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Abstract: Limited research has addressed factors associated with psychological distress following disasters among non-Western populations. The 2004 tsunami affected 1.7 million people across South Asia and Africa, with considerable variations in trauma-related outcomes. Pretraumatic and peritraumatic conditions associated with trauma-related symptoms in 305 Sri Lankan adult survivors (28% male, aged 18-83 years; mean = 39.9 years; standard deviation = 15.3), clinically assessed 1 month posttsunami, were e ...

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1 Abstract

2
3 Limited research has addressed factors associated with psychological distress following disasters
4 among non-Western populations. The 2004 tsunami affected 1.7 million people across South
5 Asia and Africa with considerable variations in trauma-related outcomes. Pretraumatic and
6 peritraumatic conditions associated with trauma-related symptoms in 305 Sri Lankan adult
7 survivors (28% male, aged 18 to 83, $M=39.9$ yrs, $SD=15.3$) clinically-assessed one month post-
8 tsunami, were evaluated retrospectively. Outcome measures were total scores on 11 trauma-
9 related symptoms. Multivariate linear regression analyses tested for associations between
10 pretraumatic and peritraumatic conditions and symptom scores, with peritraumatic conditions
11 adjusted for pretraumatic variables. Pretraumatic conditions of female gender, employment, prior
12 health and social issues, substance use and peritraumatic conditions of loss of family, witnessing
13 the tsunami or suffering an injury were associated with trauma-related symptoms. The findings
14 facilitate understanding cultural contexts that define risk factors associated with trauma-related
15 symptoms in Sri Lankans, which are critical for developing culturally appropriate interventions.
16 Key words: adult survivors, cross-cultural, Sri Lanka, trauma, tsunami.

17

18 Researchers have proposed multiple models to explain why some individuals are more affected
19 by potentially traumatising events (PTEs) than others.¹ Such models are derived from Western
20 contexts and tested in predominantly Western populations. The impact of PTEs in non-Western
21 populations is less understood. Relative to trauma-related research outcomes from Western
22 countries, the number of published studies on psychological effects of disasters from non-
23 Western countries, chiefly Asia, is limited.² This lack of research is concerning, as most
24 worldwide natural disasters, such as the 2004 Indian Ocean tsunami, occur within Asia.³ In Sri
25 Lanka, for example, very little is known about psychological reactions to unprecedented PTEs
26 such as tsunamis. This paper addresses the limitations of research studies focusing on Western
27 populations by examining the correlates associated with increased/decreased trauma-related
28 symptoms (e.g., stress, anxiety, depression) within a Sri Lankan population.

29 Research examining the impact of the tsunami on survivors has found considerable
30 variability in the prevalence of posttraumatic stress disorder (PTSD)^{4,5} and other disorders (e.g.,
31 anxiety, depression, emotional distress and negative adjustment) within affected survivors.⁶⁻⁸ The
32 varying results of these studies indicate that across different tsunami survivor populations,
33 exposure to the PTE alone did not predict the prevalence of trauma-related symptoms and
34 symptoms are possibly influenced by other factors.

35 Trauma research has identified risk factors for those more likely to develop PTSD and
36 other trauma-related symptoms following exposure to a PTE⁹ and classified these factors as
37 pretraumatic and peritraumatic conditions.¹⁰ Pretraumatic (demographic and social factors)
38 associated with posttrauma mental health difficulties in survivors of the 2004 tsunami include
39 female gender,¹¹ low household income,⁴ lower education levels,¹² observance of religions other
40 than Buddhism,⁵ previous individual psychopathology⁵ and negative life events (e.g., family

41 loss).¹³ The peritraumatic factors or factors pertaining to the traumatic event (e.g., trauma
42 exposure, losses experienced) associated with posttrauma mental health difficulties in survivors
43 of the 2004 tsunami, included higher trauma exposure, loss of family members, property damage
44 and loss, loss of livelihood and work equipment, danger to life or that of a family member, injury
45 due to the tsunami and loss of social networks.^{4-6,11,14} Considerable variability in risk factors
46 associated with trauma-related symptoms is seen across the different affected populations.

47 Theoretical models of vulnerability to and recovery from psychological trauma
48 emphasise the critical role of social support in influencing impairment and recovery.⁹ Models
49 attribute variations in posttrauma symptoms across populations of different ages to cultural
50 differences in the nature and function of pretraumatic and peritraumatic social support factors. In
51 collectivist cultures such as Sri Lanka, where family is emphasised over individuals,¹⁵ it is
52 expected that loss/disruption to social networks would impact persons considerably. Substantial
53 cultural variation is noted in other risk factors associated with posttrauma difficulties such as
54 substance use¹⁶ and marital status.¹⁷ While level of trauma exposure is the most robust predictor
55 of posttraumatic mental health difficulties following exposure to a PTE,¹⁸ the studies above
56 indicate substantial variations in traumatic outcomes across different countries. Given that
57 current theory and models are formalised on Western populations, it is vital to take cultural
58 differences into consideration, thus underscoring the need for continued cross-culture research.

59 The current study is a community-based introductory exploration of the impact of the
60 2004 tsunami on a population from Sri Lanka investigating the pretraumatic and peritraumatic
61 factors associated with trauma-related symptoms in survivors one month post-tsunami, derived
62 from data extracted via a retrospective case-file analysis. Based on previous findings, we
63 predicted that the pretraumatic conditions of female, unmarried, lower levels of education,

64 unemployed, prior health and social issues and drug/alcohol use would be positively related to
65 trauma-related symptoms. Unemployment, prior health and social issues relate to known risk
66 factors such as low household income, prior individual psychopathology and negative life events
67 and these conditions were expected to positively relate to trauma-related symptoms. We also
68 predicted that, after controlling for pretraumatic conditions, peritraumatic conditions affecting
69 interpersonal and social networks such as loss of family members would be more strongly related
70 to trauma-related symptoms than factors that are more materially focused (loss of home/property
71 or work equipment).

72 **Method**

73 *Participants and Procedure*

74 This retrospective case analysis was based on data collected by the National Institute of
75 Professional Counselors, Sri Lanka, during a counselling project organised for 1093 adult and
76 631 child tsunami survivors residing in 19 temporary shelters and camps within the Galle District
77 in January, 2005. This project is described elsewhere.¹⁹ Participants completed assessments as
78 part of counseling services provided by the institute. Of the data collected, 698 individual paper
79 files of survivors were stored by the Institute (adults = 357, children = 305, age missing = 36).
80 These files were de-identified and provided to the research team. This study is based on adults
81 only. Ethics approval to conduct the study was provided by the Deakin University Faculty of
82 Health Human Ethics Advisory Group.

83 Case files were translated into English from Sinhalese by one author (CG). The accuracy
84 of the translations was checked by another bilingual colleague, and words and terminology were
85 verified. Data were extracted from files by CG using the systematic coding approach described
86 following. Missing values were examined. Variables containing large numbers of missing data

87 were excluded. Cases were checked for missing data and those missing any data were deleted
88 using listwise deletion (52 cases, 15% of total available adult cases). The final sample comprised
89 305 adult survivors.

90 *Measures*

91 Individual diagnostic interviews used to ascertain demographics, type of tsunami experience and
92 trauma-related symptoms were conducted on survivors one month post-tsunami by 26 trained
93 counsellors attached to the institute – all had completed diplomas in counselling. Participant
94 information was classified as follows.

95 *Pretraumatic conditions.* Individual case records included information about age, gender,
96 marital status, level of education, employment, pre-disaster health (e.g., physical ailments,
97 diagnosed mental disorders) and social problems (e.g., marital conflict, bereavement), and
98 substance use. Eighty six (28%) reported physical problems (e.g., cardiovascular disease,
99 arthritis), seven (2%) reported mental problems (e.g., psychosis) and 22 (7%) reported social
100 problems (e.g., conflicts with spouse). For substance use, assessed via one question on general
101 use, 12 (4%) reported alcohol use, six (2%) reported drug use and one (.3%) reported both
102 alcohol and drug use. Pretraumatic categorical variables were coded as follows: gender (0 =
103 male, 1 = female); religion (0 = non-Buddhist, 1 = Buddhist); marital status (0 = unmarried, 1 =
104 married); level of education (0 = none up to Year 8, 1 = Year 8 up to Year 13); employment (0 =
105 unemployed, 1 = employed); prior health (0 = no prior health problems, 1 = prior health
106 problems) and prior social problems (0 = no prior social problems, 1 = prior social problems).
107 Any type of substance use (alcohol and/or drugs) was combined into one variable, ‘substance
108 use’ (0 = no substance use, 1 = substance use).

109 *Peritraumatic conditions.* Participants were asked about their adverse experience of the
110 tsunami via one open-ended item. The experiences described were witnessing the tsunami,
111 getting caught in the waves and/or suffering injury, loss of occupation/work equipment, loss
112 of/damage to property, and loss of family members. Six persons (2%) witnessed the tsunami and
113 10 (3%) were caught in the waves/ injured. Peritraumatic categorical variables were coded as:
114 loss of occupation (0 = no, 1 = yes); property damage (0 = no property damage, 1 = property
115 damage); loss of family members (0 = no loss of family members, 1 = loss of one or more family
116 members). As being caught in the waves/injured included witnessing the tsunami, these variables
117 were combined into “witnessing the tsunami/being injured” (0 = did not witness/was not injured,
118 1 = witness/injury).

119 *Psychological symptoms and conditions.* Trauma-related symptoms were assessed via a
120 clinical interview based on clinical observation. The presence of symptoms was indicated
121 through 11 dichotomous (no = 0, yes = 1) symptom items: stress, anxiety, depression, PTSD,
122 suicidal thoughts, aggression, inability to cope/defeat, lack of hope, bodily aches, other physical
123 symptoms and other symptoms.¹⁹ These symptom indices were derived from DSM IV criteria for
124 depression, anxiety and PTSD. However formal diagnoses were not made. Thus, this paper
125 examines a community-based measure of trauma-related symptoms and not a measure based on
126 DSM diagnoses since formal diagnostic testing was not practical.

127 *Data Treatment and Analysis.*

128 Descriptive analyses (means, proportions) were used to summarise the sample demographics and
129 survivor characteristics. Responses on the 11 traumatic symptom items were summed (range: 0-
130 11). For Chi-square analyses, symptoms scores were dichotomised (0-2, 3 or more) based on a
131 median-split. Multiple linear regression was used to test for relationships between pretraumatic

132 and peritraumatic conditions and traumatic symptom score. Crude regression models were run
133 for each of the pretraumatic and peritraumatic variables. To test the unique contribution of the
134 pretraumatic and peritraumatic conditions on trauma-related symptoms, the pretraumatic and
135 peritraumatic variables respectively were entered in sequential blocks with the symptom score as
136 the outcome variable. All analyses were conducted using SPSS software (version 17.0; IBM
137 Corporation, Armonk, New York). Alpha was set at $p < .05$.

138 **Results**

139 The sample characteristics are presented in Table 1. Half of the sample were educated up to Year
140 8, and none had post-secondary education. A third were aged 18-30 years and a third, 31-45
141 years. Just under half reported some form of employment, most were married and nearly all were
142 Buddhist. More than half the survivors completely lost their homes and property, while one in
143 ten reported loss of one/more family members.

144 Insert Table 1 here

145
146 The most common symptoms were stress (55%), anxiety (42%), inability to cope/defeat (34%),
147 lack of hope (32%), bodily aches (26%), and PTSD (20%). Overall, 17% reported no symptoms,
148 38% one to two, and 24% three to four symptoms. The characteristics of adults reporting zero to
149 two (lower) or three or more (higher) trauma-related symptoms are presented in Table 2.
150 Significantly higher proportions of adults who were over 45 years, employed, had prior health
151 conditions and lost family members reported higher (>3) trauma-related symptoms.

152 Insert Table 2 here

153

154 Table 3 presents results of the crude and adjusted regression analyses. Trauma-related symptoms
155 were positively associated with the pretraumatic conditions of age, employment and pre-existing
156 health issues, and peritraumatic condition of loss of family members.

157 In the adjusted analyses, for the first model, the pretraumatic conditions significantly
158 positively associated with trauma-related symptoms were female gender, being employed, pre-
159 existing health issues, pre-existing social issues and substance use. When the pretraumatic
160 conditions were controlled in the second model, the peritraumatic conditions of loss of family
161 members and witnessing the tsunami/injury suffered were significantly positively associated with
162 trauma-related symptoms.

163 The second model with both the pretraumatic and peritraumatic variables accounted for
164 16% of the variance in trauma-related symptoms, ($R^2 = .20$, adjusted $R^2 = .16$, $F(13, 291) = 5.51$,
165 $p < .001$).

166 Insert Table 3 here

167

168 Discussion

169 This study investigated the pretraumatic and peritraumatic conditions related to increased
170 trauma-related symptoms in Sri Lankan adult survivors one month following the tsunami.

171 Consistent with findings reported for Western adults this study found that females,²⁰ adults with
172 prior health²¹ and social issues,²² and substance use,¹⁶ were associated with increased trauma-
173 related symptoms. Females have also shown increased symptomology in non-Western
174 samples.^{11,14} Gender differences in trauma-related symptoms indicate that females in diverse
175 cultural contexts are more vulnerable than males to the effects of PTEs²³ which suggests that
176 gender patterns in response to familial loss and vulnerability to major stressors seem stable

177 across cultures.²⁴ However, whether these gender differences are due reporting biases (e.g.,
178 women being more open to reporting distress than men) or genuine differences between genders
179 is unknown.

180 In non-Western samples, research on the association of prior health and social conditions
181 and substance use with trauma-related symptoms is limited.²⁵ It should be noted that males
182 indicated substance use in the current sample, the majority of whom also reported symptoms of
183 aggression. However, these symptoms could be gender-related effects not necessarily due to the
184 tsunami and may be more indicative of how adult males who reported substance use reacted to
185 the tsunami.

186 Research using Western samples has identified lower income levels and lower socio-
187 economic status⁹ as associated with increased PTSD symptoms. This study found that being
188 employed is linked to trauma-related symptoms, which has not been shown previously.
189 Employed adults being more affected by the tsunami than unemployed adults may be due to
190 unemployed adults possibly having other means of income or being dependent on others. Adults
191 in the current sample were from a rural community, where fixed employment/income is not
192 available or guaranteed. As employed adults are their households' source of income they may be
193 more susceptible to the stressful impact of losing their means of subsistence and consequently
194 show more trauma-related symptoms. While the impact of the tsunami on loss of livelihood and
195 work equipment was examined in the current study and showed no significant associations with
196 increased symptoms, the indirect effects of the tsunami on the local economy are unknown. Such
197 effects may increase the likelihood of traumatic symptoms in employed adults.

198 Other pretraumatic conditions expected to have associations with trauma-related
199 symptoms which were being unmarried, a lower level of education, and non-Buddhist religion -

200 were not related to trauma-related symptoms. There was no increase in trauma-related symptoms
201 for being unmarried, a finding consistent with previous research reporting no associations
202 between marriage and PTSD in Western¹⁷ and non-Western populations.¹² This lack of a
203 relationship with marital status may be attributed to the local culture, where unmarried adults
204 typically do not live alone - both married and unmarried adults share similar social support
205 networks. Contrary to prior research in Western and non-Western populations, this study found
206 no influence of education levels on trauma-related symptoms,^{12,26} possibly due to an effect of the
207 relative homogeneity of educational status in the sample (none had completed a post-secondary
208 education). For age, research has shown younger age associated with PTSD and trauma
209 symptoms in Western²⁷ and non-Western populations,⁶ and older age associated with both
210 protective factors²⁸ and PTSD symptoms²⁷ in Western populations. In this sample, age was not
211 associated with increased likelihood of trauma-related symptoms, possibly due to the broader
212 age-range when compared with other studies. There was also no association between non-
213 Buddhist religion and trauma-related symptoms in this sample, contrary to prior research.⁵

214 Within peritraumatic conditions, loss of family members and witnessing the tsunami
215 and/or being injured were associated with trauma-related symptoms, even after controlling for
216 pretraumatic conditions. Previous research has identified links between loss of family, injury
217 sustained and trauma-related symptoms in Western²⁰ and non-Western populations.^{6,11} Losing
218 loved ones and witnessing the tsunami and/or being injured universally appears to increase the
219 likelihood of increased trauma-related symptoms. Damage/loss of property or loss of
220 livelihood/work equipment were not associated with trauma-related symptoms in this study,
221 contrary to research which has shown destruction of property¹¹ and loss of livelihood/work
222 equipment^{5,14} as associated with PTSD symptoms in non-Western samples. As this study was

223 conducted one month post-tsunami, when survivors were in temporary housing and receiving
224 assistance from governmental/other organisations, this assistance may have buffered the impact
225 of property and livelihood loss. Whether adults may show delayed-response symptoms to their
226 material losses is unknown. Additionally, it is possible some survivors possessed limited
227 property, therefore were less affected by property loss.

228 This study provided an exploratory understanding of the pretraumatic and peritraumatic
229 factors associated with posttrauma mental health difficulties at a community-level in a tsunami-
230 survivor population from southern Sri Lanka. Such understanding is essential given the limited
231 research on the impacts of large-scale disasters on non-Western populations. The findings
232 provide a basis for understanding the impact of a PTE on this population, which has implications
233 for informing culturally relevant future research and theory and facilitates intervention efforts –
234 particularly for more vulnerable survivors. It should be noted that the majority of adults
235 completed counselling without further evaluation/treatment, regardless of the number of trauma-
236 related symptoms they reported, which would be concerning in a Western context. Natural
237 disasters in developing countries are more likely to produce PTSD due to the magnitude of the
238 loss of resources associated with such disaster exposure.²⁹ Sri Lankans have also faced several
239 recent challenges, including a two decade-long civil war, a declining economy and political
240 instability.³⁰ Such crises signify that tsunami survivors who did not receive adequate
241 attention/care to alleviate their trauma-related symptoms may face tremendous difficulties
242 impacting their mental health and possibly express symptoms for years to come. By identifying
243 the high-risk survivor groups for trauma-related symptoms and the factors associated with
244 increased symptomology, interventions can be targeted to vulnerable individuals ensuring they
245 receive evidence-based rather than general forms of intervention.

246 A weakness of the current research is that the measures used were developed by the
247 counselling institute based on a Western model, and the applicability of such measures to
248 assessing PTEs in non-Western survivors is questioned. It is important that any research on
249 survivors from non-Western cultures and intervention consider the cultural context to facilitate
250 better understanding of the impact of a large-scale traumatic event. Other limitations include the
251 cross-sectional design, examining predictive effects and the restrictive convenience sample,
252 which does not allow for generalising to other contexts and case-file retrospective analysis,
253 which limits investigating exposure and outcomes. The use of a symptom-count measure based
254 on clinical observations of trained counselling staff without formal diagnoses limit the reliability
255 of these observations. Further, the measure of symptoms did not include an assessment of
256 confounders such as pre-tsunami exposure to PTEs (e.g., childhood traumatisation). Women in
257 particular may have been exposed to childhood trauma/abuse, which may reflect in their
258 increased traumatic symptoms post-tsunami in comparison with men. The measure also did not
259 include an assessment of dissociative symptoms – which are key posttraumatic symptoms –
260 during/immediately after the tsunami. However, despite the practical and methodological
261 limitations, we are cautiously optimistic our findings make a necessary contribution to the
262 existing culturally-limited literature.

263 The need for examining impacts of natural disasters on non-Western populations remains,
264 since natural disasters are as unpredictable as they are devastating. It is imperative that
265 researchers strive for in-depth understanding of such impacts to facilitate recovery, care and
266 treatment programs in culturally-appropriate ways to maximise effectiveness in alleviating the
267 mental health burden on populations in developing countries.

268 **References**

- 269 1. Cahill SP, Foa EB. Psychological theories of PTSD. In: Friedman MJ, Terence M.
270 Keane, Resick PA, eds. *Handbook of PTSD: Science and practice*. New York, NY:
271 Guilford Press; 2007:55-77.
- 272 2. Udomratn P. Mental health and the psychosocial consequences of natural disasters in
273 Asia. *International Review of Psychiatry*. 2008;20(5):441-444.
- 274 3. Iain B. Defending against disasters: Global public health emergencies and opportunities
275 for collaboration and action. *Asia Pac J Public Health*. 2010;22(3 suppl):222S-228S.
- 276 4. Kumar MS, Murhekar MV, Hutin Y, Subramanian T, Ramachandran V, Gupte MD.
277 Prevalence of posttraumatic stress disorder in a coastal fishing village in Tamil Nadu,
278 India, after the December 2004 tsunami. *Am J Public Health*. 2007;97(1):99-101.
- 279 5. Thienkrua W, Cardozo BL, Chakkraband MLS, et al. Symptoms of posttraumatic stress
280 disorder and depression among children in tsunami-affected areas in Southern Thailand.
281 *JAMA*. 2006;296(5):549-559.
- 282 6. Souza R, Bernatsky S, Reyes R, de Jong K. Mental health status of vulnerable tsunami-
283 affected communities: A survey in Aceh Province, Indonesia. *J Trauma Stress*.
284 2007;20(3):263-269.
- 285 7. Wickrama KAS, Wickrama KAT. Family context of mental health risk in tsunami
286 affected mothers: Findings from a pilot study in Sri Lanka. *Soc SciMed*. 2008;66(4):994-
287 1007.
- 288 8. Krishnaswamy S, Subramaniam K, Indran T, Low W-Y. The 2004 tsunami in Penang,
289 Malaysia: Early mental health intervention. *Asia Pac J Public Health*. July 1, 2012
290 2012;24(4):710-718.
- 291 9. Brewin CR, Andrews B, Valentine JD. Meta-analysis of risk factors for posttraumatic
292 stress disorder in trauma-exposed adults. *J Consult Clin Psychol*. 2000;68(5):748-766.
- 293 10. Vogt DS, King DW, King LA. Risk pathways for PTSD: Making sense of the literature.
294 In: Friedman MJ, Keane TM, Resick PA, eds. *Handbook of PTSD: Science and practice*.
295 New York, NY US: Guilford Press; 2007:99-115.
- 296 11. Frankenberg E, Friedman J, Gillespie T, et al. Mental health in Sumatra after the tsunami.
297 *Am J Public Health*. 2008;98(9):1671-1677.
- 298 12. Suar D, Das N, Hota LB. Social indicators affecting post-tsunami trauma of survivors.
299 *Journal of Health Management*. 2010;12(4):483-500.
- 300 13. Wahlström L, Michélsen H, Schulman A, Backheden M. Childhood life events and
301 psychological symptoms in adult survivors of the 2004 tsunami. *Nordic Journal of*
302 *Psychiatry*. 2010;64(4):245-252.
- 303 14. Lommen MJJ, Sanders AJML, Buck N, Arntz A. Psychosocial predictors of chronic post-
304 traumatic stress disorder in Sri Lankan tsunami survivors. *Behav Res Ther*.
305 2009;47(1):60-65.
- 306 15. Triandis HC, Bontempo R, Villareal MJ, Asai M, Lucca N. Individualism and
307 collectivism: Cross-cultural perspectives on self-ingroup relationships. *J Pers Soc*
308 *Psychol*. 1988;54(2):323-338.
- 309 16. Jacobsen LK, Southwick SM, Kosten TR. Substance use disorders in patients with
310 posttraumatic stress disorder: A review of the literature. *Am J Psychiatry*.
311 2001;158(8):1184-1190.

- 312 17. Breslau N, Peterson EL, Poisson LM, Schultz LR, Lucia VC. Estimating post-traumatic
313 stress disorder in the community: Lifetime perspective and the impact of typical
314 traumatic events. *Psychol Med*. 2004;34(05):889-898.
- 315 18. Friedman MJ, Resick PA, Keane TM. PTSD: Twenty-five years of progress and
316 challenges. In: Friedman MJ, Terence M. Keane, Resick PA, eds. *Handbook of PTSD:
317 Science and practice*. New York, NY: Guilford Press; 2007:3-18.
- 318 19. Ranawaka DS, Dewaraja R. Tsunami counselling project of the Sri Lanka National
319 Institute of Professional Counsellors. In: Kubo C, Kuboki T, eds. *Psychosomatic
320 medicine: Proceedings of the 18th World Congress on Psychosomatic Medicine, held in
321 Kobe Japan, between 21 and 26 August 2005*. New York, NY: Elsevier Science;
322 2006:79-81.
- 323 20. DiGrande L, Perrin MA, Thorpe LE, et al. Posttraumatic stress symptoms, PTSD, and
324 risk factors among lower Manhattan residents 2-3 years after the September 11, 2001
325 terrorist attacks. *J Trauma Stress*. 2008;21(3):264-273.
- 326 21. Green BL, Kimerling R. Trauma, posttraumatic stress disorder, and health status. In:
327 Schnurr PP, Green BL, eds. *Trauma and health: Physical health consequences of
328 exposure to extreme stress*. Washington DC, US: American Psychological Association;
329 2004:13-42.
- 330 22. Solomon Z, Zur-Noah S, Horesh D, Zerach G, Keinan G. The contribution of stressful
331 life events throughout the life cycle to combat-induced psychopathology. *J Trauma
332 Stress*. 2008;21(3):318-325.
- 333 23. Kendler KS, Karkowski LM, Prescott CA. Causal relationship between stressful life
334 events and the onset of major depression. *Am J Psychiatry*. 1999;156(6):837-841.
- 335 24. Galbally M, Lewis AJ, Ijzendoorn Mv, Permezel M. The role of oxytocin in mother-
336 Infant relations: A systematic review of human studies. *Harv Rev Psychiatry*.
337 2011;19(1):1-14.
- 338 25. Thavichachart N, Tangwongchai S, Worakul P, et al. Posttraumatic mental health
339 establishment of the tsunami survivors in Thailand. *Clinical Practice and Epidemiology
340 in Mental Health*. 2009;5:11.
- 341 26. Norris FH, Friedman MJ, Watson PJ. 60,000 disaster victims speak: Part II. Summary
342 and implications of the disaster mental health research. *Psychiatry: Interpersonal &
343 Biological Processes*. 2002;65(3):240-260.
- 344 27. Keane TM, Marx BP, Sloan DM. Post-traumatic stress disorder: Definition, prevalence,
345 and risk factors. In: Shiromani PJ, Keane TM, LeDoux JE, eds. *Post-traumatic stress
346 disorder: Basic science and clinical practice*. Totowa, NJ, US: Humana Press; 2009:1-19.
- 347 28. Creamer M, Burgess P, McFarlane AC. Post-traumatic stress disorder: Findings from the
348 Australian national survey of mental health and well-being. *Psychol Med*.
349 2001;31(7):1237-1247.
- 350 29. Norris FH, Slone LB. The epidemiology of trauma and PTSD. In: Friedman MJ, Keane
351 TM, Resick PA, eds. *Handbook of PTSD: Science and practice*. New York, NY: Guilford
352 Press; 2007:78-98.
- 353 30. Karunathilake IM. Health Changes in Sri Lanka: Benefits of Primary Health Care and
354 Public Health. *Asia Pac J Public Health*. July 1, 2012 2012;24(4):663-671.

356 **Table 1.** Characteristics of the Demographic (Pretraumatic) and Loss and Damage
 357 (Peritraumatic) Conditions.

Characteristic	<i>N</i> (%)
<u>Pretraumatic condition</u>	
Age, mean years (SD)	39.9 (15.3)
Males	87 (28.5)
Married	265 (86.9)
No education – up to Year 8	154 (50.5)
Buddhist	294 (96.4)
Employed	137 (44.9)
Prior health issues	97 (32.0)
Prior social issues	26 (8.5)
Substance use	19 (6.2)
<u>Peritraumatic condition</u>	
No damage	19 (6.2)
Witnessed tsunami/injured	16 (5.2)
Loss of occupation/equipment	20 (6.6)
Complete loss of property	178 (58.4)
Loss of one/more family members	27 (8.9)

358

359

360 **Table 2.** Proportion of Adults within the Lower and Higher Traumatic Symptom Groups.

	≤ 2 Traumatic symptoms (n = 167)		≥ 3 Traumatic symptoms (n = 138)		χ ²
	n	%	n	%	
<u>Pretraumatic condition</u>					
<i>Gender</i>					
Male	54	62.1	33	37.9	2.6
Female	113	51.8	105	48.2	
<i>Age in years</i>					
18-30	69	65.7	36	34.3	9.4**
31-45	55	53.4	48	46.6	
≥ 46	43	44.3	54	55.7	
<i>Marital status</i>					
Single	22	55.0	18	45.0	0.0
Married	145	54.7	120	45.3	
<i>Education</i>					
No Education –Year 8	81	52.6	73	47.4	0.6
Year 8 – Year 13	86	57.0	65	43.0	
<i>Religion</i>					
Buddhist	161	54.8	133	45.2	0.0
Other (Hindu, Muslim, Christian)	6	54.5	5	45.5	
<i>Employment</i>					
Unemployed	104	61.9	64	38.1	7.7**
Employed	63	46.0	74	54.0	
<i>Prior health issues</i>					
No prior health issues	130	62.5	78	37.5	15.8***
Prior health issues	37	38.1	60	61.9	
<i>Prior social issues</i>					
No prior social issues	157	56.3	122	43.7	3.0
Prior social issues	10	38.5	16	61.5	
<i>Substance use</i>					
No substance use	160	55.9	126	44.1	2.6
Substance use	7	36.8	12	63.2	
<u>Peritraumatic condition</u>					
<i>Witness/Injury</i>					
Did not witness/was not injured	161	55.7	128	44.3	2.0
Witnessed/was injured	6	37.5	10	62.5	
<i>Loss of occupation/equipment</i>					
No loss of occupation	156	54.7	129	45.3	0.0
Lost occupation/equipment	11	55.0	9	45.0	
<i>Property damage</i>					
No property damage	9	47.4	10	52.6	0.5
Some property damage	59	54.6	49	45.4	
Complete loss of property	99	55.6	79	44.4	
<i>Loss of family members</i>					
No loss of family	163	58.6	115	41.1	19.1***
Lost one/more members	4	14.8	23	85.2	

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

362 **Table 3.** Multiple Linear Regression Analyses presenting Pretraumatic and Peritraumatic Conditions associated with Traumatic Symptom
 363 Scores^a

	Crude			Model 1			Model 2		
	B	SE B	β	B	SE B	β	B	SE B	β
<u>Pretraumatic condition</u>									
Gender	0.44	0.28	0.09	1.19***	0.33	0.24	1.20***	0.32	0.24
Age	0.02*	0.01	0.13	0.01	0.01	0.08	0.01	0.01	0.05
Marital status	0.32	0.38	0.05	-0.20	0.40	-0.03	-0.11	0.39	-0.02
Education	-0.17	0.26	-0.04	0.23	0.28	0.05	0.19	0.27	0.04
Religion	-0.31	0.69	-0.03	-0.24	0.67	-0.02	-0.24	0.64	-0.02
Employment	0.69**	0.26	0.15	1.09***	0.28	0.24	1.16***	0.28	0.26
Prior health issues	0.94**	0.27	0.12	0.79**	0.28	0.16	0.91**	0.28	0.19
Prior social issues	0.58	0.46	0.07	0.89*	0.44	0.11	0.94*	0.43	0.12
Substance use	0.97	0.53	0.10	1.58**	0.55	0.17	1.31*	0.54	0.14
<u>Peritraumatic condition</u>									
Witness/Injury	0.84	0.58	0.08				1.13*	0.54	0.11
Loss of occupation/ equipment	0.11	0.52	0.01				0.12	0.51	0.01
Property damage	-0.12	0.26	-0.03				-0.03	0.25	-0.01
Loss of one or more family members	1.99***	0.44	0.25				1.97***	0.42	0.25

364 *Note.* Model 1 – pretraumatic variables only; Model 2 – pretraumatic and peritraumatic variables.

365 ^a Traumatic symptom scores are the responses to the 11 traumatic symptom items which were summed

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

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