ORIGINAL ARTICLE

FACTORS THAT AFFECT THE POSTTRAUMATIC GROWTH OF FLASH-FLOOD SURVIVORS IN INDONESIA

Sri Warsini[1]*, Hanif Eka Cahyani[2], Hanin Assyifa[2]

1. Mental Health and Community Nursing Department, Faculty of Medicine, Public Health and Nursing Universitas Gadjah Mada, Indonesia
2. School of Nursing, Faculty of Medicine, Public Health and Nursing Universitas Gadjah Mada, Indonesia

ABSTRACT

Disasters not only bring bad impacts and cause problems to the victims, but they can also bring a positive impact, i.e., posttraumatic growth (PTG), that appears after the disaster. Investigating the posttraumatic growth of disaster survivors is important as it helps to identify the needs of survivors and develop intervention programs. Currently, there is no research in Indonesia about the PTG of flash flood disaster victims. This study aims to determine the posttraumatic growth of flash flood disaster victims in Indonesia. This was an analytical correlation analysis study which observed 95 flood victims in Magelang and employed the Posttraumatic Growth Inventory-Expanded (PTGI-X) instrument. The data were analyzed by using the Mann-Whitney, Pearson, independent t-test, and multiple linear regression tests. The average PTG of flood victims was 72.31 ± 15.91. The disaster victims with high PTSD scores, males, holding high school and university levels, received more severe disasters had a higher level PTG. This model described that the factors investigated in this study had a 23.2% contribution to PTG. The factors that influence the PTG of flood victims were PTSD, gender, educational level, and severity of disasters.

INTRODUCTION

Disasters have risen in occurrence worldwide and Indonesia is one of the disaster-prone countries as it is located in the Pacific Ring of Fire (Wibowo, Surbakti, & Yunus, 2013). The Index for Risk Management data reported that Indonesia ranked 19th out of 191 countries in the world for hazards and exposure (INFORM, 2016). Meanwhile, the World Risk Report in 2019 ranked Indonesia in the 37th position of 180 countries based on the risk of disasters (Day et al., 2019).

Indonesia faces many natural disasters, such as earthquakes, tsunamis, volcanic eruptions, floods, droughts, landslides, hurricanes, and fires. However, based on data from 2006 to 2021, floods are the most frequently occurring disaster and bring severe damage (Asian Disaster Reduction Center, 2021).

One flood disaster which brought severe impact during the last 5 years was a flash flood in Magelang which occurred on Saturday, April 29, 2017. The flood occurred at 3.30 PM at the Grabag District, Magelang. The flood struck two villages and five *dusun* (small villages). The flood displaced 170 people, destroyed 71 houses: 25 heavily damaged houses, 12 lightly damaged houses, and 34 affected houses (Fitriana, 2017). The total death toll of the flood was 13 people: 12 died in the disaster site and one died at Tidar Hospital, Magelang ("Flashflood in Magelang", 2017).

Disasters can negatively affect the physical and psychological health of survivors and their families (Warsini, Buettner, Mills, West, & Usher, 2015a). The most frequently occurring psychological impact is posttraumatic stress disorder (PTSD). Meanwhile, other problems that could be caused by a disaster are depression, anxiety, sleep disturbance, and decreased quality of life (Warsini, West, Mills, & Usher, 2014).

However, disasters not only bring negative impacts on human life, but also positive impacts perceived by humans after their occurrence. One of the positive effects is posttraumatic growth (PTG) (Cao et al., 2018), which is defined as a person's positive view or changes after struggling with a traumatic event (Tedeschi, Shakespeare-Finch, Taku & Calhoun, 2018; Asgari & Naghavi, 2019). This trauma includes the trauma caused by a disaster, rape, loss, attempted murder, and diseases, such as cancer or a heart attack.

Investigating the PTG of disaster survivors is important as it helps to identify the needs of survivors. Furthermore, it may help to develop interventions to minimize the survivors' burden (Javed & Dawood, 2016; Amiri et al., 2019). Disaster survivors who have PTG might also have a positive perspective of the disaster, which could help them to recover faster by using adaptive coping.

Some studies on the PTG of disaster victims in Indonesia have been conducted by Sattler et al. (2018) and Harsono et al. (2021), investigated the victims of the Bantul earthquake as well as Akbar and Witruk (2016), who investigated the victims of the Bantul earthquake and the Merapi eruption. All these studies used the Posttraumatic Growth Inventory (PTGI). However, to date, no study in Indonesia has described the PTG of flash flood disaster victims by using the PTGI-X, the newest and more comprehensive instrument of PTG. Therefore, it is considered critical to explore the PTG of flood victims by using the PTGI-X. This research aims to describe the posttraumatic growth of flash flood victims in Magelang, Indonesia.

METHOD
Study Design
This was an analytical correlation research. A cross-sectional design was used in this study.

Research Samples
This research involved 100 respondents. The sample size was counted by using the Lemeshow equation. The stratified sampling technique applied in this study considered the following respondent proportions: elderlies, adults, men, and women to be almost balanced.

The respondents were selected by predetermining the inclusion criteria: (1) willingness to be involved as a research subject, (2) being at least 18 years old, and (3) being survivors of a flash flood disaster in April 2017. The respondents were excluded if they had a medical history of mental disorders and were not at the research site when the data was collected.

Data Collection
The research was conducted at Sambungrejo Village, Grabag District, Magelang Regency, Indonesia, where the flood occurred. The data was collected from September-October 2017.

Two research assistants were involved with the data collection. The requirement for being a research assistant was mastery of the local language. All assistants received training on the research purposes, protocols, and instruments of data collection. The data from all respondents were collected from their residences. The research assistants also described the research to the respondents and helped the illiterate respondents to read the questionnaire.

Instrument
The first section of the survey included sociodemographic questions including age, gender, marital status, education level, employment status, and survivor length of stay. The experiences of survivors during the disaster were also included.

The second section was the Indonesian version of the Impact of Event Scale-Revised (I-IES-R). This instrument consisted of 22 questions and was tested for its validity and reliability by Warsini et al. (2015b). All questions in the instrument are valid and the Cronbach Alpha result was 0.90 for the test and 0.92 for the retest.

The third section was the PTG instrument. The most common instrument widely used to measure PTG was the PTGI was developed by Tedeschi in 1996 (Cao et al., 2018; Jin, Xu, Liu, & Liu, 2014). However, this instrument was revised in 2017 because the spiritual domain was considered too short and limited in describing the domain. The revision was done by adding four items in the spiritual domain, thereby changing the domain name into the Spiritual-Existential Change, and calling the instrument the expanded PTGI (PTGI-X) (Tedeschi, Cann, Taku, Senol-Durak, & Calhoun, 2017).

The PTGI-X consisted of 25 questions with Likert options ranging from 0 to 5. It was comprised of several domains: personal strength (PS), new possibilities (NP), relating-to-others (RO), appreciation of life (AL), and spiritual existential changes (SEC) (Tedeschi et al., 2017).

The PTGI-X questionnaire was initially translated from English to Indonesian. Then, the translated version was retranslated to English. Finally, the translated version was compared with the retranslated version (the Indonesian and English translated versions). After the translation process was completed, the instrument was tested and measured to gain validity and reliability with 78 respondents who were landslide victims in Purworejo and not respondents of this research. The validity test revealed that all items were valid, and the value of the Cronbach's alpha was 0.931.

Data Analysis
The data were analyzed by using univariate, bivariate, and multivariate analyses with SPSS software. The univariate analysis was conducted by measuring the percentage of the mean and median of each measured variable, including the demographic data. Meanwhile, the bivariate test was conducted by using the Mann-Whitney and Pearson tests. The multivariate test was performed by using linear regression with the forward method.

Ethical Consideration
The ethical approval was obtained from the Ethics Commission of the Faculty of Medicine, Universitas Gadjah Mada, with the No. KE/FK/0931/EC/2017. Before the data was collected, all research respondents received explanations of the research and signed informed consent forms.

RESULTS
This study involved 100 respondents, but five data were excluded because they were outliers. Table 1 concludes that the respondents in both locations had similar demographic characteristics.

Table 1. Demographic characteristics of respondents (n=95)

Variable	
Gender, f(%)	
Female	52 (54.7)
Male	43 (45.3)
Age (years), median (min-max)	39 (18-96)
Age group, f(%)	
< 25 years	13 (13.7)
26-35 years	27 (28.4)
36-45 years	20 (21.2)
46-55 years	18 (18.9)
56-65 years	10 (10.5)
>65 years	7 (7.4)
Occupation, f(%)	
Unemployed (household, student, retired)	31 (32.6)
Employed (farmer, employee, labor, merchant)	64 (67.4)
Education level, f(%)	
Illiterate	5 (5.3)
Elementary	52 (54.7)
Junior high	26 (27.4)
Senior high	9 (9.5)
University degree	3 (3.2)
Marital status, f(%)	
Married	78 (82.1)
Unmarried/widow/widower	17 (17.9)
Length of stay (years), median (min-max)	30 (1-85)
Disaster experience before, f(%)	
Yes	4 (4.2)
No	91 (95.8)
Family died due to disaster, f(%)	
Yes	11 (11.6)
No	86 (88.4)
Family injured due to disaster, f(%)	
Yes	9 (9.5)
No	86 (90.5)
House damage due to disaster, f(%)	
Yes	35 (36.8)
No	60 (63.2)
Evacuation experience, f(%)	
Yes	37 (38.9)
No	58 (61.1)
Severity level of disaster which experienced, f(%)	
Mild	17 (17.9)
Severe	78 (82.1)
PTSD score, mean±SD	31.52 ± 16.16

The PTG of 95 respondents of flood victims is shown in Table 2. The PTG score of the respondents was 72.31 with a maximum score of 125. The spiritual and existential change domain has the highest score while the new possibilities domain obtained the lowest score.

Table 2. PTG score of respondents (n=95)

Variable	Mean ± SD or Median (Min-Max)
Total score of PTG	72.31 ±15.91[a]
Domain score	
Appreciation to Life	3.1 (1-5) [b]
Personal strength	2.75 (0.75-4.75)[b]
New Possibilities	2.2 (0.8-4.6)[b]
Relating to Others	2.99±0.82[a]
Spiritual and Existential Change	3.15±0.79[a]

[a]Mean±SD; [b]Median (Min-Max)

The PTG comparison based on the respondents' characteristics is displayed in Table 3. Table 3 shows that the PTG scores are significantly associated with the variables of age, level of education, severity level, and the PTSD scores of the respondents. Besides the four previously mentioned variables, the other three variables were classified in the multivariate analysis because the p-values of the variables of gender, marital status, and experience of disasters were < 0.25.

Table 3. PTG score based on respondents' characteristics (n=95)

Variable	Mean ± SD or r	p
Gender		
Female	70.25 ± 14.63	0.167[a]
Male	74.79 ± 17.18	
Age		
Adult	73.69 ± 16.54	0.022*[a]
Elderly	65.94 ± 10.90	
Occupation		
Employed	73.13 ± 15.45	0.474[a]
Unemployed	70.61 ± 16.95	
Education level		
Illiterate - junior high	71.07 ± 15.86	0.046*[a]
Senior high - university	80.83 ± 14.04	
Marital status		
Married	71.36 ± 15.66	0.216[a]
Unmarried/widow/widower	76.65 ± 16.84	
Disaster experience before		
Yes	57.50 ± 16.11	0.057[a]
No	72.96 ± 15.67	
Family died due to disaster		
Yes	73.27 ± 13.69	0.832[a]
No	72.18 ± 16.25	
Family injured due to disaster		
Yes	72.00 ± 18.82	0.952[a]
No	72.34 ± 15.70	
House damage due to disaster		
Yes	72.83 ± 15.84	0.808[a]
No	72.00 ± 16.08	
Evacuation experience		
Yes	72.38 ± 18.29	0.972[a]
No	72.26 ± 14.34	
Severity level		
Mild	63.35 ± 13.20	0.010[a]*
Severe	74.26 ± 15.85	
PTSD	r = 0.372	0.000[b]*

[a]*analyzed by using the independent t-test, [b]analyzed by using the Pearson test*

The multivariate analysis results are shown in Tables 4 and 5. The analysis discovered that the factors that influence the PTG of flood victims were PTSD, severity, gender, and education level. The best model is the fourth model. The equation of the regression model of the PTG in this study is 23.815 + 0.358 (PTSD) + 9.127 (severity) + 6.971 (gender) + 9.277 (education level). The four factors of the PTG respondents contributed 23.2%. The remainder was influenced by factors not examined in this study.

Table 4. Model summary

Model	R	R Square	Adjusted R Square	Std Error of The Estimate
1	.372a	.139	.129	14.847
2	.427b	.182	.164	14.545
3	.477c	.227	.202	14.216
4	.515d	.265	.232	13.941

Tabel 5. Model coefficients for PTG as a dependent variable

Model		Standardized Coefficient			t	Sig.
		B	Std. error	Beta		
1	(Constant)	60.753	3.353		18.117	.000
	PTSD	.367	.095	.372	3.867	.000
2	(Constant)	45.873	7.477		6.135	.000
	PTSD	.334	.094	.339	3.556	.001
	Severity level	8.730	3.941	.211	2.215	.029
3	(Constant)	34.183	8.899		3.841	.000
	PTSD	.365	.093	.370	3.929	.000
	Severity level	9.171	3.857	.222	2.378	.020
	Gender	6.834	2.968	.215	2.302	.024
4	(Constant)	23.815	9.968		2.389	.019
	PTSD	.358	.091	.364	3.936	.000
	Severity level	9.127	3.782	.221	2.413	.018
	Gender	6.971	2.911	.219	2.394	.019
	Education level	9.277	4.310	.195	2.153	.034

DISCUSSION

This study found that the research respondents had a higher PTG average value than that of the earthquake victims in China which employed the same instrument (PTGI-X) and found an average value of 68.7 ± 25.3 (Cao et al., 2018). To date, from the revision of the PTGI in 2017 to the writing of this report, it was only Cao et al. (2018), who had applied the PTGI-X to measure PTG. Mordeno et al. (2016) also investigated a flood case in the Philippines and found that their respondents had a lower PTG with an average value of 57. The PTG values of the respondents in this study signified that the flood victims in Indonesia experienced more positive psychological changes compared to the earthquake victims in China or the flash flood victims in the Philippines.

Moreover, the PTG value of flood victims in this study was higher in almost all domains than that of Tedeschi et al.'s study (2017), who investigated the PTG of undergraduate students from the US, Turkey, and Japan by using the PTGI-X. The Japanese respondents were earthquake victims of Great East Japan. Meanwhile, the respondents from Turkey and the US were students who had a traumatic experience six months before data collection. However, the respondents of this research only had a lower value on the domain of new possibilities than the respondents in Turkey.

This difference was likely caused by many factors, such as the respondents' characteristics, disaster type, trauma experienced, and culture. The respondents in the study of Tedeschi et al. (2017) were students in Turkey who did not experience a specific disaster. In contrast, this research involved the general population (i.e., adults and elderlies), who experienced a flood. In addition, the two populations had very different cultures (Asian and European). An individual's PTG is influenced by his culture (Taku, 2011) because it could influence his subjectivity in assessing the PTG indicators (Taku, 2013).

This study found several factors that influence PTG, namely, PTSD, gender, education level, and severity of the disasters experienced. The respondents with high PTSD scores were males with high education levels (high school to university level) and experienced a severe disaster; they had a positive and more significant impact on disasters.

This study found moderate and positive values of the relationship between PTSD and PTG. This result is similar to those of Xu and Liao (2011), Jin, Xu, Liu, et al. (2014), Dursun et al. (2016), and Tominaga et al. (2019). The higher the PTSD score, the higher the PTG is perceived. Meanwhile, the results of the multivariate analysis of this research proved that PTSD was a factor that affects the PTG. Conversely, Dursun et al. (2016) found different results. Although Dursun et al. (2016) employed the multivariate analysis to investigate flood victims, their multiple regression analysis results did not show that PTSD was one of the factors that predict PTG. They only discovered that the search for meaning and perceived social support were the factors that affect PTG. This condition was probably caused by limited research proficiency levels, such as fewer samples (n = 57) and the likelihood that the samples were of students who less perceived the impact of a disaster. PTG will appear when the disaster victims have been traumatized to a certain level because to reach a positive sense or wisdom from a disastrous event, the tragedy itself must not cause excessive trauma (Liu, Wang, Li, Gong & Liu, 2017; Lowe, Manove & Rhodes, 2013, Zeligman, Majuta & Shannonhouse, 2020). This statement means that a traumatic event will cause a person to experience growth when he experiences PTSD. A specific level of psychological pressure is required to develop PTG. Distress has been found as a catalyst in cognitive restructuring which aims to explore the world in a new way and has become a characteristic of the PTG (Siqveland, Nygaard, Hussain, Tedeschi, & Heir, 2015). After facing traumatic events, people will adapt to their new situation by using cognitive restructurisation (Coroiu, Korner, Burke, Meterissian & Sabiston, 2016). Therefore, through this process, people can reassess their life goals and priorities, gain better social relations with others, and appreciate their life better (Aflakseir, Nowroozi, Mollazadeh & Goodarzi, 2016).

This result is different from that of Sattler et al. (2018), who investigated residents near the epicenter of the Bantul earthquake in Indonesia. Sattler et al. (2018) did not find a significant relationship between PTSD and posstraumatic growth. One possible explanation of the difference may be

due to data collection time. Sattler et al. (2018) collected the data long after the incidence of the disaster (10-11 years). The time of data collection which is too long from the disaster events may affect the PTSD and posttraumatic symptoms among disaster survivors.

This research revealed that gender is a factor that affects PTG. This finding is in accordance with the research of Akbar and Witruk (2016) and He et al. (2013). Interestingly, previous research (Akbar & Witruk, 2016; He et al., 2013; Jin, Xu, & Liu, 2014; Vishnevsky, Cann, Calhoun, Tedeschi, & Demakis, 2010) found that female respondents had a higher PTG score, while this study discovered that the male respondents had a higher PTG score.

At least two mediators could explain the difference in posttraumatic growth based on gender, namely, the rumination style (Leal-Soto, Carmona-Halty, & Ferrer-Urbina, 2016) and the coping style (Panjikidze, Beelman, Martskvishvili & Chitashvili, 2020). Some literature explained that women tend to use the deliberate rumination style and emotional-focused coping to encourage a high PTG (Jin, Xu, & Liu, 2014; Vishnevsky et al., 2010). The PTG will appear after the victim changes from intrusive rumination to deliberate rumination when coping with the situation (Garcia, Cova, Rincon, & Vazquez, 2015). This research was conducted in Indonesia and found that men tended to have deliberate rumination while women tended to have destructive intrusive rumination (overthinking but not resolving issues). In addition, Javanese women are known for too much thinking, worrying about something, and easily feeling emotional when solving problems. In contrast, men were more open to solving issues, meeting friends, finding a solution, and widely socializing (Warsini, 2015). Akbar and Witruk (2016) further stated that Javanese women used more of a coping approach.

The third factor which affects PTG in this research is education level. Sattler et al. (2018) and He et al. (2013) also asserted that the education levels of disaster victims affect their PTG. Cao et al. (2018) discovered that respondents with low levels of education had a high PTG. In contrast, this study revealed that respondents with higher levels of education (high school - university) had a high PTG. This result is in line with the research by He et al. (2013) who investigated earthquake victims in China and Wen et al. (2020) who found that respondents with high levels of education had higher PTG. This may be because having a higher education helps survivors to more comprehensively understand the trauma they experienced and improved their confidence to recover their physical and mental conditions after the disaster (He et al., 2013), as well as creative skills to facilitate their life opportunities (Wen et al., 2020).

The fourth factor that affects PTG is the level of severity of the disaster experienced by the survivors. This finding is in accordance with the research results of Leal-Soto et al. (2016) and Jin, Xu, Liu et al. (2014) who investigated the earthquake victims in Chile and China. Bilbao et al. (2013) also stated that the level of severity plays an important role in raising the PTG of victims. A severe event, in this case, a catastrophe, can lead to positive and large changes, such as personal strength development and support from others, through several mechanisms. First, the severity of disasters will affect the basic belief that instantly triggers the emergence of PTG (Leal-Soto et al., 2016). Second, the severity of disasters pushes intrusive rumination (Garcia, Pa'ez-Rovira, Zurtia, Martel, & Reyes, 2014). Moreover, the severity of disasters will encourage deliberate rumination after intrusive rumination occurs and support the emergence of problem-focused coping through social sharing (Garcia et al., 2015).

The contribution of the factors investigated in this research in predicting the respondents' PTG was only 23.2%. Meanwhile, the remaining factors were influenced by other variables not examined in this study. Some of these variables were social support (Harsono et al., 2021; He et al., 2013; Sattler et al., 2018), spirituality (Subandi, Achmad, Kurniati, & Febri, 2014), coping strategy (Akbar & Witruk, 2016; He et al., 2013), problem-focused coping (Sattler et al., 2018), religious coping (Prati & Pietrantoni, 2009), hope (Dong et al., 2017; Teixeira & Graça Pereira, 2013) optimism (Ho et al., 2011), distress, personality, emotional expression, environmental characteristics, perspectives to the world, contemplation styles (Ramos, Leal, Costa, Tapadinhas, & Tedeschi, 2018), physical health (Sawyer et al., 2010), religiosity (Russano, Straus & Sullivan, 2017), and social well-being (Wlodarczyk, Basabe, Paez, Villagran & Reyes, 2017).

Nevertheless, this study had several limitations. Firstly, this study only involved 95 respondents and only tested the variables of PTSD and the respondents' characteristics as PTG predictors. In addition, there was no clear cut-off point for PTG; thus, the researchers could not calculate the prevalence of PTG. Therefore, it is necessary to conduct further research, involve more samples to test the PTG predictors by using other variables, and examine the cut-off point of PTG in Indonesians.

CONCLUSION AND RECOMMENDATION
Flood victims in Magelang had excellent PTG. PTSD, gender, level of education, and level of disaster severity have become predictors of the PTG of flash flood survivors in Magelang. It is highly recommended that health workers and relevant stakeholders pay greater attention to the survivors of flash flood disasters so that they will not experience severe PTSD and instead gain posttraumatic growth as a positive impact from the disaster.

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