

# Multi-Natural Disasters in Gonaïves Haiti: Long-term Outcomes among Child and Adolescents and Social Support

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**ABSTRACT:** *In this article, we posit the hypothesis that the January 2010 earthquake in Port-au-Prince reawakened a number of traumas linked to the natural disasters that struck Gonaïves in 2004 and 2008. The study set out to evaluate the PTSD and social support in the affected areas in Gonaïves seven years after the disasters. The study covered a sample of 917 participants, of whom 534 (58.23%) were females, aged between 10 and 23 with an average age of 16.03 (SD = 2.65). A variety of scales were used: the Clinician Administered PTSD Scale (CAPS-1); the Traumatic Exposure Severity Scale (TESS); the PTSD Check-List Civilian version (PCL-C); the Impact of Event Scale Revised (IES-R) and the Social Support Questionnaire (SSQ). The results reveal a higher rate of PTSD among the oldest participants, a similarly higher rate of social support among Catholics than among Protestants, a more severe rate of PTSD among school going children and a positive correlation between social support and PTSD.*

**Key words:** *Haiti, natural disasters, PTSD*

## INTRODUCTION

In 2004, the town of Gonaïves was struck by floods (Hurricane Jeanne) which left 2,620 injured, 846 disappeared, 300,000 disaster victims and over 3,000 dead. Four years later, in 2008, further hurricanes (Ike, Hanna, Gustave) severely struck the town, resulting in extensive material damage and loss of life. The inhabitants fled the area and headed for neighbouring towns and even the capital Port-au-Prince. In January 2010, following the powerful earthquake that devastated Port-au-Prince and the surrounding area (over 220,000 dead according to UNDP, (2010), over 1.3 million displaced, according to the IOM (2010), Gonaïves – which its own inhabitants had fled in 2004 and 2008 – became a refuge for the Port-au-Prince victims, even though the town had not escaped the seismic tremors. The town appeared as both a source of risk and protection, depending on the period concerned and the location of the traumatic event.

Numerous studies have identified positive or negative changes in PTSD in the wake of traumatic events (Maercker, Gäbler, O’Neil, Schützwohl & Muller, 2013; Solomon & Mikulincer, 2006; Pietrzak et al., 2013; Santiago et al., 2013). Certain researchers (Maercker et al., 2013; Pietrzak et al., 2013) have distinguished four possible outcomes: chronic, recovered, delayed and resilient states. The prevalence of PTSD tends to diminish initially only to resume later. These variations depend on factors before, during and after a trauma but also on whether or not the traumatic event is intentional. Santiago et al. (2013) showed that the prevalence of PTSD diminishes more easily if the population has been exposed to a non-intentional traumatic event. In a 20-year longitudinal study on war victims, Solomon & Mikulincer (2006) showed that the rate of PTSD fell three years after the event, only to rise again 14 years later. Concerning the earthquake that struck China on 12 May 2008, Liu, Yang, Ye, Zeng, Xiang & Yuan (2010) showed that one year after the disaster, the prevalence of PTSD had significantly reduced. Trickey et al. (2012), Vogel & Vernberg (1993) and further studies also have specified the role of

socio-demographic data such as sex, socioeconomic status and others in the prevalence of PTSD following a traumatic event.

Regarding social support, studies following the hurricane Katrina in 2005 have shown that low levels of social support may be an important determinant in the development of PTSD symptoms (Galea, Tracy, Norris & Coffey, 2008; Glass, Flory, Hankin Kloos & Turecki, 2009). The studies conducted by Pina et al. (2008) with young survivors of this disaster also shows that even the absence of both family and non-family social support is a factor that facilitates the development of symptoms of PTSD and other comorbid disorders. Studies conducted among the population of Florida following the same 2004 hurricane that also hit Gonaïves, also showed that a low level of social support is able to predict symptoms of PTSD and other disorders such as depression (Alcierno et al. 2007; Ruggiero, 2009). In a major review of the literature conducted on work with survivors of various disasters from 1981 to 2001, Norris et al. (2002) found 83 items showing that social support is one of the most important moderating the symptoms of PTSD.

In Haiti, studies with children and adolescents in Port -au- Prince after the earthquake of January 12, 2010 show that a high level of social support is associated with a low level of development of PTSD and that the support social is a key factor in building a resilient process (Derivois et al. 2014; Cénat & Derivois, 2014a; Cénat & Derivois, 2014b).

As part of the ANR-RECREAHVI (Resilience and Creative Process Among Child and Adolescent Victims of Natural Disasters) project following the 2010 earthquake in Haiti, we set out to study the PTSD and social support of children and adolescents who had lived through the natural disaster in Gonaïves, in order to explore the risk factors that might have an incidence on the prevalence of PTSD. In this article, we posit the hypothesis that the January 2010 earthquake in Port-au-Prince reawakened traumas connected with the natural disasters in Gonaïves. The aim of the study was to assess PTSD and social support in the affected areas in Gonaïves and their association with sociodemographic data seven years after the disasters.

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## METHOD

### Participants

This study covered a sample of 917 participants of whom 534 (58.23%) were females, aged between 10 and 23, with an average age of 16.03 (SD = 2.65). When recruiting participants, the following inclusion criteria were applied: (i) must be aged between 10 and 23; (ii) must have attended school or lived in the municipality of Gonaïves, in the flood-affected districts (iii) must have signed a consent form (signed by parents for the under 18s). Table 1 presents a detailed breakdown of participants by sociodemographic characteristics.

### Procedure

When conducting the study between May and June 2011, a year after January 2010 earthquake, we made a random selection of 5 secondary schools in the areas which had been completely flooded and 5 schools in areas which had been partially flooded. We targeted children with an average age of 5 during the floods of 2004. Ten pupils (5 Male and 5 Female) were chosen at random per class, from 6th grade up to the final year. The majority (67.8%) stated that they had lived through 4 or 5 of the natural catastrophes which had struck the town of Gonaïves between 2004 and 2010: Hurricane Jeanne (2004), Hurricane Hanna (2008), Hurricane Ike (2008), the earthquake (2010), and the cholera epidemic (2010). A random selection of street children and unschooled children was also drawn from these same districts. They were selected by two investigators who met them in the street. As they had more contact with their parents and as they did not want us to contact them, we asked them to sign the consent form. We told them that they could withdraw from the investigation at any time without having to give any explanation. We took every precaution to be sure that they understood the process.

### Instruments

The instruments used in the course of this research were all self-administered questionnaires. However, given the high rate of illiteracy in Haiti, the questionnaires were directly completed by two interviewers (psychology and social work students) who had been trained for the purpose. The first section of the report forms enabled the gathering of sociodemographic data concerning the age, sex, religion, family situation, educational level, parents' occupation,

family members killed during the various disasters and other factors. We then deployed the first part of the Clinician Administered PTSD Scale (CAPS-1) which evaluated the potentially traumatic life events experienced by the participants (Blake, Weathers, Nagy et al., 1995).

The third section of the questionnaire was based on the Traumatic Exposure Severity Scale (TESS) – a scale of 24 items developed by Elal & Slade (2005) in order to evaluate the level, dimensions and severity of traumatic exposure following an earthquake. It is one of the most frequently used questionnaires in the wake of natural disasters (Munson, Davis, Grills-Taquechel et al., 2010). Reliability coefficients for the TESS have been found to be 0.78 and 0.84 (Elal & Slade, 2005). The french version were used (Cronbach's  $\alpha$  of 0.82 in our sample).

The fourth part of the questionnaire was the Impact of Event Scale Revised (Weiss & Marmar, 1997). It contains 3 sub-scales (avoidance, intrusion, hyperarousal) and 22 items corresponded to the 17 criteria (B, C and D) of the DSM IV (American Psychiatric Association, 1994). He had previously planned to use the version for children. But after discussions within the research team related to the cultural maladjustment of CRIES, the adult version was used. The items are presented on a 5-point Likert scale (not at all, a little, moderately, a lot, enormously). The french language version was used for this study (Brunet, St-Hilaire, Jehel et al., 2003) a cut-off of 33 was considered for severe PTSD symptoms and a cut-off 12 for moderate symptoms. The IES-R shows good reliability coefficients and internal consistency (Cronbach's  $\alpha$  of 0.82 going from 0.78 to 0.89) (Weiss & Marmar, 1997; Creamer, Bell & Failla, 2003; Jens, Heidi, Harald et al., 2004). This version has been used in Haiti among children and adolescents and presented good reliability coefficients (Derivois et al., 2013; Cénat & Derivois, 2014a; 2014b), in our sample, Cronbach's  $\alpha$  was 0.86. The cutoff points forth is study were scores of 32 for severe PTSD symptoms and 12 for moderate symptoms, which are the same as those used in the studies cited above.

The last part of the questionnaire evaluates the social support available to these children and teenagers. We used the satisfaction sub-scale of Support Social Questionnaire 6 (SSQ-6) (Sarason et al., 1987). This sub-scale presents a good internal consistence (Cronbach's  $\alpha$ : 0.83 to 0.89). In this study, we used the French version that also used in Haiti (Racle, Bruchon-Schweitzer & Sarason, 2005; Cénat & Derivois, 2013). In our sample, Cronbach's  $\alpha$  was 0.87.

### Statistical analysis

The statistical analyses were conducted using the 19th version of the Statistical Package for Social Science (SPSS). Following the descriptive statistical analyses (mean, standard deviation, frequency distribution, cross tabulations), we conducted t-tests in order to examine the differences for traumatic exposure PTSD and social support according to age, sex and other sociodemographic data. Finally, we used analyses of bivariate linear correlation, analysis of variance and multiple linear regression.

## RESULTS

The statistical analyses reveal an average score on the traumatic exposure scale of 14.79 (SD = 5.13) with an average score of 15.03 (SD = 5.41) for males and 14.63 (SD = 4.91) for females,  $t(913) = 1.17, p = 0.24$ . In respect of PTSD symptoms, the average score is 31.05 (SD = 8.80) with an average score of 30.47 (SD = 9.27) for males and 31.48 (SD = 8.42) for females,  $t(915) = -1.71, p = 0.09$ . School going children had an average score of 15.57 (SD = 5.09) on the traumatic exposure scale while non-schooled children had an average score of 11.48 (SD = 3.77),  $t(915) = 9.98, p < 0.0001$ . School

Table 1.

Demographic Characteristics of the study sample (N= 917).

	No.	%
Sex		
Male	534	58.23
Female	383	41.77
Age group		
10-13	152	16.57
14-17	506	55.18
18-23	259	28.24
Family situation		
Non-orphan	647	70.56
Motherless child	82	8.94
Fatherless child	127	13.85
Orphan	61	6.65
Education		
Schoolgoing	742	80.92
Unschooled	175	19.08
Religion		
None	63	6.87
Catholic	255	27.81
Protestant	521	56.81
Vodouisant	3	0.33
Other	75	8.18

going children had an average score of 32.04 (SD = 8.35) on the scale evaluating symptoms of PTSD while unschooled children had an average score of 26.86 (SD = 9.40),  $t(915) = 7.20, p = 0.001$ .

The analyses also reveal a prevalence of severe PTSD symptoms of 45.04% with a prevalence of 47.19% for females and 42.04% for males,  $X=64.41, p < 0.01$ . The results therefore reveal no significant differences between boys and girls. Table 2 presents a detailed view of the results according to the various levels of prevalence of PTSD symptoms in terms of sociodemographic data.

The analysis of variance reveals that the age factor plays a role in PTSD symptoms, whereby  $F(2,914) = 18.72, p < 0.001$ . The multiple comparison test of averages revealed that the average score of children and adolescents aged 10 to 13 and those aged 14 to 17 was significantly lower than that of the group of young adults aged 18-23 respectively,  $M_s = 4.22, p < 0.05; M_s = 3.15, p < 0.05$ .

In respect of social support, the results reveal an average score of 22.65 (SD = 7.59), 23.16 (SD = 7.89) for boys and 22.28 (SD = 7.36) for girls,  $t(915) = 1.74, p = 0.08$  – an insignificant difference. In terms of religion, the analysis of variance proved significant, whereby  $F(4,912) = 21.57, p < 0.001$ . The multiple comparison test of averages revealed that the Catholic participants benefited from greater social support than the Protestants, those of no religion or those of religions other than those listed in the questionnaire (respectively,  $M_s = 1.84, p < 0.05; M_s = 9.06, p < 0.0001; M_s = 3.15, p < 0.05$  i.e. it was the Catholics and vodouisants (although few in number) who reported benefiting from the greatest social support. Given that the average score for non-orphaned children was 23.28 (SD=7.52), as against 21.74 (SD=6.92) for fatherless children, 21.91 (SD=7.76) for motherless children and 18.82 (SD = 8.22) for orphans, the analysis of variance naturally reveals a significant difference, whereby  $F(3,913) = 7.70, p < 0.001$ . However, the multiple comparison tests of averages reveal that the only significant difference is between non-orphans and orphans ( $M_s = 4.63, p < 0.0001$ ).

**Table 2.**  
Descriptive statistic of the PTSD symptoms (N= 917).

	Low		Average		High	
	N	%	N	%	N	%
PTSD Symptoms						
Total	50	5.45	454	49.51	413	45.04
Male	25	4.68	257	49.13	252	47.19
Female	25	6.53	197	51.44	161	42.04
Age group						
10-13	15	9.87	84	55.26	53	34.87
14-17	27	5.33	281	55.53	198	39.13
18-23	8	3.09	89	34.36	162	62.55
Family situation						
Non-orphan	35	5.41	346	53.48	266	41.11
Motherless child	5	6.10	32	39.02	45	54.88
Fatherless child	6	4.72	50	39.37	71	55.90
Orphan	4	6.56	26	42.62	31	50.82
Education						
Schoolgoing	26	3.50	359	48.38	357	48.11
Unschooled	24	13.71	95	54.28	56	32
Religion						
None	4	6.35	37	58.73	22	34.92
Catholic	11	4.31	117	45.88	127	48.80
Protestant	30	5.76	262	50.29	229	43.95
Vodouisant	1	33.33	0	0	2	66.67
Other	4	5.33	38	50.67	33	44
Traumatic event						
Hurricane Jeanne	50	5.45	454	49.51	413	45.04
Hurricane Hanna	56	6.47	424	48.96	386	44.57
Hurricane Ike	48	5.59	423	49.30	387	45.10
Hurricane Gustave	41	4.90	416	49.76	379	45.33
Earthquake	12	5.94	48	23.76	142	70.30
Four events	56	10.65	84	15.97	386	73.38
Five events	3	1.95	14	9.09	139	90.26

Table 3 presents the high and moderate correlation coefficients between the symptoms of PTSD, traumatic exposure, social support, exposure to traumatic events and age. The correlation coefficient between the symptoms of PTSD and traumatic exposure is 0.49, as against 0.57 between the level of traumatic exposure and the number of traumatic events experienced. Also worthy of note is the positive and significant (although relatively low) correlation coefficient between social support and PTSD symptoms ( $r=0.15$ ). Table 3 also presents other significant correlation coefficients.

As we have mentioned, we also conducted multiple regression analyses. The general model explains 28% of the total variance. The model presented in Table 4 also reveals that traumatic exposure is the variable that best predicts PTSD symptoms ( $\beta=0.49, p < 0.001$ ).

## DISCUSSION

As the results indicate, this study reinforces the notion that traumatic exposure is a variable that can predict PTSD. Furthermore, four points seem to us to be worthy of note. The first is that this study reveals significant differences based on age. The oldest (aged 18-23) who were aged 11-16 in 2004 and 15-20 in 2008 present more symptoms of PTSD than the youngest (aged 10-17) who were aged 3-10 in 2004 and 7-14 in 2008. A significant positive correlation emerges between age and the symptoms of PTSD, even if this is not substantial. Could this be because their greater awareness of the latter events reawakened memories of earlier events?

The second point concerns the difference between Catholics and Protestants in respect of social support, which attains higher levels among the former. This question merits greater exploration, but we may posit the hypothesis that the difference is explained by the fact that Catholicism is not only the oldest religion in Haiti but also more homogenous than the various Protestant denominations, which are more scattered. Moreover, the Catholic religion is the State religion and the Haitian state signed an accord with the Catholic Church in 1860 concerning the schooling of children.

The third point concerns the significant difference between school going children and unschooled children, with the former group developing a greater frequency of severe PTSD symptoms. What might explain the phenomenon? We posit the hypothesis that school going children, accustomed to the comforts of school support, were brutally deprived of this back-up and thus destabilised, while unschooled children have always depended solely on their family and social bonds. We have seen that orphaned children enjoyed less social support than non-orphans. As for street children, it may be the case that they drew strength from pre-established survival mechanisms and strategies developed in the face of everyday hardship.

The final important point concerns the positive correlation between social support and PTSD. In a parallel study conducted in the Delmas district of Port-au-Prince, (Derivois et al., 2013), a lower correlation was noted. The correlation between social support and PTSD symptoms ( $r = 0.284, p < 0.01$ ) is significant but not substantial. How can this difference between Delmas and Gonaives be explained? Four possible theories seem plausible: 1) in Gonaives, the seismic event is remote in time and space. Even if it resonates with other disasters, social bonds were destroyed by the disaster. 2) The disorganisation of the humanitarian response and the lack of consultation with the people of Port-au-Prince disempowered the population from organising itself. 3) In the provinces, social and mutual support among the people is often very natural and may therefore be immune to PTSD. In the capital Port-au-Prince, with its nearly 10 million inhabitants from across the entire country, social bonds are more difficult to establish and maintain. 4) Finally,

**Table 3.**  
Bivariate correlations among major variables.

	Age	Traumatic Event Experienced	Traumatic exposure	Symptoms of PTSD
Age	—			
Traumatic Event Experienced	0.127**	—		
Traumatic exposure	0.257**	0.571**	—	
Symptoms of PTSD	0.275**	0.252**	0.498**	—
Social Support	0.080*	-0.076*	0.108**	0.153**

\* $p < 0.05$ ; \*\* $p < 0.01$

**Table 4.**  
Multivariate regression analyses predicting PTSD (N= 917).

PTSD symptoms	F	P	R <sup>2</sup>	B	t	P
PTSD symptoms	70.51	<.0001	.28			
Age				.15	5.29	<.0001
Female gender				.08	2.74	<.006
Traumatic experienced event				-.04	-1.22	.22
Orphan status				.05	1.85	.06
Traumatic Exposure				.49	13.58	<.0001

in the Haitian collective psyche, Gonaïves, as the historic seat of independence, is seen as a place of resistance (Constant, 2003). Despite the town's socioeconomic condition, there is a certain pride associated with living in Gonaïves, based on the local solidarity which led to Independence in 1804.

These hypotheses merit further exploration in future research. However, the results of the present study reveal a number of factors determining PTSD and social support (the street, age, religion, education, etc.) and suggest ways forward for the design of solutions in the fields of mental health and educating vulnerable young people.

On the other hand, if the results show that variables integrated into the multiple regression analysis explain 28% of the variance in PTSD, they also show that it is not the fact of living more of these events that contains more traumatic load ( $\beta=0.04$ ,  $t=-1.22$ ,  $p=0.22$ ). But the variable that best explains the traumatic load is the degree of involvement and the level of exposure of subjects in events ( $\beta=0.49$ ,  $t=13.58$ ,  $p<0.0001$ ).

However, this study also has some limitations. The first concerns the population. There would have been better to focus on only a child and adolescent population. The fact that the research was conducted, for the most part, in schools, we found that there was many students exceed 20 years. We were obliged to take them into account for the sake of representativeness. The second limitation concerns the measures used, especially the evaluating PTSD which was especially developed for adults. However, as we have already mentioned, studies previously conducted with the population of children and adolescents with measures drawn to their attention, have shown that they deserve a lot of adjustment before use in children and young Haitians, which also pushed us in other studies also using the IES -R has good reliability coefficient with our population and other tools developed for adults (Derivois et al. 2014 Cenat & Derivois, 2014a; 2014b). The last limitation we would like to highlight is the lack of research among the population before and after the deadliest natural disasters. This removes the possibility allowed to make comparisons with the results of this, then it would have been necessary in order to see the evolution curve of the consequences of these disasters.

However, this study remains extremely important in that it allows the study of traumatic consequences of multiple natural disasters suffered by the people of Gonaïves in the long term. It also opens the way to the need for public health officials to implement programs support the surviving population.

### Acknowledgments

This research and the project ANR-10-HAIT-002 RECREAHVI

were funded by the National Research Agency (ANR) of France. We thank members of the research team at University Lyon 2 (Lisbeth Brolles, Gildas Bika, Nathalie Guillier-Pasut, Min-sung Kim, Christo Zafimaharo, Laura Coursol, Amira Karray-Khemiri, Bernard Chouvier), at the EDITEC, at University of Paris 13 (Yoram Mouchenik), at the State University of Haiti including investigators (Ronald Jean Jacques, Marjory Mathieu), at Haitian Bible Society (Pierre Michel and Marie Carme Derivois).

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