

Effect of Post-Traumatic Stress Disorder Caused by Earthquake on Post Traumatic Growth: Focusing on the Mediating Effects of Stress Coping

HyungjunPark¹, Jun Ho Jo^{2*}

¹(Disaster Protection and Safety Engineering, HanYang University, South Korea)

²(Civil and Environmental Engineering, HanYangUniversity, South Korea)

Abstract:

Purpose: The study was conducted for Pohang citizens who experienced Pohang earthquake damage. The purpose of this study is to examine how these post-traumatic stress disorders affect post-traumatic growth and to examine the mediating effects of stress coping on the causal relationship between post-traumatic stress disorder and post-traumatic growth.

Materials and Methods: The survey was conducted for the citizens who experienced Pohang earthquake, and the survey data were statistically analyzed using the SPSS 25.0 program.

Results: Post traumatic stress disorder has been shown to affect post traumatic growth. In addition, as a result of examining the mediating effect of stress coping method on the relationship among these variables, the problem solving center and the social support method had a mediating effect, but the evasion method did not mediate.

Conclusion: The post-traumatic stress disorder caused by disasters such as earthquakes was found to be able to overcome the obstacle and grow after trauma, as the coping method is problem solving and social support.

Key Word: Pohang Earthquake; Post-Traumatic Stress Disorder; Post Traumatic Growth; Stress Coping.

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I. INTRODUCTION

Background

In recent years, there are unusual magnitude earthquakes occurred in Gyeongju and Pohang, South Korea. The earthquake occurred on 12th September in Gyeongju which was the 5.1 magnitude in advanced shock and 5.8 magnitude of main shock resulted 23 injuries 111 disaster suffers and 11 billion won in property damage (South Korean currency, ₩). The seismic magnitude scales 5.4 earthquake occurred in Pohang on 15th November, 2017 caused 135 injuries, 1,797 disaster suffers, 57,039 case of facilities damage and about (₩)85 billion won in property damage (Ministry of the Interior and Safety, 2018). The Pohang earthquake was smaller than the previous Gyeongju earthquake, but the geological features of the region caused more severe damage than the Gyeongju earthquake. Until then, South Korea has been regarded as a relatively safe zone from earthquake, so the public's psychological shock regarding the earthquake has been immense. Further, earthquake victims, as well as massive damage of property, are negatively affected by the overall experience (Yoo and Lee, 2010).

Post-traumatic stress disorder (PTSD) is a mental illness that can be carried over when exposed to traumatic events by disasters such as earthquakes. In this case, trauma event is an experience or threat of serious injury (i.e. an earthquake) and exposure to direct experience or sighting (American Psychiatric Association, 2013). The main symptoms are known as re-experiencing, avoidance, cognition, negative change in mood, change in arousal and reactivity (American Psychiatry Association, 2013). Post-traumatic stress disorder can be sustained for a long time or repeated throughout life after a traumatic event (McFarlane et al., 2002). Serious functional disorders can occur in social and professional fields and a high rate of comorbidity (known as complication) when compared to those without a disability (American Psychiatry Association, 2013). According to data from the Ministry of Health and Welfare (2017), significant levels of comorbidity are reported, including alcohol dependence, disorder of nicotine use and depression disorder.

On the other hand, even a disaster such as earthquake does not lead to a stress disorder, but rather some of those who experience trauma recover to a previous health situation after experiencing a trauma, and this also makes more adaptive and positive changes, which are called post-traumatic growth (PTG) (Tedeschi and Calhoun, 2004). This means a positive psychological change experienced as an outcome of a struggle to

overcome a greatly challenging living environment (Tedeschi and Calhoun, 2004). Calhoun and Tedeschi (2006) suggested the experience of PTG can be presented as follows: firstly, a traumatic event can be happened to everyone; secondly, people can share emotional sympathy and consolation by sharing their own perception of self-awareness and trauma experiences with others which are more positive than before when someone overcame his trauma while being aware his limitations. Thirdly, as developed closer relationships, people felt the importance of others, and as they changed their goals and attitudes after the trauma event, they decided to change their priorities in their life. Finally, it was a change in the philosophy of life that strengthened religious belief as the heart of gratitude and the meaning of life had been deepened (Calhoun and Tedeschi, 2006). While the PTG is consistent, there are different opinions on the process of PTG. There is theory regard PTG as the result of management and theory of coping strategies from a form of partial positive illusion to protect oneself in struggling against trauma.

It is very important for a disaster experienced person to remain stress disorder, such as an earthquake, or to overcome it and to become an opportunity to grow after trauma event. Since it is critical to decide the satisfaction of life afterward, it is crucial to deal with post-traumatic stress disorder so that it can be alleviated and recovered to its previous psychological state to prepare for growth. According to the preceding studies, the active coping method to trauma has a positive relationship to PTG rather than passive one. The more active the approach, the higher the level of PTG. However, the level of post-traumatic stress disorder is increasing when people take passive response method (Maercker and Langner, 2001). Therefore, the positive response expands the virtuous circle, resulting in positive effects for individuals such as GTG. Likewise, using negative response can result amplify the vicious cycle, causing symptoms such as post-traumatic stress disorder (Allwin et al., 2009).

Stress Coping refers to the ability to solve problems with adaptive response to events and effectively deal with them in stressful situation (Bellizzi and Blank, 2006) This could be differ depend on individual resources or circumstances which directly or indirectly affect the adaptation of individual. It is widely understood that stress is experienced due to something matter greatly serious or due to exterior factors, but in fact, it depends on the experience and intensity of something very trivial or one's way of thinking and one's inner expectations or desires. Therefore, post-traumatic stress disorder also does not occur in everyone who has experienced a trauma. This is because the main cause of post-traumatic stress disorder is the experience of a trauma event, but the adaptation after the trauma event experience depend not on the event itself but on how it was coped with. Therefore, the use of stress response is very important.

Despite the importance of coping with stress, Sout Korea is not properly provided with psychological support for those who have experience in disaster trauma such as earthquake at an early stage compared to other countries, and there are lack of studies compared to its importance. Thus, it is required to examine citizens who have experienced earthquake damage in Pohang and how their post-traumatic stress disorder affects PTG. It is also necessary to assist understanding deeply of PTG from people who experienced trauma event through verifying the mediated effect of the stress response method in the casual relationship between post-traumatic stress disorder and PTG.

Aims and Objectives

This study aims to investigate the impact of post-traumatic stress disorder in Pohang citizens who had experienced earthquake damage in Pohang. Furthermore, it aims to verify the mediated effect of the stress response method in the casual relationship between post-traumatic stress disorder and post-traumatic growth.

II. MATERIAL AND METHODS

Subject Materials

This study determined experience subject for citizens who experienced an earthquake occurred in Pohang, 2017. A total of 240 copies of the questionnaire were asked by this research in person, fully explaining about the aim and objectives of the survey to the citizens who agreed to and cooperated with the survey. Then study completed the questionnaire in accordance with the self-written method in anonymous. Total of 228 answered questionnaire excluding 12 what was missing or showed unfaithful responded, was used for final statistical analysis.

Experience Model and Hypothesis

Several previous study stated that post-traumatic stress disorder can affect post-traumatic growth (Bellizzi and Blank, 2006; Aldwin et al., 2009). In this case, the following research model and research theories were designed, inferring the stress response method would be mediated. In this study, factors of post-traumatic stress disorder were set as independent variables, factors of post-traumatic growth as dependent variable and response method of post-traumatic stress were set as parameters.

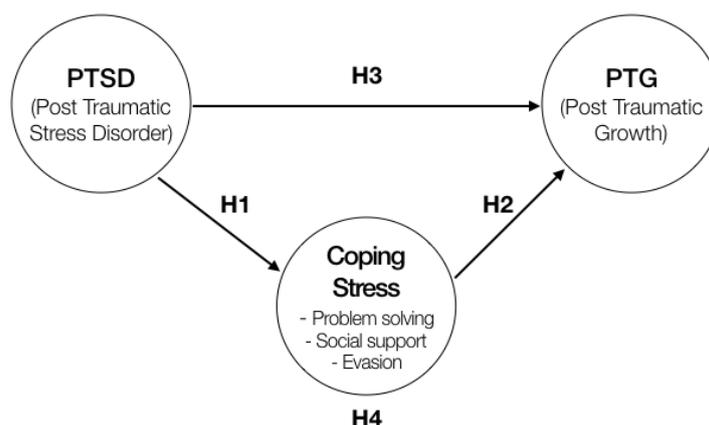


Figure no 1: Research model.

H1. Post-traumatic stress disorder will affect stress coping method.

- 1-1: Post-traumatic stress disorder will have a negative impact on problem-solving-oriented approach
- 1-2: Post-traumatic stress disorder will have a negative impact on social support-oriented approach.
- 1-3: Post-traumatic stress disorder will have a positive effect on the avoidance-focused coping.

H2. Post-traumatic stress response will affect post-traumatic growth.

- 2-1: The problem-solving-oriented approach will have a positive impact on post-traumatic growth.
- 2-2: The social support-oriented approach will have a positive effect on post-traumatic growth.
- 2-3: The avoidance-focused coping approach will have a negative impact on post-traumatic growth.

H3. Post-traumatic stress disorder will have a negative impact on post-traumatic growth.

H4. There would be a mediating effect of post-traumatic stress disorder on post-traumatic growth.

- 4-1: The effect of post-traumatic stress disorder on post-traumatic growth will be mediated by a problem-solving approach.
- 4-2: There would be a mediating effect of the social support-oriented approach in the effect of post-traumatic stress disorder on post-traumatic growth.
- 4-3: There would be a mediating effect of the avoidance-focused coping approach in the effect of post-traumatic stress disorder on post-traumatic growth.

Operational Definition of Variable

Post-Traumatic Stress Disorder: In this study, the event impact scale (IES) developed by Horowitz (1979) was measured on a five-point Likert scale using the Korean-revised version of event impact scale (IES-R-K) standardized by Eun et al. (2005). It rated as "Highly likely to be" for five marks and "Highly unlikely to be" for one mark. The higher the total score, the higher the level of post-traumatic stress disorder.

Stress coping method: In this study, the event impact scale (IES) developed by Horowitz (1979) was measured on a five-point Likert scale using the Korean-revised version of event impact scale (IES-R-K) standardized by Eun et al. (2005). It rated as "The possibility is very high" for five marks and "The possibility is very low" for one mark. The higher the total score, the higher the level of post-traumatic stress disorder.

Post-traumatic growth: Post-traumatic growth scale (PTGI) developed by Tedeschi and Callhoun (2004) to measure post-traumatic growth was measured on a Likert five-point scale using a measure that was translated into Korean by Song and Lee (2009). It rated as "Highly likely to be" for five marks and "Highly unlikely to be" for one mark. The higher the total score, the higher post-traumatic stress growth level.

Method

This study utilized statistical processing of survey materials for empirical analysis was analyzed using SPSS 24.0 statistical program. Firstly, study conduct an exploratory factor analysis (EFA) to verify the validity of post-traumatic stress disorder, post-traumatic stress response methods, and post-traumatic growth tools, and the Cronbach's α coefficient was calculated to determine reliability. Factor loading was based on 0.5 or higher and eigenvalue was based on 1.0 or higher. Secondly, Pearson correlation analysis was employed to identify the correlation between the study model variables. Thirdly, a multiple regression analysis was performed to verify the theory of the research, which is the cause-and-effect relationship between the variables. Additionally, mediator regression analysis was conducted to verify effect of mediator, and Sobel test was performed to

confirm the significance of the mediator effect coefficient. All of above analyse verified statistical significance based on a significant level of 0.05.

III. RESULT

Demographic characteristics of the subject

This study presents demographic characteristics of 228 Pohang citizens surveyed in Table 1 below. First, gender is distributed 121 male (96.7%) and 107 female (96.7%). In terms of age, 62 people (27.2%) in their 20s, 53 people (23.2%) in their 30s, 71 people (31.1%) in their 40s, 42 people (18.4%) in their 50s and the highest distribution shows in their over 40s. Meanwhile, the education level of the citizens surveyed was 50 highschool graduates, (21.9%), 146 university graduates (64.0%) and 32 post-graduated graduates (14.1%) with high-education graduates accounting for more than 70% of the total.

Table no 1:Demographic Characteristics of the Surveyed Objects.

		Number	Percentage(%)
Sex	Male	121	53.1
	Female	107	46.9
Age	20s	62	27.2
	30s	53	23.2
	40s	71	31.1
	≥50s	42	18.4
Education Level	High school	50	21.9
	College	146	64.0
	Graduate school	32	14.1
Total		228	100.0

Validation of Measurement Tools

The study conducted exploratory factor analysis (EFA) and reliability analysis as preparative resolution to verify hypothesis. First of all, factor analysis was performed on each variable in a Varimax method. The eigenvalue, which is the basis for factor extraction, was set at 1.0 or higher, the factor loading at 0.5 or higher and the questions that did not exceed 0.5 were removed while repeating the factor analysis. In addition, a reliability analysis was employed on the questions bound for each factor, and the Cronbach's coefficient was measured and verified. The results are presented in Table 2 below.

First of all, as a result of repeated exploratory factor analysis of 20 questions of post-traumatic stress disorder, KMO (Kaiser-Meyer-Olkin) values to verify sample adequacy are 0.862 and Bartlett's Sphericity verification of the suitability of the factor analysis results in =3916.122, $df=190$, $p<.001$, $df=190$, $p<0.001$ confirms that the use of factors analysis is appropriate and common factors exist. According to factor analysis results, a factor was derived and factor load of all components presents 0.5 or higher, which was sufficient to determine their validity. Reliability analysis shows Cronbach's =.955 which is 0.6 higher than reference value elaborating that the measurement data are internally consistent.

Repeated exploratory factorial analyses of 30 questions of post-traumatic stress response showed that the value of KMO (Kaiser-Meyer-Olkin) to verify sample was 0.682. Bartlett's sphericity verification results showing the validation of the factor analysis =6210.567, $df=435$, $p<.001$ confirms that the use of factor analysis is appropriate and common factors exist. Three factors were derived from the results of the factors analysis, and all items had a factor load of 0.5 or higher that sufficient to determine their validity. Also, the reliability analysis indicated that the measurement data is internal consistent within the following detailed values: the problem-solving-focusing Cronbach's =0.931, avoidance-oriented Cronbach's =0.896, and social support-seeking-focusing Cronbach's =0.920, all higher than the reference value of 0.6. Finally, as a result of repeated exploratory factor analysis of 15 questions of post-traumatic growth, the study used Kaiser-Meyer-Olkin (KMO) to verify sample adequacy and the value is 0.838, Bartlett's sphericity verification results =1993.310, $df=105$, $p<.001$ indicating the suitability of factor analysis with common factor exist. A factor was derived from the results of the factor analysis, and all component had a factor load of 0.5 or higher, which was sufficient to determine their validity. As a result of the reliability analysis, the cronbach's=.919 of traumatic growth was higher than the reference value of 0.6 and indicated that the measurement data had internal consistency.

Table no2: Exploratory Factor Analysis and Reliability for the Variable.

PTSD	Factor Loading	Coping Stress (CS)	Factor Loading			PTG	Factor Loading
			Problem solving	Evasion	Social support		
PTS-17	.869	CS-8	.823	-.017	.341	PTG-7	.818
PTS-14	.863	CS-16	.810	.032	.064	PTG-8	.776
PTS-2	.854	CS-17	.774	-.206	.098	PTG-3	.755
PTS-18	.846	CS-29	.763	-.044	.172	PTG-4	.753
PTS-10	.841	CS-3	.758	-.051	.310	PTG-14	.735
PTS-5	.808	CS-15	.750	-.110	-.029	PTG-11	.725
PTS-11	.802	CS-20	.745	.090	.164	PTG-12	.707
PTS-8	.782	CS-9	.744	-.064	.327	PTG-5	.704
PTS-15	.776	CS-11	.740	.147	.144	PTG-9	.684
PTS-19	.764	CS-7	.656	.069	.267	PTG-2	.683
PTS-12	.757	CS-2	.639	-.044	.313	PTG-10	.667
PTS-20	.744	CS-28	.328	.807	-.056	PTG-6	.660
PTS-3	.709	CS-27	.111	.800	-.060	PTG-15	.587
PTS-16	.678	CS-22	.086	.751	.130	PTG-1	.529
PTS-1	.647	CS-26	.121	.717	-.314	PTG-13	.517
PTS-9	.619	CS-6	-.094	.716	.138	PTS-7	.609
PTS-7	.609	CS-30	-.117	.670	-.309	PTS-13	.596
PTS-13	.596	CS-21	-.233	.621	-.163	PTS-6	.592
PTS-6	.592	CS-10	.043	.618	-.369	PTS-4	.582
PTS-4	.582	CS-13	-.012	.616	-.382		
		CS-4	-.106	.613	-.333		
		CS-18	-.271	.595	-.158		
		CS-5	.111	-.241	.782		
		CS-24	.310	-.239	.776		
		CS-23	.373	-.190	.774		
		CS-25	.181	-.292	.758		
		CS-1	.221	-.032	.757		
		CS-12	.283	-.035	.723		
		CS-14	.154	-.281	.723		
		CS-19	.220	-.032	.600		
Eigen Value	11.051	Eigen Value	6.934	5.630	5.630	Eigen Value	7.176
Variance(%)	55.255	Variance(%)	23.114	18.768	18.768	Variance(%)	47.841
Cronbach's α	.955	Cronbach's α	.931	.896	.920	Cronbach's α	.919

* PTSD : KMO=.862, Bartlett's test=3916.122(p<.001), df=190

** CS : KMO=.682, Bartlett's test=6210.567 (p<.001), df=435

*** PTG : KMO=.838, Bartlett's test=1993.310(p<.001), df=105

Correlation Verification

A correlation analysis was conducted to investigate the relationship between the variables used in this study before determining the relationship between the effect of post-traumatic stress disorder on PTG of high school students affected by earthquake in Pohang. The results are as shown in Table 3. Post-traumatic stress disorder is a sub-factor of post-traumatic stress responses and it shows negative correlation with problem-solving-focusing and the social support-oriented with (r=-0.209, p<0.001) and (r=-0.588, p<0.001), respectively. There is a positive correlation between post-traumatic stress disorder and avoidance-oriented (r=0.687,

p<0.001). Post-traumatic stress disorder had a negative correlation in post-traumatic growth (r= -0.665, p<0.001). In addition, post-traumatic growth is a sub-factor of post-traumatic stress response and it showed positive correlation with problem-solving-focusing (r=0.458, p<,0.001) and the social support-center (r=0.779, p<0.001). The PTG and avoidance-oriented (r=-0.472, p<0.001) shows negative correlation.

Table no3: Pearson Correlations of the Research Variable.

		PTSD	Stress Coping			PTG
			problem Solving	Social Support	Evasion	
PTSD		1				
Stress Coping	Problem Solving	-.209***	1			
	Social Support	-.588***	.507***	1		
	Evasion	.687***	-.082	-.407***	1	
PTG		-.665***	.458***	.779***	-.472***	1

***p<.001

Hypothesis Verification

As a result of investigating the impact of post-traumatic stress disorder on post-traumatic stress response (see Table 4), the coefficient of determination (r-squared) explained how post-traumatic stress disorder is problem-solving is =.044 which is 4.4% and F=9.047 indicating =.01 for significance level that suitable for regression model. Post-traumatic stress disorder (=-.209, p<.01), as an independent factor, have a significant negative impact on the problem- solving-oriented approach. The coefficient of determination of post-traumatic stress disorder and social-support-oriented method shows =0.473 and F=177.454 indicating that it is suitable in regression model with =.001 of significance level. Post-traumatic stress disorder (=.687, p<.001), as Independent variable, shown to have a significant negative impact on the social-support-oriented method. The degree of coefficient of determination that describes the avoidance-centered approach of post-traumatic stress disorder is =0.473. The R-squared was found to be 47.3% and F=177.454, addressing the regression model was found to be suitable in a significance level is =.001. As an independent variable, Post-traumatic stress disorder (=687, p<.001) have a significant positive effect on the avoidance-oriented approach. To conclude, all hypotheses H1-1, H1-2 and H1-3 were adopted in the effect of post-traumatic stress disorder on post-traumatic stress response methods.

Table no 4: The Effects of PTSD on Stress Coping.

Dependent variable	Independent variable	B	SE	β	t	p
problem solving	(constant)	4.266	.162		26.343	.000
	PTSD	-.200	.066	-.209	-3.008**	.003
	$R^2 = .044$, Adj. $R^2 = .039$, F=9.047**, p=.003					
Social support	(constant)	5.340	.148		36.024	.000
	PTSD	-.623	.061	-.588	-10.237**	.000
	$R^2 = .346$, Adj. $R^2 = .343$, F=104.794***, p=.000					
evasion	(constant)	.964	.113		8.525	.000
	PTSD	.619	.046	.687	13.321***	.000
	$R^2 = .473$, Adj. $R^2 = .470$, F=177.454***, p=.000					

p<.01, *p<.001

As the results of investigating the effects of post-traumatic stress response on post-traumatic growth, it was unproblematic in multicollinearity that analysed by multicollinearity determination and the result of VIF was ranging from 1.229 to 1.644, less than 10. The D/W value was 2.305 which is close to 2, indicating that there was no correlation between the residuals. The degree to which the post-traumatic stress response method explains post-traumatic growth is =.645 with 64.5% R-squared determinant confirmed, F=118.888, significance

level is =0.001, the regression model was found to be suitable. Problem-solving-oriented (=0.118, p<.05) and social-support-oriented (=0.636, p<.001) among the lower factors of post-traumatic stress response presented a significant positive impact on post-traumatic stress growth. Avoidance-oriented (= -0.203, p<.001) had a significant negative impact on PTG. Relative influence was shown in the order of social support-oriented, avoidance-oriented and problem-solving-oriented. As a result, all hypotheses including H2-1, H2-2 and H2-3 were adopted in the effect of post-traumatic stress coping methods on post-traumatic growth.

Table no 5:The Effects of Stress Coping on PTG.

Dependent variable	Independent variable	B	SE	β	t	p	VIF
PTG	(constant)	2.160	.204		10.562	.000	
	problem solving	.097	.041	.118	2.365*	.019	1.381
	Social support	.469	.040	.636	11.668***	.000	1.644
	evasion	-.176	.041	-.203	-4.296***	.000	1.229
$R^2 = .645$, Adjusted $R^2 = .640$, F=118.888***, p=.000, D/W=2.305							

*p<.05, ***p<.001

As a result of the effect of post-traumatic stress disorder on post-traumatic growth (see Table 6), the degree of coefficient of determination that explains post-traumatic stress disorder is (=0.442) with 44.2% R-squared and shown F=156.881 indicating that the regression model was suitable in a significant level =.001. Post-traumatic stress disorder (= -0.665, p<.001), as an independent variable, was found to have a significant negative impact on post-traumatic growth. As a result, Hypothesis H3 was adopted in the effect of post-traumatic stress disorder on post-traumatic growth.

Table no 6: The Effects of PTSD on PTG.

Dependent variable	Independent variable	B	SE	β	t	p
PTG	(constant)	5.139	.101		50.884	.000
	PTSD	-.519	.041	-.665	-12.525** *	.000
$R^2 = .442$, Adj. $R^2 = .439$, F=156.881***, p=.000						

***p<.001

The results of the verification of the mediated effects of the post-traumatic stress disorder on post-traumatic growth (see table 7), post-traumatic stress disorder (= -0.209, p<.001) has a negative impact on the problem-solving-oriented approach in first phase with 4.4% R-squared. In second phase, post-traumatic stress disorder (= -0.665, p<.001), as independent variable, has a negative impact on post-traumatic growth with 44.2% R-squared. In phase 3, the last stage of the effectiveness test for mediation, the parameters are problem-solving-oriented (=0.333, p<.001) had a positive effect on post-traumatic growth, indicating that it has a mediating effect. Post-traumatic stress disorder (= -0.595, p<.001) was shown to have a significant effect on post-traumatic growth in stage 3, indicating the problem-solving-oriented approach partially mediated the effect of post-traumatic stress disorder on post-traumatic growth. Therefore, hypothesis H4-1 was adopted.

Table no 7: Mediating Effect of Problem Solving on the Effects of PTSD on PTG.

	Step 1		Step 2		Step 3	
	(Problem Solving)		(PTG)		(PTG)	
	β	t	β	t	β	t
PTSD	-.209	-3.008**	-.665	-12.525** *	-.595	-12.156** *
Problem Solving					.333	6.806***
R^2	.044		.442		.548	

F	9.047**	156.881***	119.562***
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p<.01, *p<.001

Results of verifying the mediated effects of the social support-oriented approach in the effects of post-traumatic stress disorder on PTG (see Table 8), post-traumatic stress disorder (= -0.588, p<.001), as independent variable in phase 1, has a negative impact on the social-support-oriented approach and has 34.6% R-squared. In second phase, post-traumatic stress disorder (= -0.665, p<.001) has a negative impact on post-traumatic growth and has 44.2% R-squared. The last stage of the effectiveness test of meditation, in phase 3, social support-oriented (= -0.593, p<.001), as mediated variable, has a positive effect on post-traumatic, indicating that it has a mediating effect. Post-traumatic stress disorder (= -0.316, p<.001) was shown to have a significant effect on post-traumatic growth. Therefore, the social-support-oriented approach was presented to partially mediated effected of post-traumatic stress disorder on post-traumatic growth. Thus, hypothesis H4-2 was adopted.

Table no 8: Mediating Effect of Social Support on the Effect of PTSD on PTG.

	Step 1		Step 2		Step 3	
	(Social support)		(PTG)		(PTG)	
	β	t	β	t	β	t
PTSD	-.588	-10.237***	-.665	-12.525***	-.316	-6.263***
Social Support					.593	11.751***
R^2	.346		.442		.672	
F	104.794***		156.881***		201.795***	

***p<.001

As the result of the avoidance-oriented mediated effect of post-traumatic stress disorder on post-traumatic growth (see Table 9), post-traumatic stress disorder (= 0.687, p<.001), as an independent variable in phase 1, had a positive effect on the avoidance-oriented approach with 47.3% R-squared. Post-traumatic stress disorder (= -0.665, p<.001), as an independent variable in phase 2, had a negative impact on post-traumatic growth and has 44.2% R-squared. The last step of mediated effectiveness test. in phase 3, the avoidance-oriented (= -0.027, p<.001), as the parameter, was shown to be insignificant and showed no mediated effect. Therefore, hypothesis H4-3 was rejected.

Table no 9: Mediating Effect of Evasion on the Effect of PTSD on PTG.

	Step 1		Step 2		Step 3	
	(Evasion)		(PTG)		(PTG)	
	β	t	β	t	β	t
PTSD	.687	13.321***	-.665	-12.525***	-.646	-8.819***
Evasion					-.027	-.374
R^2	.473		.442		.442	
F	177.454***		156.881***		78.170***	

***p<.001

IV. CONCLUSION

The study investigated on the citizens who experienced earthquakes damage in Pohang and examined how their post-traumatic stress disorder affects post-traumatic growth. Furthermore, the mediated effects of the stress response method in cause-and-effect relationship between post-traumatic stress disorder and post-traumatic growth were verified through the survey investigation.

The main results from empirical analysis are as follows: First, post-traumatic stress disorder has been shown to affect the stress coping method. In particular, in stress coping method, problem-solving-oriented and social support-oriented methods are shown to reduce post-traumatic stress, while avoidance-oriented methods are shown to increase post-traumatic stress which means that post-traumatic stress disorder can be affected by stress coping method. Second, stress coping method have been shown to affect post-traumatic growth. In particular, among stress coping method, problem-solving-oriented and social-oriented method have been shown to increase post-traumatic growth, while avoidance-oriented methods have been shown to reduce post-traumatic

growth. Third, post-traumatic stress disorder has been shown to affect post-traumatic growth. Fourth, in terms of the effect of post-traumatic stress disorder affected on post-traumatic growth, the study verified the mediated effect of the stress response method. The results have shown problem-solving-oriented and social-support-oriented method had a mediating effect, while the avoidance-oriented method had no mediated effect. These results indicate that in the event of post-traumatic stress disorder caused by disaster such as earthquake, an active response to post-traumatic growth is necessary.

The presented results confirmed that post-traumatic stress disorder caused by disasters such as earthquakes can overcome obstacles and grow post-traumatic growth if the response is problem-solving-oriented or social support-oriented method. These result of research has shown accord in the outcomes of preceding research, in which the used of positive response would expand the virtuous cycle, resulting in positive effects such as post-traumatic growth, and amplifying the vicious cycle if a negative response was used, resulting in symptoms such as post-traumatic stress disorder (Maercker&Langner, 2001; Bellizzi and Blank (2005); and Aldwin et al., 2009). Furthermore, the study by Shin et al. (2015) presented a sub-factor of the stress response method as a factor for post-traumatic growth, which supports the results of this study.

However, despite the significant implications of this study, the fact that the topic is a empirical analysis study limited to some citizens who have experienced the Pohang earthquake may limitations in expanding and generalizing the research outcomes. Therefore, further study is required to be carry out to citizens in other regions in South Korea with experience of earthquake damage, such as Gyeongju. This will provide important policy implications for the establishment of disaster policies that can be provided disaster preparedness capabilities at the level of advanced countries.

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