

# Physical Health Problem Intrusion Linking Religious Attributions to Marital Satisfaction in Survivors of the 2004 Tsunami

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## Abstract

The impact of the 2004 tsunami that struck East Asia on Buddhist, Sri Lankan mothers was investigated in this study. More specifically, the relationship between attributing the 2004 tsunami to Karma and marital satisfaction was examined in a sample of 163 women, 3 years after the Disaster. Mediation by persisting physical health problems, on the relationship between attributing the tsunami to Karma and marital satisfaction, after controlling for mental health status and income before the tsunami was also tested. Karma attributions were not directly associated with marital satisfaction. However, an indirect path positively linking Karma attributions with persistent physical health challenges, and negatively linking physical health challenges to marital satisfaction was observed. Using Hobfoll's (1989) conservation of resources (COR) model, implications of physical health challenges for disaster survivors and attributions endorsing an external locus of control are discussed.

**Keywords:** Natural disaster; Karma; Tsunami; Physical health

## Introduction

A variety of events fit within the classification of a natural disaster. This term encompasses mass destroyers such as supercyclones [1], floods [2,3], hurricanes [4], tornadoes [5], earthquakes [6], and tsunamis [7]. One such disaster began from a large scale under water earthquake off the coast of Eastern Asia on December 26, 2004. Tsunami waves were spawned, massive enough to ravage a large portion of the continental coastline which included multiple countries. Hundreds of thousands were killed, maimed, or lost within the writhing waves [8]. Dramatic accounts of mothers and fathers literally having children ripped from their arms by the relentless tides, and others searching helplessly for missing loved ones amidst the debris and wreckage are some examples of the traumatic events experienced by survivors. Many were compelled to search among decaying bodies in hopes of identifying the remains of friends and family members. The spread of carnage was estimated to have claimed more than 126,000 lives within the first minutes [7,8].

The effects of this disaster were devastating. The dramatic effect of the tsunami suggests the likelihood of long-lasting psychological, emotional, and physical effects for survivors. As such, continued and ongoing research is warranted to evaluate the ways in which the tsunami and its effects still influence survivors.

## Disasters and mental health

For decades researchers have been evaluating the mental health effects of disasters on survivors. However, much research has focused largely on the mental health outcomes of individuals relatively soon after the disaster [9,10]. The incidence of posttraumatic stress disorder (PTSD) and depressive symptoms are among the most common mental health constructs examined in disaster research. Studies investigating what personal characteristics or disaster circumstances predict variance in these symptoms is a prolific question within disaster research.

Property destruction and the loss of lives have been found to explain variance in symptoms of both PTSD and Depressive Symptoms in survivors of the 2004 tsunami [11]. The intensity of various resources lost in a disaster has also been found to explain a significant portion of depressive symptoms in some disaster survivors [12]. The unexpectedness of disaster is another circumstance that is thought to

contribute particularly to the incidence of PTSD [9]. Other predictors of variance in PTSD symptoms after a disaster include personal characteristics such as a previous mental health problems [4,13], trauma exposure [14], being female [4,13], never having been married, or being illiterate [4].

Research findings clearly point to the fact that disaster incidence is related to higher levels of individual mental health distress symptoms through a number of mechanisms and circumstances. Mental health distress outcomes for individuals have been found to be present in both the acute aftermath of disaster as well as over time [15]. Although much is understood about the predictors of variance in individual mental health distress outcomes in the disaster context, there has been less emphasis on relational outcomes in disaster, although this is rapidly changing [16,17].

## Disaster and families

Family relationships are beginning to receive attention as a factor buffering the effects of disasters. Family cohesion and functioning have been identified as both outcome variables of interest [17] and a resilience factor against adverse natural disaster outcomes [17]. With regard to factors that may be protective against mental health problems post disaster, some have also been identified that relate to the quality of close relationships. For instance, social support from family and other trauma exposed peers consisting of a sentiment of social acknowledgement of survivor trauma associated with lower levels of depression after a disaster in one study [14]. Moreover, adolescent

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survivors of the 2004 tsunami exhibited lower levels of Depressive Symptoms and PTSD symptoms if they had a high quality relationship with their mothers [11].

Previous research findings suggest that positive and close relationships assist in coping with disaster and buffering against mental health distress outcomes and other adverse outcomes. However, little has been investigated so far to examine whether mental health distress or other disaster related variables associate with marital satisfaction as an outcome. Studying couple relationships within the context of disasters further allows us to not only understand the impact that disasters have on interpersonal functioning, but also the impact of interpersonal connectedness on disaster recovery [18,19]

### **Physical health problems and marriage**

Although little is known about the status of couple relationships in the context of disaster, there has been a body of research examining the way that various physical health problems associate with a host of marital variables. This is significant because physical health problems and injury were a particularly salient outcome of the 2004 tsunami [19]. Examining the relationships between various physical health issues and marital relationship outcome variables can help create a foundation upon which to begin to study these relationships in the context of disaster.

There is a body of evidence suggesting that persisting physical health issues associate positively with problems in marital and family relationships [20-22]. Specifically, negative relationship quality is related to poor heart health for both men and women [2] while strong marital quality has been shown to be associated with spousal health benefits [23]. Booth and Johnson (1994) suggested that physical health problems may influence marital relationships negatively through decreased marital interaction and an increase of behaviors in the sick spouse that were problematic for their partner [20].

Not only does it appear that physical health issues predict variance in marital relationships, but it also appears that marital quality variables may actually influence the experience of health problems. For instance, Treif and colleagues [22] found that marital distress predicted illness distress at a later time. Although we have this information, the relationship between marital satisfaction and persisting physical health problems has not been investigated in the context of natural disasters. Furthermore, how physical health issues are understood and made sense of in the disaster context what may inform the way that physical health issues relate to marital outcomes.

### **Disaster and religion**

One salient way in which disaster survivors cope with and make meaning of their experiences and disaster outcomes is through religious beliefs [24]. The role of Judeo-Christian faiths and other theistic orientations have been documented in coping with stress [3,25] and the influence of a spiritual relationship with a higher power has been investigated in the context of trauma [26]. However, the body of literature systematically studying non-theistic religions such Buddhism in terms of making meaning about natural disaster is still developing [17,24] Religious participation and activities in a Buddhist sample in Sri Lanka was found to be protective against post tsunami Depressive Symptoms [17]. However, in Wickrama and Wickrama's (2007) study, religion was not assessed in terms of attribution or meaning making about the disaster, but rather as behavioral participation. We do not know enough about how religious attributions may shape perceptions of events and their outcomes, such as the loss of physical health in the

disaster context. Furthermore, it is possible that the way survivors make sense of their experience influences their relationships [17].

Some aspects of religion and spirituality may facilitate recovery and even increase mental or emotional maturity; this outcome of hardship is known as posttraumatic growth [27,28]. Calhoun et al. [28] suggested that openness and flexibility within religious activity and meaning in the context of trauma is associated with post-traumatic growth.

The findings of researchers indicate that the role of religion in coping with disaster could yield both positive and negative outcomes. Ai et al. [25] found that the use of a positive religious-spiritual coping style, enhanced by a high degree of religiousness was predictive of optimism in Bosnian war refugees. Furthermore, the use of positive religious coping behaviors associated positively with desired psychological outcomes after a flood in the American Midwest. On the other hand, in the same sample, negative religious coping such as harboring anger or distance from God or church and praying for miracles or bargaining with God associated with problematic psychological outcomes [2,3].

It has been suggested that avoiding grief is one explanation for the use of negative coping strategies and the subsequent forfeit of posttraumatic or spiritual growth [29]. Another possible explanation for negative outcomes of religious coping could be meaning making constructed by survivors about the traumatic event that then drives their religious coping behaviors. It could be that not only religious behaviors and activities associate with how trauma is experienced. The way traumas are philosophically conceptualized within one's religious context could be key to understanding how survivors manage the outcomes of natural disaster. One study indicated that those subscribing to a religious attribution style endorsing the concept of Karma in response to trauma experienced a higher severity of PTSD symptoms than those who did not [30]. The dominant religion for the sample of the current study is Sinhalese Buddhism, which endorses a belief in Karma.

### **Karma, physical & mental health, and relationships**

The concept of Karma has long been linked to an external locus of control. This makes sense given that Karma explains current events as resulting from unavoidable consequences of past behaviors, thus putting current events out of the control of those who experience them. Using Rotter's [31] internal-external locus of control measure, Khanna and Khanna [32] found that Hindus, significantly more than non-Hindus, displayed characteristics of an external locus of control. It seems that increases in externalizing locus of control negatively could negatively impact mental health outcomes. Solomon and Mikulincer [33] also found a link between higher levels of PTSD and a more external locus of control in Israeli soldiers returned from combat.

As mentioned before, Davidson et al. [30] conducted a study which yielded evidence suggesting that subscribing to the theory of Karma related to more severe PTSD experiences in an American Internet sample. Given these findings, it appears that an external locus of control, or attributing certain events or conditions to Karma may be related to poor psychological outcomes. It has been observed however in one study that an endorsement of Karma was associated with some relational variables well such as being unmarried. In the same study, researchers also noted that endorsing a belief in Karma also related to poor physical and mental health [30]. It is unclear how physical health relates to this endorsement, but findings like those of Davidson and his colleagues invites further investigation as to how they relate. At this time, we still lack information about how human relationships may

be influenced by the presence of an external locus of control or the attribution of traumatic events to Karma, especially in the context of a disaster. There is also little known about how an external locus of control associates with how one experiences the outcomes and losses of disaster. It is clearly easier to ask questions than to draw conclusions about how endorsing Karma or having an external locus of control may relate to marital satisfaction or influence the way a physical health problem is experienced. Overall, research on religion and trauma, or disaster for that matter, present an unfinished picture of what characteristics of religious belief serve to buffer stress or exacerbate it. Furthermore, there is more to be understood about how the stressors and losses of natural disaster influence relationship quality through the way those losses and stressors are conceptualized.

### Theoretical lens

Hobfoll's (1989) conservation of resources model offers a lens through which to consider what may create difficulty for marriages in the context of disaster. Hobfoll [34] postulated that when resources are in danger, or being heavily taxed, people mobilize themselves in various ways to protect the resources they have, and gain more. They do this in various ways including creating cognitive attributions about the loss such as devaluing lost resources. Furthermore, it is actually resource loss that is theorized to create hardship in the face of disruptions, not disruptions in and of themselves. We suggest that how resource losses are conceptualized and what meaning is made of them may be significant to how those losses create hardship [34].

What Hobfoll essentially suggests is that resource loss mediates the relationship between stressful events and poor mental health or relational outcomes. Previous studies seem to suggest that those who fail to mobilize a cognitive structure supporting an internal locus of control do not adjust well to loss of physical or mental health [33].

The premise of the current study is to examine the role of Karma attributions regarding the 2004 tsunami in predicting marital satisfaction and the experience of physical health problem intrusion three years later in a sample of women who suffered an extreme disaster. It is clear that physical health problems relate to concerns in family relationships [20-22] and that those facing physical injury or trauma may subscribe to an external locus of control [33]. These relationships support the appearance of a possible sequential relationship, or an indirect link, from an external locus of control predicting variance in the experience of the intrusion of physical health problems, and in turn, the intrusion of a physical health problem predicting variance in marital satisfaction. Hobfoll's [34] conservation of resources (COR) model lends itself well as a theoretical foundation from which to explain why this relationship may exist.

We will adopt Hobfoll's [34] lens that resource loss mediates between a stressor accounting for the way the stressor was perceived and its self-report relational outcomes of married women in our sample. For the purposes of this study, we view the tsunami to represent a major life disruption for those who survived it and will attend specifically to the dimension of how those in our sample attributed the events with regard to Karma. The specific resource disturbance we will be examining is the intrusiveness of a persisting physical health problem which originated from the tsunami. The hardship or outcome of interest in the present study will be marital satisfaction.

The present study proposes to address the following question: Does the level of disruption inflicted by a physical health problem lingering from the tsunami mediate or link the relationship between attributing

the tsunami to Karma and marital satisfaction three years after the tsunami?

### Hypotheses

1) We first hypothesize that there exists a negative association between Karma endorsing attributions about the tsunami events and marital satisfaction. Suggesting that endorsing Karma as a model of attribution for explaining the tsunami will associate with lower levels of marital satisfaction and vice versa.

2) Secondly, we hypothesize that the intrusion of long-standing, tsunami-related physical health challenges of survivors in our sample will mediate the relationship between Karma endorsing attributions and marital satisfaction.

3) We also hypothesize that the indirect link between Karma endorsing attributions and marital satisfaction will be characterized this way:

a) First, that Karma endorsing attributions will predict variance in the level of disruption of a long-standing tsunami-related health issue in a positive fashion such that endorsing Karma as an explanation for the tsunami will relate to higher levels of physical health problem disruption and vice versa.

b) Second, that the level of disruption of a long-standing tsunami-related health issue will predict variance inversely in marital satisfaction.

The passage of three years since the time of the tsunami and the collection of the data most likely has an impact on the results in that relationships found among the data. The relationships in question may be weaker than expected, if the study were conducted in higher chronological proximity to the disaster. However, the passage of time also allows for an examination of the possible persistent effects of the tsunami.

### Method

#### Sample

Participants were mothers living in Southern Sri Lanka who were affected by the 2004 Tsunami. The data used were obtained from a study entitled Health Risk and Resiliency in Tsunami Affected Mothers and Adolescents conducted in 2008, approximately three years following the disaster. Additionally, income data used in this study were collected in 2005, 3 months following the tsunami. Women were identified for participation using voter registration records which are updated annually by an officer in the village who is supervised by the district officer. From these records, which are publicly available, eligible participants were identified by their having an adolescent child in the home. Trained, recruited, native, female interviewers conducted in-home interviews and administered translated 8<sup>th</sup> grade level (English to Sinhalese) questionnaires. This convenience sample consists of 163 Sri Lankan mothers living in Polhena in Southern Sri Lanka at the time of data collection. This village that was exposed to the devastating effects of the 2004 tsunami is located in the Matara district.

#### Measures

Marital Satisfaction was conceptualized by two items on the tsunami Mental Health Study—Adult Questionnaire [11]. The first item asked, "Overall, how happy are you with your relationship?" This question was answered on a 6-point Likert scale with responses ranging from 1= "Extremely unhappy" to 6= "Extremely happy." The second item asked "Overall, how satisfied are you with your relationship?" This



question was answered on a 6-point Likert scale ranging from 1= "Not at all satisfied" to 6= "Completely satisfied." The mean composite of these items demonstrated an adequate Cronbach's alpha ( $\alpha=.75$ ) in this sample. The distribution of this variable was significantly negatively skewed as evidenced by a skewness statistic of  $-1.94$  divided by the standard error of the skewness which was  $.196$ . This resulted in a score of  $-4.8$  which is beyond the absolute value of  $1.96$ , the chi-square critical value. In order to ameliorate this issue, the variable was transformed by taking its square root. The resulting skewness-to-standard error ratio of the transformed variable was  $-.93$ .

Persisting physical health problems resulting from the tsunami were assessed by asking respondents to rank the applicability of a statement with responses ranging on a 5-point Likert scale from 1= "strongly disagree" to 5= "strongly agree." The statement was, "Tsunami related physical health problems interfere with my daily activities, even today." This variable was not significantly skewed and had a skewness-to-standard error ratio of  $1.38$ .

Mental health measures as well as monthly family income data from 2005, collected 3 months after the tsunami about income prior to the tsunami, were also included to parse out variance in the model predicted by pre-tsunami income, PTSD, and Depressive Symptoms. To measure symptoms of PTSD, 17 items derived from The *Diagnostic and Statistical Manual of Mental Disorders* version four (DSM-IV) [35,36] diagnostic interview were administered. Variations of this scale have been used in previous research relating to trauma and marital variables. Items asked about symptoms occurring in the last 4 months and included such questions as "Did you feel distant or cut off from others?" "Did you feel a lot worse when you were reminded of the event?" Responses were coded as a "no"=1 or "yes"=2 answer to each question. Internal consistency for the sample in the present study was  $\alpha=.73$ . The responses were normally distributed without any significant skew. The variable had a skewness-to-standard error ratio equal to  $-.53$ .

To assess depressive symptoms within the sample, 20 items from the Center for Epidemiological Studies Depressive Symptoms Scale (CES-D) [35] were used. This measure has been used previously in research relating to traumatic experiences and marital functioning. Previous use of this measure, translated in cross-cultural examinations of mental health, indicates this as a viable measure of Depressive Symptoms in terms of its psychometric properties [11]. The responses to the 20 items were summed to indicate levels of depressive symptoms in respondents. Scores greater than 16 points have been established as a clinical cut-off [35]. Questions asked about respondent experiences in the past week such as "I had trouble keeping my mind on what I was doing" and "I felt depressed." Answers ranged on a 4-point Likert scale from 0= "rarely, or none of the time" to 3= "most or all of the time." Cronbach's alpha for the current sample was  $\alpha=.84$ . Responses were positively skewed for depression symptoms in that more respondents generally had lower scores than higher. However, nearly half of the sample (46%) had a score of 16 or above. The skewness-to-standard error ratio was significant at  $4.01$ . A log base 10 transformation was applied to depression symptoms which brought the skewness-to-standard error ratio to  $-1.91$ .

To measure pre-tsunami monthly family income, participants were asked to list their income in Sri Lankan Rupees. This variable was highly positively skewed. It was transformed using a log base 10 function to bring the skewness-to-standard error ratio from  $12.32$  to  $-.57$ .

To assess whether respondents believed the tsunami to have occurred due to their Karma, they were asked two questions. The first

was, "Do you believe the tsunami occurred due to Karma?" Secondly, participants were asked, "Did you believe the tsunami consequences were unavoidable due to your Karma?" Participants were asked to answer "no"=1 or "yes"=2. Participant answers were summed to create a single score. The distribution for this variable was not significantly skewed with a skewness-to-standard error ratio of  $1.45$ . The internal consistency for this scale was roughly adequate at  $\alpha=.68$ .

The hypothesized model is shown in Figure 1. All analyses were completed with the transformed variables.

## Results

### Univariate analysis

The means, standard deviations, medians, skewness, range and kurtosis statistics for all study variables and transformed study variables are presented below in Table 1.

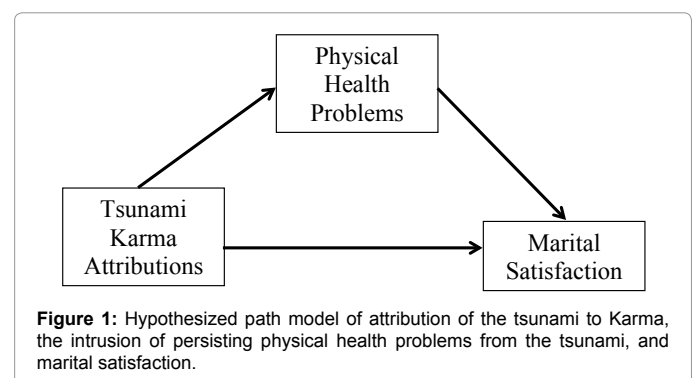
### Bivariate analysis

To determine relationships the variables had with one another, a bivariate analysis was performed. Pearson correlations were computed between variables and are presented in Table 2.

### Multivariate analysis

In order to address the study hypotheses, a series of path models were fit to the data. The placement of the control variables in the models was determined through the bivariate correlations presented above. Regression paths were added in the models from control variables to study variables with which they significantly correlated. Covariances were added in the models between control variables which were significantly correlated. Our first hypothesis, that attributing the tsunami to Karma would significantly correlate inversely with marital satisfaction was not met ( $r = -.07, ns$ ). However, to test whether the selected control variables would influence the relationship between Karma attribution and marital satisfaction, a path model was fit to the data. In this path model marital satisfaction was regressed on attribution of the tsunami to Karma as well as 2005 monthly family income. The variation due to depression and PTSD symptoms was controlled in Karma. Also, monthly family income was allowed to correlate with depression symptoms, and depression symptoms were allowed to correlate with PTSD symptoms. Even when taking into account the control variables, the path between Karma attribution and marital satisfaction was not significant ( $\beta = -.02, ns$ ). This model had acceptable fit ( $\chi^2=5.40, df=4, p=.248; NFI=.934; CFI=.979; TLI=.922; RMSEA=.047, PCLOSE=.44$ ).

Given that our first hypothesis was not met, we fit a series of 2



Scales	M	SD	Median	Range	Skewness (SE)	Kurtosis (SE)
<b>Attributing the Tsunami to Karma N=163</b>	4.23	1.18	4	2-6	.28 (.19)	-1.24 (.38)
<b>Physical Health Problems N=163</b>	2.79	1.16	3	1-5	.26 (.19)	-.98 (.38)
Marital Satisfaction N=153	3.05	.89	3	1-5.5	-.94 (.20)	2.33 (.39)
<b>Square Root Transformation of Marital Satisfaction N=153</b>	1.81	.28	1.77	1-2.35	-.18 (.20)	.742 (.39)
Depression Symptoms N=163	17.14	10.30	14	3-47	.76 (.19)	.38 (-.19)
<b>Log base 10 Transformation of Depression Symptoms N=163</b>	1.15	.29	1.15	.48-1.67	-.36 (.19)	-.50 (.38)
<b>PTSD Symptoms N=156</b>	1.48	.26	1.51	1-2	-.21 (.19)	-.76 (.39)
Pre-Tsunami Monthly Family Income (in Rupees) N=156	6,804.23	5,189.20	5,000	500-30,000	2.34 (.19)	7.06 (.39)
<b>Log base 10 Transformation of Pre-Tsunami Monthly Family Income N=156</b>	3.74	.29	3.7	2.7-4.48	-.11 (.19)	.87 (1.39)

Note: Cases with missing data were deleted listwise. Some variables' univariate statistics were calculated with different sample sizes as a result.

**Table 1:** Univariate Statistics for Study Variables and Transformed Study Variables.

	1	2	3	4	5	6
1. Attributing the Tsunami to Karma	1.00					
2. Physical Health Problems	.02	1.00				
3. Square Root Marital Satisfaction	-.07	-.23**	1.00			
4. Log base 10 Depression Symptoms	-.16*	.34***	-.09	1.00		
5. PTSD Symptoms	-.43***	.26**	.11	.44***	1.00	
6. Log base 10 Pre-Tsunami Monthly Family Income	.13	-.07	.18*	-.19*	-.09	1.00

*Multivariate Analysis*

**Table 2:** Pearson Correlation Coefficients for Study Variables (\*p < .05, \*\*p < .01, \*\*\*p < .001).

nested path models in order to test not for mediation but instead for a significant indirect effect connecting Karma attribution with physical health problems in turn with marital satisfaction taking into account our control variables. We first fit a constrained model which did not include a path between Karma attributions and marital satisfaction. Then we fit a model which was exactly the same except that it included a path between Karma attributions and marital satisfaction and compared the model fit. In order to assess the relationships among the variables, the statistical software, SPSS, was used. The data were then fit to two different path models using the statistical software, AMOS. The first model demonstrated adequate fit ( $\chi^2=7.54$ ,  $df=6$ ,  $p=.274$ ;  $NFI=.935$ ;  $CFI=.984$ ;  $TLI=.943$ ;  $RMSEA=.040$ ,  $PCLOSE=.507$ ). Model 1 is depicted below in Figure 2. The dotted lines represent significant inverse associations, while the bold solid lines represent significant positive associations. Non-bold lines represent non-significant associations. In both models, the path from Karma attributions to physical health problems was marginally significant (Model 1:  $\beta=.14$ ,  $p=.076$ ; Model 2:  $\beta=.14$ ,  $p=.076$ ).

The second model was fit to the data which was exactly the same except that it included a path between Karma attributions and marital satisfaction. The second model also demonstrated acceptable fit ( $\chi^2=6.23$ ,  $df=5$ ,  $p=.284$ ;  $NFI=.946$ ;  $CFI=.987$ ;  $TLI=.945$ ;  $RMSEA=.039$ ,  $PCLOSE=.498$ ). A delta chi-square test was performed to see if adding the path between Karma attributions and marital satisfaction would significantly improve the fit of the model. The  $\Delta \chi^2$  was equal to 1.31 with a  $\Delta df$  of 1 indicating that adding the path did not significantly improve the fit of the model. As such, the more parsimonious model was retained in favor of an indirect link between Karma attributions, and marital satisfaction through persisting physical health problems due to the tsunami.

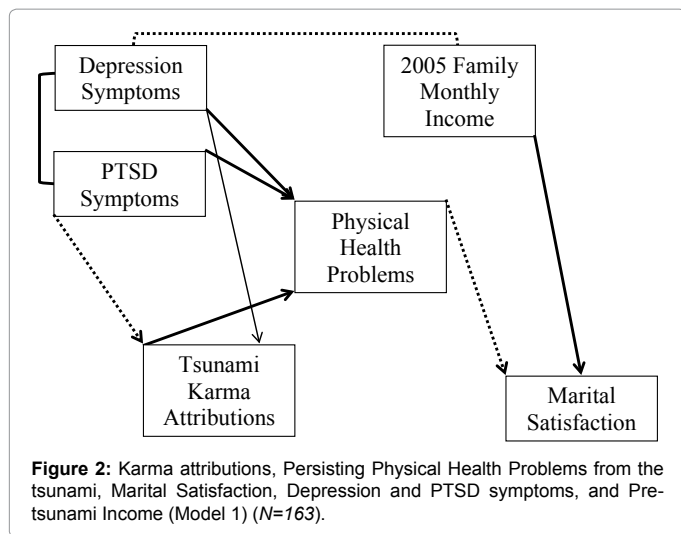
The non-standardized parameter estimate of path coefficients

in Model 1 are included in Table 3 below. The correlation between depression and PTSD symptoms in the model was significant  $r = .43$ ,  $p < .001$ , as was the correlation in the model between depression symptoms and monthly family income pre-tsunami  $r = -.16$ ,  $p < .05$ . The total variance explained in Karma attributions by the model was 18.8%. The model explained 7.3% of the variation in marital satisfaction, 14.5% of the variance in the daily interference of persisting physical health problems due to the tsunami.

**Discussion**

The most important finding we uncovered in our analysis was the observation that attributing the tsunami to Karma may influence marital satisfaction through physical health problems. In other words, the marital satisfaction of the women in our sample seems to have been influenced by the way they made sense of the tsunami, but only when taking into account the daily intrusions of the health problems that resulted from it. We concluded from our analysis that attributing the tsunami to Karma may influence the level of intrusion of persisting physical health problems due to the tsunami which may in turn influence marital satisfaction.

The relationship tested to correspond with hypothesis one, between attribution of the tsunami to Karma and marital satisfaction, was non-significant. However, reflecting on Hobfoll's [34] conservation of resources model some hypotheses about this can be formulated. Hobfoll basically proposed that resource loss mediates between stressful events and their outcomes. In this case we tested whether a given perception about a stressor was related to a self-report about a relational outcome and whether the daily disruption of the intangible resource of physical health mediated that relationship. We hypothesized that attributing the event of the tsunami to Karma would associate negatively with marital satisfaction. It could be that had our analysis been completed with data in closer timing proximity to the disaster, an effect may have been



	Tsunami Karma Attributions	Physical Health Problems	Marital Satisfaction
Depression Symptoms	$\beta = .17, ns$	$\beta = 1.14, p < .001$	--
PTSD Symptoms	$\beta = -2.08, p < .001$	$\beta = .87, p < .05$	--
2005 Family Monthly Income	--	--	$\beta = .16, p < .05$
Tsunami Karma Attributions	--	$\beta = .14, p = .08$	--
Physical Health Problems	--	--	$\beta = -.05, p < .01$

**Table 3:** Non-standardized parameter estimates of path coefficients in Model 1, N=163 Exogenous variables listed in the left column. Endogenous variables listed across the top row.

found. However, data regarding how the tsunami was attributed was not available. It is also possible that an externally oriented attribution about the disaster simply did not predict variance in the self-report of marital satisfaction provided by the participants. Given that our first hypothesis was not supported in the analysis, our second hypothesis was not tested.

Our third hypothesis was supported in part in that there was an indirect effect located between attributing the tsunami to Karma and marital satisfaction, through the disruption of daily life due to a persisting tsunami-related health problem. It appears that any influence of attributing the tsunami to Karma on marital satisfaction in our sample actually occurred *through* the daily intrusion of a persistent physical health problem resulting from the tsunami. Put more specifically, it seems that attributing the disaster to Karma predicts higher levels of daily disruption by a health problem instigated by the tsunami. Then, in turn, higher levels of daily disruption of a health problem instigated by the tsunami associate with lower levels of marital satisfaction. What this may mean is that the daily inconvenience of a tsunami inflicted health problem contributes to lower levels of satisfaction in marriage; the interesting possibility is that perhaps the mechanism by which the health problem has an impact on marital satisfaction is that the bearer of the health problem believed that the cause of their health problem was Karma. This could be a potentially discouraging idea because it places controllability of the outcome of the disaster, in this case the level of intrusion of a physical health problem, outside of the self. Obviously it is beyond the scope of the present study to suggest any type of causality,

and it is just as possible that the correlations uncovered in our analysis are sequenced in another way.

### Implications of research findings

The indirect effect suggests that not only does the level of intrusion of physical health problems lingering years after a disaster predict variance in marital satisfaction, but that physical health problems are also in fact a vehicle through which attributions about the tsunami may influence marital satisfaction. It is important to note that the physical effects of the tsunami are still having an impact on survivors with regard to their marital satisfaction. Special attention to the long term daily interferences of physical health problems in survivor families is needed for those seeking to assist in mental and relational health intervention for survivors. While efforts in disaster recovery are often focused on meeting the immediate physical needs of survivors [24], and debriefing survivors emotionally and mentally [7], it appears that attention to family relationships and chronic health problems is also needed. More attention to the impact of disaster on family dynamics in general is also warranted. The emergence of tensions and quarrels among family members has been documented [9,10]. Even so, it appears that research efforts post disaster, are often mainly focused at the individual [9] and community levels [10] rather than at the family level. Emerging research focusing more intently on family relationship outcomes and risks [17] may begin to shift the focus of intervention development post disaster toward families.

Another highly significant implication of the findings of this study is that the way people make sense out of their experience of disaster appears to have an impact on their wellbeing *and* their relationships. This finding has implications for helping disaster survivors. It suggests that gaining an understanding of what religious ideas, and how survivors' perception of control inform their interpretations of disaster experiences is paramount.

The current study has given insight into the way that marital satisfaction continues to be influenced by the intrusion of physical health problems and attributions about disaster years after its occurrence. Even despite the implications of this finding, there is still much variance yet to be explained in marital satisfaction after the disaster. It is likely that many other factors contribute to family outcomes after a disaster. Even though attention ought to be given to physical health problems and their intrusiveness, when attempting to assist families in their adjustment after a disaster, a thorough assessment of all the challenges faced by families will need to be considered. This is especially the case since the intrusion of physical health problems relate to adverse self-reported relational outcomes 3 years after the disaster. The fact that this substantial amount of time has passed since the disaster may in part explain why more variance was not explained by physical health problems. As previous research indicates, chronological proximity to disaster tends to relate to more intense adverse mental health symptoms. The fact that physical health problems predict variance in marital satisfaction three years after the tsunami given the other variables in the model is significant; thus discovering more about what explains the variance in survivors' experience of physical health problems is worth exploring further.

Furthermore, it is significant that the findings of the present study clarify a distinct role of cognitive constructions about the disaster in relation to physical health problems. From the results of this study, it appears an attribution generally endorsing an external locus of control, or rather an unavoidable consequence due to past actions, may actually contribute to negative perceptions and experiences of persisting physical

health difficulties. Examining how survivors perceive the disaster may open channels for assistance by helping survivors and their families to construct more hopeful or controllable stories about their experience. As mentioned before, this is perhaps the most significant finding of the study in that this clarifies how important it may be for those wishing to assist disaster survivors to understand what attributions inform the experience of the disaster.

### Limitations

One of the main limitations of this study is that it relied on the self report of respondents. The measures used to assess Depressive Symptoms (CESD) [35] and PTSD (DSM-IV diagnostic interview) [36] were reliable in this sample, as was the measure of marital satisfaction. The measure of Karma attributions approached an acceptable level of internal consistency but was not excellent. Furthermore, the intrusion of persisting physical health problems was not able to be evaluated for reliability because it relied on a single item responses.

There is another limitation regarding limitation that should be noted as well. The measures of depressive and PTSD symptoms were developed and normed in Western culture. Given that the experience of disaster, depression and trauma is integrally influenced by how one is culturally situated, we cannot assume that a measure formed in one culture will make sense in another. Watters (2010) has cautioned against oversimplifying the conceptualization of mental health distress across culture. However, similar measures have been used in studies with Sri Lankan respondents [17,37]. Also, the mental health distress variables associated with the other study variables in ways that would be theoretically expected, suggesting that perhaps Western measures of PTSD and depression are not totally inapplicable in an Eastern sample. Notwithstanding that possibility, further study of disaster survivors with mental health distress measures that are developed and situated within the culture is certainly warranted.

Another limitation of this study is found in some of the sample characteristics. While it is important to evaluate the effects of trauma on religious women three years following a natural disaster, we cannot be sure that these findings translate to males experiencing the same trauma. More needs to be done to study male experiences in the same or a similar context. The current sample was of mothers whose mean age was 44. The average education level was 9 years. Ninety-five percent of mothers were married, and 31% were employed. Also, the respondents had an average of 3.1 children per family. These distinct sample characteristics are also a strength given that we need to know the effects of disasters on this demographic. However, given that all respondents lived in the same village, the results give a picture of the tsunami experience for these respondents, but are not directly generalizable to any other samples. Also, the sample was not randomly selected and consisted of a very specific demographic. This is another reason the generalizability of the study is very limited.

The data was cross-sectional except for family monthly income data pre-tsunami which was collected 3 months after the tsunami struck. As such, the current study didn't include measures of retrospective marital satisfaction before the tsunami. This rendered us unable to differentiate between marital satisfaction, mental health or Karma attributions prior to the tsunami so changes were not detectable.

### Future research and addressing of limitations

Perhaps the first step in expanding the research on family outcomes of natural disaster outcomes would be to include other family members as respondents. The current study included only women (mothers). In

order to better understand how having a physical health problem differs from having a spouse or child with a physical health problem, future research would benefit from considering adverse health challenges of other family members. Asking all family members to report on family outcomes would also give a more complete perspective of how family closeness and marital satisfaction relate to the outcomes of disaster.

Further research on the construct of physical health problems from natural disasters as well as other resource losses such as home damage, occupation disruption need to be considered in more detail with regard to marital outcomes. Previous disaster research have considered injury from disasters [17], and occasionally address illness [9]. However, there is limited work on the physical limitations which may accompany injuries and illnesses due to disaster and complicate the daily lives of survivors for years afterward [37-39]. It is possible that physical health limitations may interact with other disaster outcomes to synergize the effect of losses on relational outcomes. For example, physical health problems may contribute to occupational disruptions and compound the difficulties presented by challenges such as home damage and destruction. However, this synergy may be more easily detected in the short term after disaster since the passage of 3 years may have allowed some survivors to adjust or compensate for some of their resource losses. Research focusing on how these losses relate to family outcomes will be an important contribution, especially as studies also include considerations of how physical health problems relate to family outcomes post disaster.

Previous research has shown that often the most reliable predictors of adverse mental health outcomes after a disaster are mental health outcomes before a disaster. Future research should continue to assess pre-disaster mental health status as accurately as possible. Furthermore, if pre-existing mental morbidity predicts adverse mental health outcomes post-disaster, an inclusion of pre-disaster marital indicators may reveal whether disasters create family problems or perhaps exacerbate pre-existing vulnerability. Asking respondents to self report on retrospection of marital satisfaction and functioning may provide a preliminary baseline level to be studied.

Existing studies of the effects of religious attributions in Western culture included attributions of a positive and negative nature [2,3]. It was found that the quality of attribution (which often signified either an internal or external locus of control) influenced the relationship these attributions had with mental health outcomes. Future research with Buddhist populations should include more varied attributions than the present study offered for consideration. Believing the tsunami and its consequences to have been unavoidable due to Karma may be an indication of an external locus of control, which has been shown to relate to higher PTSD symptom levels [1]. An inclusion of a more neutral or positive attribution, such as that regarding the tsunami being due to *anicca*, the impermanence of all things [24] may yield important results for relational and mental health distress outcomes. This is especially important because previous research has connected the quality of religious attribution to religious and mental health outcomes [2,3], but no studies exist to our knowledge that examine the connection between religious attributions and relational outcomes in the disaster context. Finally, future research on this topic should attempt to include more rigorous instrumentation to assess physical health problems, as well as attributions about disasters that indicate both an adoption of internal as well as external loci of control.

### References

1. Suar D, Mandal Mk, Khuntia R (2002) Supercyclone in Orissa: An Assessment of Psychological Status of Survivors. *Journal of Traumatic Stress* 15:313-319.



2. Smith TW, Uchino BN, Berg CA, Florsheim P, Pearce G, et al. (2007) Hostile Personality Traits and Coronary Artery Clarification in Middle-Aged and Older Married Couples: Different Effects For Self-Reports Versus Spouse-Ratings. *Psychosomatic Medicine* 69:441-448.
3. Smith BW, Pargament KI, Brant C, Oliver JM (2000) Noah Revisited: Religious Coping by Church Members and the Impact of The 1993 Midwest Flood. *Journal of Community Psychology* 28:169-186.
4. Caldera T, Palma L, Penayo U, Kullgren G (2001) Psychological Impact of The Hurricane Mitch in Nicaragua in a One-Year Perspective. *Soc Psychiatry PsychiatrEpidemiol*, 36:108-114.
5. Menzel Baker Sm, Hunt Dm, RittenburgTI (2007) Consumer Vulnerability as a Shared Experience: Tornado Recovery Process in Wright, Wyoming. *Journal of Public Policy & Marketing* 26:6-19.
6. Proctor LJ, Fauchier A, Oliver PH, Ramos MC, Rios MA, et al. (2007) Family Context and Young Children's Responses To Earthquake. *Journal of Child Psychology and Psychiatry* 48:941-949.
7. Bronisch T, Maragos M, Freyer C, Muller-Cyran A, et al. (2006) Clinical Insights: Crisis Intervention after the Tsunami in Phuket and KhaoLak. *Crisis* 27:42-47.
8. Anderson Km (2007) Charting A Course into the Unknown: Banda Aceh, Indonesia, Tsunami, 2004. *Perspectives in Psychiatric Care* 43: 47-51.
9. Assanangkornchai S, Tangboonngam S, Edwards JG (2004) The Flooding of Hat Yai: Predictors of Adverse Emotional Responses to Natural Disaster. *Stress and Health* 20: 81-89.
10. Catapano F, Malafronte R, Lepre F, Cozzolino P, Arnone R, et al. (2001) Psychological Consequences of the 1998 Landslide In Sarno, Italy: A Community Study. *ActaPsychiatrScand* 104: 438-442.
11. Wickrama K, Kaspar V (2007) *Social Science & Medicine* 64: 713-723.
12. Sattler DN, Dealvarado AMG, Decastro NB (2006) El Salvador Earthquakes: Relationships among Acute Stress Disorder Symptoms, Depressive Symptoms, Traumatic Even Exposure, and Resorce Loss. *Journal of Traumatic Stress*: 19: 879-893.
13. Mcmillen JC, Smith EM, Fisher RH (1997) Perceived Benefit and Mental Health After Three Types of Disaster. *Journal of Consulting and Clinical Psychology* 65: 733-739.
14. Weidmann A, Fehm L, Fydrich T (2008) Covering the Tsunami Disaster: Subsequent Post-Traumatic and Depressive Symptoms and Associated Social Factors. *Stress and Health* 24: 129-135.
15. Madrid PA, Grant R (2008) Meeting Mental Health Needs Following a Natural Disaster: Lessons From Hurricane Katrina. *Professional Psychology, Research and Practice* 39: 86-92.
16. Banford A, Wickrama T, Brown M, Ketring S (2011) The Relationship Between Physical Health Problems and Couple Violence and Conflict in Survivors of the 2004 Tsunami: Mediation by Marital Satisfaction. *International Journal of Mass Emergencies and Disasters*, 29: 149-170.
17. Wickrama KAS, Wickrama, KA (2008) Family Context of Mental Health Risk in Tsunami Affected Mothers: Finding from a Pilot Study in Sri Lanka. *Social Science & Medicine* 66l: 994-1007.
18. Lindgaard CV, Iglebaek, T, JensenTk (2008) Changes in Family Functioning in The Aftermath of a Natural Disaster: The 2004 Tsunami in Southeast Asia. *Journal of Loss and Trauma*. 14:101-116.
19. Vanrooyen M, Leaning J (2005) After the Tsunami—Facing the Public Health Challenges. *The New England Journal of Medicine*. 352: 435-438.
20. Booth A, Johnson Dr (1994) Declining Health and Marital Quality. *Journal of Marriage and the Family* 56: 218-223.
21. Murray Jrtl, Murray Ce, Daniels Mh (2007) Stress and Family Relationship Functioning as indicators of the Severity of Fibromyalgia Symptoms: A Regression Analysis. *Stress and Health* 23:3-8.
22. Trief PM, Morin PC, Izquierdo R, Teresi J, Starren J, et al. (2006) Marital Quality and Diabetes Outcomes: The Ideatel Project. *Families, Systems, & Health* 24:318-331.
23. Lillard L, Waite L (1995) Til Death Do Us Part: Marital Disruption and Mortality." *American Journal of Sociology* 5:1131-1156.
24. De Silva P (2006) The Tsunami and its Aftermath in Sri Lanka: Explorations of a Buddhist Perspective. *International Review of Psychiatry* 18: 281-287.
25. Ai Al, Peterson C, Huang B (2003) The Effect of Religious—Spiritual Coping on Positive Attitudes of Adult Muslim Refugees from Kosovo and Bosnia. *The International Journal for the Psychology of Religion* 13: 29-47.
26. Koenig H (2006) In the Wake of Disaster: Religious Responses to Terrorism and Catastrophe. Philadelphia: Templeton Press.
27. Shaw A, Joseph S, Linley PA (2005) Religion, Spirituality, And Posttraumatic Growth: A Systematic Review. *Mental Health, Religion & Culture* 8:1-11.
28. Calhoun LG, Cann A, Tedeschi RG, Mcmillan J (2000) A Correlational Test of The Relationship Between Posttraumatic Growth, Religion, and Cognitive Processing. *Journal of Traumatic Stress* 13:521-527.
29. Chen L (1997) Grief as a Transcendent Function and Teacher of Spiritual Growth. *Pastoral Psychology* 46: 79-84.
30. Davidson JRT, Connor KM, Lee L (2005) Beliefs in Karma and Reincarnation among Survivors of Violent Trauma: A Community Survey. *Soc Psychiatry PsychiatrEpidemiol*, 40:120-125.
31. Rotter JB (1966) Generalized Expectancies for Internal Versus External Control of Reinforcement. *Psychological Monographs* 80 (1 Whole No. 609).
32. Khanna P, KhannaJI (1979) Locus of Control in India: A Cross-Cultural Perspective. *International Journal of Psychology* 14: 207-214.
33. Solomon Z, Mikulincer M (1990) Life Events and Combat-Related Post Traumatic Stress Disorder: The Intervening Role of Locus of Control and Social Support. *Military Psychology* 2:241-256.
34. HobfollS (1989) Conservation of Resources A New Attempt at Conceptualizing Stress. *American Psychologist* 44: 513-523.
35. Radloff LS (1977) The Ces-D Scale: A Self-Report Depressive Symptoms Scale for Research in the General Population. *Applied Psychological Measurement* 1:385-401.
36. American Psychiatric Association (1994) *Diagnostic and Statistical Manual of Mental Disorders (4<sup>th</sup> Ed.)* Washington, Dc: Author.
37. Watters E (2010) *Crazy Like Us: The Globalization of the American Psyche*. New York, Ny: Free Press.
38. Centre For Research on The Epidemiology of Disasters (Cred) (2005) Trends in Natural Disasters. (2005) In Unep/Grid-Arendal Maps And Graphics Library. Retrieved 22:27, May 2, 2009 From [Http://Maps.Grida.No/Go/Graphic/Trends-In-Natural-Disasters](http://Maps.Grida.No/Go/Graphic/Trends-In-Natural-Disasters).
39. Wu HC, Pesus C, Chou FHC, Su CY, Tsai KY, et al. (2006) Survey of Quality of Life and Related Risk Factors For a Taiwanese Village Population 3 Years Post-Earthquake. *The Authors Journal Compilation: The Royal Australian and New Zealand College of Psychiatrists* 355-361.