

Psychological preparedness for disasters among nurses with disaster field experience: An international online survey

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1. Introduction

Disasters are a significant source of psychological problems. Different reactions may occur such as psychological reactions to traumatic events. In countries which are affected by disasters and trauma experiences, there is a greater burden of mental health problems and adverse effects on psychosocial well-being [1]. For example, after Hurricane Sandy, people were exposed to increased risk of depression, anxiety, and post-traumatic stress disorder (PTSD) [2]. Wynn [3] reported that survivors might experience grief, sadness, anxiety, and depression; and problems in sleeping, concentrating, and making decisions and setting priorities. Out of all, following disasters and crises, psychological trauma may outnumber physical trauma [4]. Nurses, as first responders to disasters, have to care for people with different types and levels of trauma. They have to be well prepared skill-wise, and able to provide appropriate psychological support for the victims, and even for the nurses themselves. People with lower psychological preparedness tend to have higher anxiety and avoidance [5]. Hence, to mitigate the negative effects of disasters, psychological factors related to preparedness should be considered [6]. Although research in psychological preparedness has been found substantial in its value and benefit in preparing for disasters [5], previous studies expressed the lack of psychosocial aspects in nursing disaster preparedness plans [7]. Psychosocial aspects of the nursing preparedness should be included in any disaster plan. However, there is a dearth of studies on the topic of psychological preparedness of health professionals responding to disasters. Disaster preparedness in general is still low to moderate and less attention has been paid to its psychological aspects; nurses in different studies have expressed the need for psychological preparedness to be included in their training [8]. There is little research on the identification of the elements that constitute disaster-related psychological preparedness in nurses.

The current study is underpinned by Malkina-Pykh and Pykh's [9]

framework for the assessment of psychological preparedness. Psychological preparedness is in general considered as a psychological state of awareness, anticipation, and readiness; and the capacity to anticipate and manage one's psychological response in a threatening situation [5, 10]. The framework of Malkina-Pykh and Pykh concludes that the personality variables including self-efficacy, dispositional optimism, trait anxiety, and self-esteem are key variables in the assessment of psychological preparedness [9]. Since the literature has reported that PTSD has an adverse psychological effect on healthcare responders, especially nurses responding to disasters [11], PTSD was added to the framework for the current study. The study aims to investigate the state of psychological preparedness for disasters among nurses with disaster field experience internationally. The objectives are to, 1) identify to what extent nurses are psychologically prepared for disaster, and 2) evaluate the relationship of psychological preparedness of nurses in relation to self-efficacy, dispositional optimism, trait anxiety, and self-esteem.

2. Methods

This study is an international cross-sectional online survey. Ethical approval from the Human Subjects Ethics Committee of the Hong Kong Polytechnic University (ref. no. HSEARS20190118001) was obtained before the study commenced. An information sheet explained the study to potential participants in detail, and completion of the survey tool implied consent to participate.

2.1. Sampling and setting

The study used convenience and snowball sampling that targeted member nurses from the World Society of Disaster Nursing (WSDN), Asia-Pacific Emergency and Disaster Nursing Network (APEDNN), and other nursing networks. Drawing of three free registrations for a disaster nursing conference were offered to nurses who had completed the

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survey in appreciation for their participation. As the focus of the study was on psychological preparedness of nurses with actual field experience, the inclusion criteria of participants were broad, including being either male or female nurses; having at least one occasion of experience in responding to a disaster; and including all age, positions held, and educational levels.

2.2. Instruments

Structured questionnaires were used. The *first section* was about the characteristics of participants, including age, gender, education level, practice speciality, marital status, workplace (hospital, clinic), working department, current position, years of work experience, working hours per week, number of times responding to disasters, nature or type of disaster relief (earthquake, hurricanes, etc.), and previous disaster/psychological training (how many times and nature of this training). Based on the model of Malkina-Pykh and Pykh [9] for disaster preparedness, section two to four of the survey included the following validated measures and tools.

The *second section* was a PTSD Diagnostic Scale for DSM-5 (PSD-5) [12]. It is a 24-item tool with a 5-point Likert scale of '0' to '4' [0 = Not at all to 4 = severe]. Internal consistency of the PDS-5 was high ($\alpha = 0.95$) for the full scale [12]. In the current study, a high internal consistency was observed ($\alpha = 0.95$).

The *third section* was the Psychological Preparedness for Disaster Threat Scale (PPDTS) [10]. The PPDTS is a scale with 18 questions on a 4-point Likert-type scale (1 = not at all true of me, to 4 = exactly true of me). Psychometric properties of the PPDTS demonstrate that the scale is a valid and reliable measure of psychological preparedness. The scale showed excellent internal consistency, with a Cronbach's alpha of 0.93 [10]. Cronbach alpha was high (0.97) in the current study.

The *fourth section* contained four tools, the *General Self-Efficacy Scale (GSE)*, the *Life Orientation Test (LOT)*, the *State-Trait Anxiety Inventory (STAI)*, and the *Self-Esteem Scale (SES)*. The *GSE* contains 10 questions on a 4-point scale (1 = not at all true to 4 = exactly true) [13]. According to Schwarzer and Jerusalem [13], the internal reliability of this scale has a range between 0.76 and 0.90. For the construct validity, it is correlated well to emotions, optimism, and work satisfaction, while negative coefficients were found for depression, stress, health complaints, burnout, and anxiety. In the current study, the internal consistency was 0.92.

The *Life Orientation Test (LOT)* was developed to assess individual differences in generalized optimism versus pessimism. There are 10 questions on a 0 to 4 Likert-scale (0 = strongly disagree to 4 = strongly agree). Cronbach's alpha for the entire scale was 0.78 [14], with an acceptable alpha in the current study ($\alpha = 0.65$). Test-retest correlations in different time intervals ranged from 0.56 to 0.79, suggesting that the scale is stable across time [14].

The *State-Trait Anxiety Inventory (STAI)* is a self-administering measure of trait and state anxiety levels [15]. It has 20 items for assessing trait anxiety and 20 for state anxiety. In this study, only the trait anxiety measure was used. All items are rated on a 4-point scale (From "Almost Never" to "Almost Always"). Internal consistency coefficients for the trait anxiety scale items have ranged from 0.89 to 0.91, and test-retest reliability coefficients have ranged from 0.65 to 0.75 over a 2-month interval [15]. In the current study, the internal consistency of the trait anxiety scale was $\alpha = 0.68$.

The *Self-Esteem Scale (SES)* has 10 questions in a 4-point Likert scale (1 = strongly agree to 4 = strongly disagree) pertaining to self-worth and self-acceptance [16]. Its internal consistency was reported to be 0.77, and a minimum coefficient of reproducibility was 0.90 [16]. In the current study, the internal consistency was 0.79. Permissions to use the above scales have been obtained from the authors.

2.3. Data analysis

The statistical software SPSS v. 25 [17] was used for data analysis.

The analysis included descriptive statistics to describe the nurses' characteristics and their responses on PPDTS, PSD-5, and other included measures. Shapiro-Wilk Test of Normality showed that PPTDS scores significantly deviated from a normal distribution ($p = 0.001$). Therefore, nonparametric tests were used in data analysis. Mann-Whitney test was used to identify the relationship between binary variables and PPDTS scores. Kruskal-Wallis Test with *post hoc* adjustment was performed to identify the relationships between categorical variables and PPDTS scores. Spearman rho correlation and Chi-Square were used to establish the relationships between the PPDTS and significant variables. Multiple regression was also used to assess possible predictors of PPDTS.

3. Results

Eighty-eight nurses responded to the online survey, with 64% of the participants being female and 83.5% working full-time. Most of the nurses were from Indonesia (25%), followed by USA (19.3%), and China (13.6%). Around 72% were married; 39.8% were holding a master's degree; while 45.5% were clinical registered nurses, 37.5% were nurse educators, 5.7% were heads of departments, and 3.8% were licensed practical nurses. Their mean age was 43 years (SD = 12.13), with a mean work experience of 18.3 years (SD = 12.95). Their mean number of times responding to disasters was six times (SD = 7.86) (Table 1). For the training, 84% of participants received some disaster training, including general disaster preparedness (85%), psychological preparedness (59%), stress management (53%), and disaster mental health preparedness (53%) (Table 2).

Respondents reported moderate mean scores in the PPDTS (M = 43.1, SD = 13.54), GSE (M = 32.77, SD = 4.96), LOT (M = 14.84, SD = 2.99), and SES (M = 31.95, SD = 4.32). About half of respondents reported high psychological preparedness from PPDTS (49.3%), and moderate optimism (52.9%). Around 9% reported moderate to severe PTSD symptoms.

Table 1 Demographic characteristics of the sample (n = 88).

Demographics	n	%	Demographics	n	%
Gender			Educational Level		
Male	24	27.3	Diploma	4	4.5
Female	64	72.7	Bachelor	25	28.4
Work Status			Master	35	40.9
Full Time	74	84.1	Doctorate	23	26.1
Part Time	14	15.9	Marital Status		
Country			Single	18	20.5
Indonesia	22	25	Married	62	70.5
USA	17	19.3	Divorce	5	5.7
China	12	13.6	Others	3	3.4
Malta	7	8	Others	M	SD
Australia	5	5.7	Age	42.58	12.13
Palestine	4	4.5	Work Experience (in years)	18.34	12.95
Hong Kong	3	3.4	How many times have you ever responded to disasters?	6.06	7.86
Japan	3	3.4	Disaster type of response		
Cook Islands	3	3.4	Earthquake	1.23	1.83
Belgium	2	2.3	Hurricanes/Tropical Storms/	1.01	2.13
Nepal	2	2.3	Tornadoes/Severe Storms		
Thailand	2	2.3	Floods	.94	1.82
Israel	1	1.1	Tsunami	.39	1.21
Pakistan	1	1.1	Wildfires	.18	.59
Papua New Guinea	1	1.1	Volcanic eruptions	.45	1.33
Philippine	1	1.1	Incidents of Mass Violence/	.56	1.49
South Korea	1	1.1	Terrorism		
			War	.37	.97
			Others	1.02	2.42

Table 2
Types and formats of disaster preparedness training (n = 88).

Types of training	Yes n (%)	Formats of Training							
		In person			Online			Both	
		n	%	Mean Hours	n	%	Mean Hours	n	%
Did you receive any kind of training related to disasters?	74 (84.1)								
Training 1: General disaster preparedness	75 (85.1)	64	85.3	30	8	10.6	9.3	3	4.1
Training 2: Psychological preparedness	52 (59.1)	39	75	36.7	9	17.3	61.2	5	7.7
Training 3: Stress Management	47 (53.4)	32	68.1	38.9	12	25.55	67.6	2	4.25
Training 4: Disaster mental health preparedness	47 (53.4)	29	70.3	38	10	21.2	58	3	6.4

Item	Was the training Formal or Self-learning?					
	Formal ^a		Self-learning		Both	
	N	%	N	%	N	%
Training 1: General disaster preparedness	65	86.6	8	10.6	2	2.8
Training 2: Psychological preparedness	39	75	13	25	0	0
Training 3: Stress Management	31	63.9	15	31.9	1	2.1
Training 4: Disaster mental health preparedness	28	68.1	11	23.4	3	6.4

^a Formal refers to a training provided/directed by working place.

Table 3
Correlation matrix of PPDTS and GSE, LOT, SES, T-anxiety, PTSD, age, work experience, and times responded to disasters.

	PPDTS	GSE	LOT	SES	T-Anxiety	PTSD
PPDTS (n = 73)	1.000					
GSE (n = 70)	.75**	1.000				
LOT (n = 70)	.40**	.39**	1.000			
SES (n = 69)	.55**	.56**	.50**	1.000		
T-anxiety (n = 70)	-.41**	-.51**	-.53**	-.76**	1.000	
PTSD (n = 77)	-.38***	-.21**	-.20**	-.42**	.29**	1.000
Mean (SD)	43.1 (13.54)	32.77 (4.96)	14.84 (2.99)	31.95 (4.32)	39.05 (9.58)	8.41 (10.3)
	PPDTS	Age	Work Experience	Times responded to disasters ¹		
PPDTS scores (n = 73)	1.000					
Age (n = 85)	.47***	1.000				
Work Experience (n = 88)	.40***	.81***	1.000			
How many times have you ever responded to disasters? (n = 88)	.41***	.41***	.50**	1.000		

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

~ n = 69 ~ n = 70 ^ n = 71 ^ n = 73 ^ n = 85.

(1) How many times have you ever responded to disasters?.

PPDTS: Psychological Preparedness for Disaster Threat Scale, GSE: General self-efficacy, LOT: Life Orientation Test, SES: Self-esteem, T-anxiety: Trait-Anxiety, PTSD: Post-traumatic stress disorder.

In order to investigate the effect of different types of training on PPDTS (psychological disaster preparedness), a Mann-Whitney test was used and showed statistically significantly higher PPDTS in the psychological preparedness training group ($U = 259, p = 0.000$), as well as the disaster mental health preparedness training group ($U = 390, p = 0.02$). The scores of PPDTS were significantly higher in females ($U = 323.5, p = 0.028$). The correlations between PPDTS and GSE, LOT, trait anxiety, SES, and PTSD were investigated with Spearman's rho correlations. There was a strong and statistically significant correlation between PPDTS and GSE ($r_s = 0.75, p = 0.000$). There were also moderate and significant correlations between PPDTS and LOT ($r_s = 0.40, p = 0.001$), and SES ($r_s = 0.55, p = 0.000$); whereas the PPDTS and Trait Anxiety scores and PTSD scores were inversely correlated ($r_s = -0.41, p = 0.001, r_s = -0.38, p < 0.01$ respectively). (Table 3, Fig. 1). In addition, there were significant correlations between PPDTS and age, work experience, and the number of times responding to disasters ($p < 0.01$) (Table 3).

Kruskal-Wallis tests were used to examine the differences on PPDTS related to educational level, current job position, and workplace. There was a significant difference in PPDTS scores between different levels of education, [$\chi^2(3) = 11.32, p = 0.010$], with a mean rank score of 46.61 for doctorate compared with 25.68 for bachelor graduates respectively

($p = 0.01$). For the effects of different types of training on PTSD, GSE, LOT, SES, and T-anxiety scores, results of Mann-Whitney tests showed that only general self-efficacy was significantly higher in nurses who had attended training in psychological preparedness ($U = 357, p = 0.005$), as well as training in disaster mental health preparedness ($U = 418, p = 0.024$).

Gender was found to have significant impact on PPDTS ($p = 0.034$) and LOT scores ($p = 0.027$), with female nurses reporting higher mean scores than their male counterparts in these factors (59.23 vs 49.77, 33.36 vs 31.05, 15.21 vs 13.77 respectively). Trait anxiety (38.48 vs 40.72) and PTSD (8.01 vs 9.51) were lower in females compared to males, while SES was similar between females and males (31.97 vs 31.93), of which no statistical significance was observed.

Female nurses received more training than male nurses in psychological preparedness (64.1% vs 45.8%, $p < 0.05$), and disaster mental health preparedness (57.8% vs 41.7%, $p < 0.05$); whereas training in general disaster preparedness (87.5% vs 79.2%), and stress management training was similar in the two groups.

Multiple regression analysis (Table 4) was used to test whether GSE, LOT, SES, trait anxiety, and PTSD scores significantly predicted PPDTS scores. The results of the regression analysis in its final model indicated that GSE and SES were predictors that explained 53% of the variance

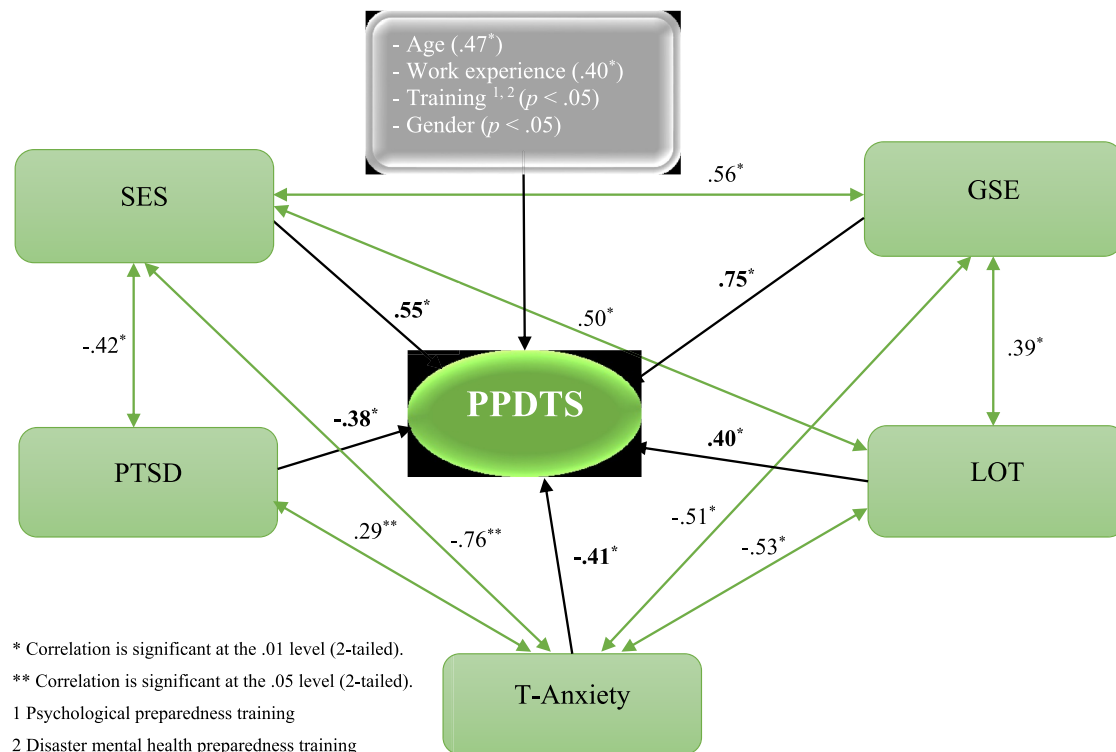


Fig. 1. Relationships between PPDTS and personality variables.

Table 4
 Multiple Regression of predictors of PPDTS.

Model	variable	B	SE B	β	T	p
1	(Constant)	-48.372	19.934	-	-2.427	.018
	GSE	1.673	.282	.633	5.937	.000
	LOT	.412	.438	.095	.939	.351
	SES	.706	.410	.234	1.722	.090
	Trait-anxiety	.249	.180	.182	1.383	.172
	PTSD	-.108	.117	-.084	-.926	.358
2	(Constant)	-51.604	19.604	-	-2.632	.011
	GSE	1.647	.280	.623	5.881	.000
	LOT	.434	.437	.100	.993	.325
	SES	.799	.397	.265	2.012	.037
	Trait-anxiety	.247	.180	.181	1.374	.174
	PTSD	-.108	.117	-.084	-.926	.358
3	(Constant)	-46.392	18.886	-	-2.456	.017
	GSE	1.661	.280	.628	5.937	.000
	SES	.875	.390	.290	2.245	.028
	Trait-anxiety	.205	.175	.150	1.175	.244
	PTSD	-.108	.117	-.084	-.926	.358
	4	(Constant)	-26.753	8.818	-	-3.035
GSE		1.579	.272	.597	5.811	.000
SES		.596	.310	.198	1.922	.059
PTSD		-.108	.117	-.084	-.926	.358
Trait-anxiety		.249	.180	.182	1.383	.172
LOT		.412	.438	.095	.939	.351

PPDTS: Psychological Preparedness for Disaster Threat Scale, GSE: General self-efficacy, LOT: Life Orientation Test, SES: Self-esteem, T-Anxiety: Trait-Anxiety, PTSD: Post-traumatic stress disorder.

[$R^2 = 0.53$, $F(2,66) = 37.24$, $p < 0.01$], and that GSE significantly predicted PPDTS scores ($\beta = 1.579$, $p = 0.000$). From the previous correlations, the relationships between studied variables and PPDTS was further established (Fig. 1).

4. Discussion

This study found that only about half the nurses responding to disasters had psychological preparedness training and this was mostly through self-learning. Psychological preparedness was related with self-efficacy and self-esteem primarily, but also, PTSD symptoms, trait

anxiety, optimism, older age, more years of experience and more times responding to disasters. Overall, around 50% of the respondents perceived a high level of PPTDS with a high mean self-efficacy. The presence of self-efficacy means higher ability in handling difficult situations [18], while self-efficacy could also be influenced by psychological responses [19]. This may explain why nurses' self-efficacy has strong and positive correlation with PPTDS scores.

A study by Malkina-Pykh and Pykh [9] found that psychological preparedness, in a group of 52 participants in the Black Sea, was positively correlated with self-efficacy, dispositional optimism, and self-esteem, and negatively with trait anxiety, supporting our data. Similarly, the current study demonstrated a moderate association of dispositional optimism and self-esteem of nurses with psychological preparedness, and the current result about the training was observed particularly in female nurses (64% of the sample). Also, there were low to moderate reverse association between PTSD symptoms and trait anxiety respectively with psychological preparedness. With higher optimism and self-esteem, people may be less prone to neuroticism which leads to lower emotional intensity and less anxiety [20]. Self-esteem also serves as a buffer against the impact of negative influences and may reduce mental health and social problems [21]. Furthermore, self-esteem may also reduce the chance of PTSD [22], which may contribute to the presence of higher psychological preparedness.

Training for psychological preparedness and disaster mental health preparedness may significantly enhance psychological preparedness. In this study, nurses received more general disaster preparedness training than that related to psychological preparedness, and the training in general disaster preparedness and psychological preparedness was more common in female than male nurses. The results showed that nurses who received psychological preparedness training through self-learning were two times more than self-learning related to general disaster preparedness. Self-learning appears to be more common, as such training is mostly available online, self-directed, and more convenient to use. This may also indicate a lower availability of formal training for

psychological preparedness, or that general disaster preparedness training has a lesser focus on psychological aspects about disaster preparedness. However, the results of this study do not indicate the specific contents of psychological preparedness that nurses would require. Training in the nursing context, such as with simulated disaster exercises, may enhance self-efficacy [18] and hence can contribute to better psychological preparedness of nurses for disasters. It is clear that this kind of pedagogy can be practically used for such training in order to pursue stronger outcomes. It is important that nurses acquire the essential skills to face adverse psychological situations, which can help them to better care for others and for themselves during stressful situations like disasters.

In the current study, most of the nurses had a moderate level of dispositional optimism, self-efficacy, and self-esteem; and a low level of anxiety. It may be that optimistic people tend to have higher self-esteem [23]. Furthermore, optimism may contribute to less anxiety and depression [24]; and can contribute to a positive relationship with coping that it will enhance cognitive and emotional functions [25]. Furthermore, people with higher levels of optimism may even have less psychological distress and greater resilience to potential post-disaster psychopathology [26].

Regarding PTSD, our study showed that it was moderately correlated with trait anxiety, and PTSD had strong inverse correlations with general self-efficacy, dispositional optimism, and self-esteem. It seems that trait anxiety may predict the development of PTSD [27]. While the presence of dispositional optimism may have served as a protective factor against such symptoms [28], trait anxiety has a negative effect on people exposed to a traumatic event. In particular, people with various degrees of self-confidence may experience higher or lower anxiety, which can influence the episodes of post-traumatic stress symptoms and somatic symptoms that carry a negative effect on cognitive function [24]. As anxiety is associated positively with traumatic exposure, and negatively with optimism and self-esteem [29], nurses with lower anxiety reported the presence of optimism and self-esteem. Current results revealed that most of the nurses had a moderate level of dispositional optimism, self-efficacy, and self-esteem; and a low level of anxiety. This appears to be corresponding with only 9% of nurses reporting moderate to severe symptoms of PTSD in this study. The level of PTSD is less than other studies of nurses after a disaster experience. For example, Zhen et al. [30] reported that 30% of the nurses who had responded to the Wenchuan earthquake relief experienced PTSD symptoms, with younger nurses reporting more psychological complaints compared to older ones (45% vs 35%). In Gaza following the military conflict in 2009 [31], around 19.7% of nurses experienced PTSD and among them 78.4% had witnessed severe injuries and deaths at work. An important question to ask is whether training for psychological preparedness of nurses would enhance their dispositional optimism, self-esteem, and self-efficacy, and reduce anxiety and PTSD during and after responding to disasters. Nevertheless, in future studies, PPDTs can be assessed through the predictive variables (GSE, LOT, SES, T-Anxiety, and PTSD) as PPDTs found to have positive relationship with GSE, LOT, and SES and negative with T-Anxiety and PTSD. In addition, nurses with higher GSE and SES were expected to have higher PPDTs, after controlling for other variables in the model.

Notably from this study, female nurses showed higher psychological preparedness and self-efficacy, lower trait anxiety, and relatively less experience of PTSD. The results are in contrast to Shamia, Thabet, and Vostanis [31] and Naushad et al. [11] who found that female nurses had reported significantly more PTSD than male nurses, even when they experienced significantly less traumatic events than males. In another study, female nurses were twice at risk of developing PTSD following trauma experience when compared with male nurses [31]. As Scheier, Weintraub, and Carver [32] found that optimism is positively correlated with seeking social support, our different results in female nurses may be explained by their more dispositional optimistic than males, and their more open and willing nature to share their feelings and thoughts with

others. This may help them in actively seeking advice and support from others that contribute to alleviate PTSD and anxiety. In contrast, some male nurses may prefer to keep their emotions and thoughts and trying to solve the problems by themselves. It might also be the training that female nurses received, and more disaster relief experiences compared to male nurses in this study, which had played a positive role in improving self-efficacy, dispositional optimism, and self-esteem and thus better psychological preparedness.

Finally, with a limited number of studies that directly evaluate psychological preparedness and effects of training for better disaster preparedness (i.e. [5,10]), it is difficult to draw conclusions to compare findings of this study with previous literature on psychological preparedness. This study adds to the limited body of evidence about the psychological preparedness of nurses for disasters from a global perspective. Moreover, the impact of dispositional optimism, trait anxiety, PTSD experience, and self-esteem on psychological preparedness for disasters should be evaluated with a larger sample to further substantiate the preliminary findings of this survey.

5. Implications for research and practice

The study revealed that respondents had moderate level of psychological preparedness, and only around half of them received training related to psychological preparedness, with strong associations between psychological preparedness training and PPDTs. Hence, the results suggest the need for psychological preparedness training and pre-disaster planning of nurses in order to strengthen their disaster response. Studies can be considered to identify and recommend the most appropriate training to achieve psychological preparedness, with an emphasis on the modifiable factors linked with psychological preparedness.

The training and continuing education may include the goal to develop psychological preparedness alongside with general disaster preparedness through interdisciplinary collaboration (e.g. with psychologists and mental health nurses). Psychological preparedness can also be included as a learning outcome of undergraduate programmes. For hospital administrators, it is important to consider PTSD assessment and trait anxiety in the nurses involved in disaster response in order to provide support and consultations to those who may suffer from such symptoms. The current study is a survey which does assume a cause and effect relationship about the training and psychological preparedness. However, in balancing the pros and cons in achieving the aims of this study from a global perspective (considering accessibility, affordability, and flexibility), this is an appropriate first step to understand the study outcome variables in nurses responding to disasters. Therefore, future studies with larger samples and more controlled trial designs are warranted to investigate the effect of specific training of nurses on psychological preparedness for disasters.

6. Limitations

Since this study recruited participants through an international survey, it was conducted in English language. Some nurses that were approached from different countries found English challenging to respond to, which led to non-participation to the study. Secondly, there may be self-selection bias as nurses who have been affected by psychological reactions may have not been willing to respond. Also, self-reported data, as in this study, inherently reflects self-perceptions that can be biased, for example with attempts to maintain a consistent model of self. In addition, as mentioned earlier in the discussion, the nurses' self-confidence was variable in this study and not controlled, and this may be a potential source of bias affecting the association of anxiety and PTSD. It is also unclear if there was recall biases when participants were asked to report previous experiences. Furthermore, the structural equation model presented should be seen as preliminary only, due to the relatively small sample used, and needs further verification in the future.

Also, while the associations between the study variables were identified, a causal relationship about training and psychological preparedness to disasters of the nurses cannot be ascertained; this needs further investigation in the future.

7. Conclusion

The current study aimed to evaluate psychological preparedness among nurses with disaster relief experiences. Findings suggested that self-efficacy, self-esteem, dispositional optimism, trait anxiety, and PTSD can be considered as predictors to assess psychological preparedness of nurses for disasters. It was also revealed that nurses had less training in psychological preparedness than general disaster preparedness. In particular, male nurses received relatively less training in disaster and psychological preparedness, as well as disaster mental health preparedness, when compared to female nurses. Appropriate training could influence self-efficacy, dispositional optimism, and self-esteem; and reduce anxiety and PTSD symptoms. The results highlighted the importance of considering psychological preparedness in future disaster planning and training for nurses.

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Declaration of competing interest

We declare that the manuscript has not been published, and is not under consideration for publication, elsewhere. And we have no conflicts of interest to disclose.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijdr.2020.101533>.

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