostile Conflict

T1 Variable	Husbands							Wives						
	Time 1 Conflict	Time 2 Conflict	Time 3 Conflict	Time 4 Conflict	Time 5 Conflict	Time 6 Conflict	**Pre- vs Post z**	Time 1 Conflict	Time 2 Conflict	Time 3 Conflict	Time 4 Conflict	Time 5 Conflict	Time 6 Conflict	**Pre- vs Post z**
Low Self-Esteem	.03	.06	.02	.12	.24**	.16*	**1.13**	.23*	.19*	.16	.08	.16	.22*	**0.27**
Neuroticism	.23**	.23**	.18*	.10	.19*	.17*	**0.54**	.41***	.30***	.29***	.21***	.19**	.20**	**0.92**
ACE	.23***	.25**	.15	.12	.14	.12	**0.98**	.37***	.36***	.35***	.11	.25***	.17*	**1.04**
Stress	.25**	.36***	.27***	.14	.14	.06	**1.17**	.36***	.39***	.32***	.24***	.30***	.25***	**1.04**
Satisfaction	-.38***	-.29**	-.15	-.26*	-.22**	-.28*	**0.28**	-.29***	-.25**	-.26*	-.23**	-.15*	-.22**	**0.37**

*p<.05, **p<.01, ***p<.001
Note: ACE = Adverse Childhood Experiences. T1 = Time 1. Pre- vs Post-z refers to a comparison between the median pre-hurricane correlation coefficient (i.e., Time 1-3) and the median post-hurricane correlation coefficient (i.e., Time 4-6) using Fisher's r-to-z transformation.
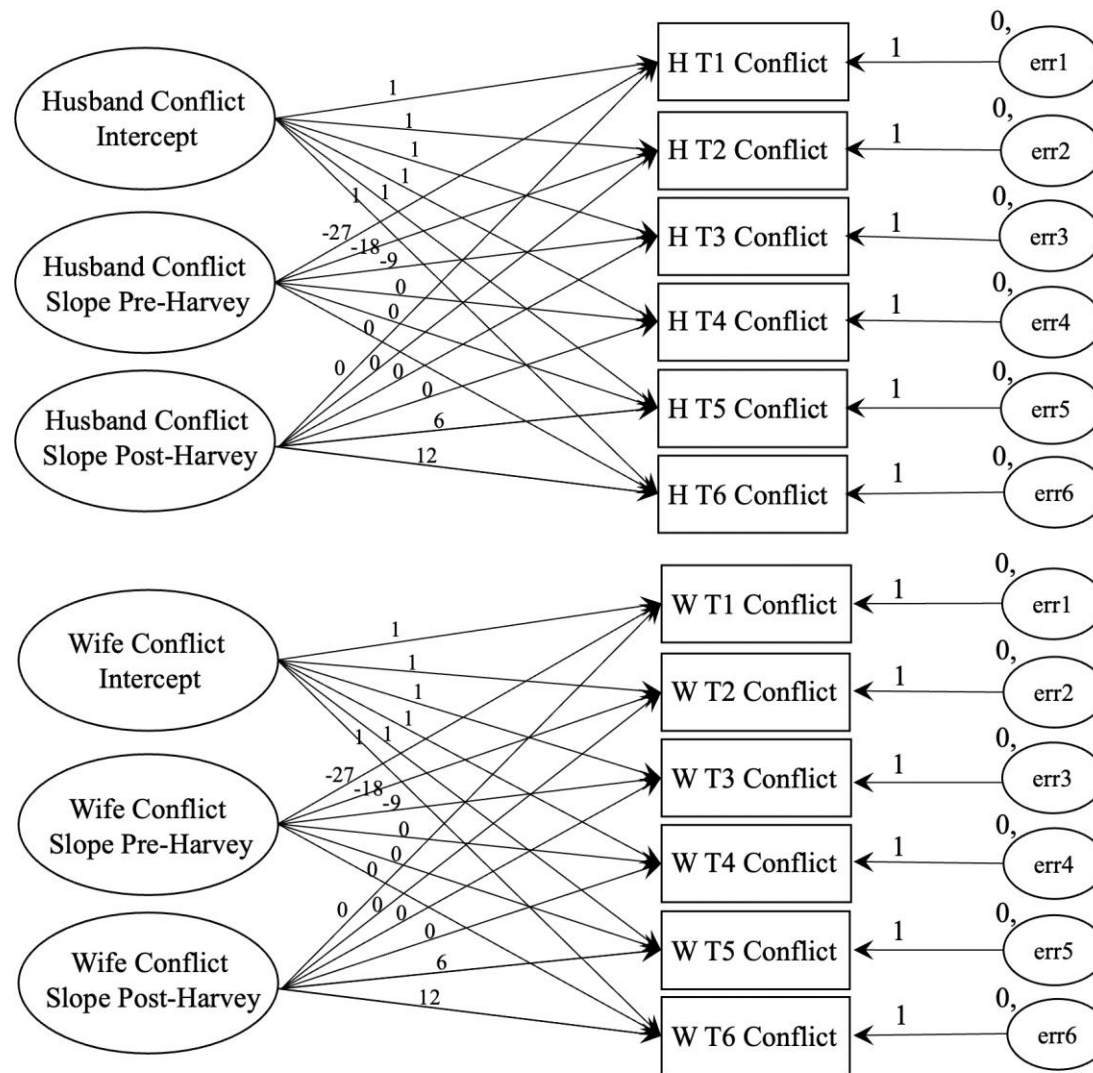
Figure 1. Visual Depiction of Piecewise Latent Growth Model.
Note. H = Husband, W = Wife, T1 = Time 1, T2 = Time 2, etc. Correlations between intercepts and slopes and between husband and wife variables are not depicted in the figure (but were included in the model).