


Traumatic life events and development of post-traumatic stress disorder among female factory workers in a developing country

International Journal of
Social Psychiatry
1–8
© The Author(s) 2018
Reprints and permissions:
sagepub.co.uk/journalsPermissions.nav
DOI: 10.1177/0020764018761502
journals.sagepub.com/home/isp


Taylor Jennelle Fitch¹, Xiao Yu², Lung-Chang Chien³,
Mohammad Monjurul Karim⁴ and Hasanat Alamgir⁵

Abstract

Background: Post-traumatic stress disorder (PTSD) may be more prevalent and burdensome in developing countries. **Aims:** The goals of this study were to (1) determine the prevalence of PTSD, (2) identify types and number of traumas related to screening positive for PTSD and (3) determine other sociodemographic risk factors and health/medical conditions that may be correlated to PTSD among garment-factory workers and a comparable working population in Bangladesh.

Method: A survey was administered to a convenient sample of 607 lower socio-economic status (SES) working women in Bangladesh, 310 of who were garment workers. The primary outcome PTSD was measured by the PTSD Checklist. The Life Events Checklist determined the number and type of traumatic events.

Results: The prevalence of PTSD was found to be 17.79% – 7.25% in garment workers and 21.55% in the comparison worker group. In multivariate analysis, PTSD was found to be significantly associated with age, income, chronic pain and number of stressful events. Participants between 45–50 years of age had the greatest odds of reporting PTSD – 15.68 fold (95% confidence interval (CI) = 4.08, 60.29) compared with those younger than 24 years. PTSD was more common in those with lower income (2,000–4,000 taka) (odds ratio (OR) = 1.60; 95% CI = 0.79, 3.26), who had chronic pain (OR = 2.48; 95% CI = 1.51, 4.07) and who experienced over three traumatic life events (OR = 11.25; 95% CI = 4.59, 27.59). The mean number of traumatic events experienced by this entire population was 4.9 with PTSD being more likely in those who experienced physical assault (OR = 6.35; 95% CI = 4.07, 9.90), who caused serious harm or death to someone else (OR = 4.80; 95% CI = 1.36, 16.87) and who had exposure to combat or war (OR = 4.76; 95% CI = 1.17, 19.34).

Conclusion: Undiagnosed and untreated PTSD impacts the quality of life and decrease worker productivity among working-age women in this developing country.

Keywords

Factory workers, PTSD, developing country

Introduction

More tools, data and resources have become available to identify, report and treat post-traumatic stress disorder (PTSD) as a health condition. Studies in the United States suggest that the prevalence of PTSD is at least 1% in the general population in a single year with the lifetime prevalence thought to be around 7.8% (Atwoli, Stein, Koenen, & McLaughlin, 2015; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Despite the heightened attention on and emerging evidence of this health condition in developed countries, very limited studies in developing countries have been conducted on PTSD prevalence. Mental health status of the population is often ignored or under-diagnosed there, and awareness among healthcare providers on

¹Department of Pediatrics, Emory University, Atlanta, GA, USA

²Department of Biostatistics and Data Science, School of Public Health, The University of Texas Health Science Center at Houston, Houston, TX, USA

³Epidemiology and Biostatistics Program, Department of Environmental and Occupational Health, University of Nevada, Las Vegas, Las Vegas, NV, USA

⁴Inclusive Job Centre, CRP-Mirpur, Dhaka, Bangladesh

⁵Department of Health Policy and Management, New York Medical College, Valhalla, NY, USA

Corresponding author:

Hasanat Alamgir, Department of Health Policy and Management, New York Medical College, Valhalla, NY 10595, USA.

Email: hasanat.alamgir@gmail.com

this issue is also very low. The very few studies conducted in South Asia and Southeast Asia on PTSD were undertaken to study consequences of specific traumatic event, such as a natural disaster like a hurricane/tsunami or after a man-made disaster like a factory fire or collapse and the prevalence was found to range from 11.3% to 60.2% (Arnberg, Bergh Johannesson, & Michel, 2013; Fitch, Villanueva, Quadir, Sagiraju, & Alamgir, 2015).

Frequencies of trauma exposure in lower income countries is usually higher compared with high-income countries because of widespread socioeconomic disparities, political unrest, poor law and order situation, less control over daily living and ongoing conflicts in many of these areas (Atwoli et al., 2015). However, people in high-income countries living in urban low-income areas also suffer from frequent exposure to trauma. One study in Detroit reported that 69.7% of its population had exposure to some traumatic event (Keyes et al., 2013). It has also been well studied that these traumatic events, including the number of such events, lead to higher incidence rates of PTSD (Cardozo et al., 2004; Miller & Rasmussen, 2010). In addition, women in many of these settings are more likely to be exposed to traumas earlier in life and more frequently and they are at higher risk of developing PTSD (Axinn et al., 2013). Despite being a highly prevalent health issue, there have been few studies looking at the association between traumatic events and the development of PTSD in low-income countries (Axinn, Ghimire, Williams, & Scott, 2013; Cardozo et al., 2004) especially in a working population.

Bangladesh, one of the largest developing countries in the world, has 31.5% of its population living in poverty (The World Bank, 2011, 2014). Women in Bangladesh like many other developing countries suffer from a number of socioeconomic and health issues: few social protections, higher economic insecurity, low education and empowerment, early marriage, high rates of fertility, high infant mortality, frequent domestic abuse and violence. All of these place these working-age women at a higher risk of developing PTSD (Begum, 2010; Kodali, 2015). Garment factories which provide jobs for millions of women with lower education and skills are now a key driver of this country's economic growth. However, very little is known about these workers' mental health, including the number of traumatic events sustained and possible PTSD development or diagnosis (Fitch et al., 2017). The impact of poor mental health on workers' well-being, quality of life, morale, productivity and absenteeism has not been investigated, understood or appreciated in developing countries (Kessler, Chiu, Demler, Merikangas, & Walters, 2005; Lépine & Briley, 2011; Breslau & Anthony, 2007). Despite tremendous amount of resources allocated recently to understand, protect and improve mental health of workers in developed countries, mental health status of workers in developing countries has largely been ignored even though

most Western companies and consumers continue to benefit immensely from this cheap workforce.

The goals of this study were to (1) determine the prevalence of PTSD, (2) identify types and number of traumas related to screening positive for PTSD and (3) determine other sociodemographic risk factors and health/medical conditions that may be correlated to PTSD among garment-factory workers and a comparable working population in Bangladesh.

Methods

The study population is made up of working women of lower socio-economic status SES. The population was approached via the Centre for the Rehabilitation of the Paralyzed (CRP) – a large local non-governmental organization (NGO). This organization provides preventive care as well as aid and treatment for those who have disabilities. The subjects were recruited at garment factories and others who were invited to come to CRP. The comparison group was made up of tailors, beauticians, housekeepers, shopkeepers, and secretaries from nearby facilities as well as certain employees from the CRP itself who were thought by the research team to have a comparable income and education as garment-factory workers. Once an individual participated in this study, she was requested to pass on study information to other working women she knew. This snowballing technique allowed to recruit a large sample size in a relatively short period of time.

The survey administered included components on: demographic and health conditions, Chronic Pain Scale, Life Events Checklist (LEFC), Post-traumatic Stress Disorder Checklist-Specific (PCL-S) and Patient Health Questionnaire 9 (PHQ-9). All surveys were translated into Bengali keeping the education level of the participants in mind. Before administered, the surveys were first piloted for 3 days on comparable lower SES women and modifications were made accordingly. The study took place in February of 2016. The surveys were administered by a CRP research staff and a health science undergraduate student. They were both trained by this research team and they also helped in obtaining consent forms. Institutional review board (IRB) approval was obtained from both The University of Texas Health Science Center Medical School and CRP, Bangladesh.

The first portion of the survey (demographics and health conditions) collected data on age, employment, salary, hours worked and medical history. The Chronic Pain Scale gathered information on the location of pain, severity, duration, and if the pain was secondary to a workplace injury. If the patient had pain lasting longer than 6 months, she was grouped as having chronic pain. The LEFC determined lifetime traumatic experiences; examples of traumatic events included toxic exposures, traffic/workplace accidents, physical/sexual assaults, and exposure to death

and dying (a sick family member, witnessing violent event). The PCLS was administered only when LEFC survey revealed a traumatic event happened to a respondent. If the score was 45 or higher, the individual was determined to screen positive for PTSD. The PCLS was selected as this tool has been used in other international studies, including one in Bangladesh, with reported sensitivity and specificities ranging from 0.78 to 0.82 and 0.83 to 0.86, respectively (Blanchard, Jones-alexander, Buckley, & Forneris, 1996; Fitch et al., 2015; Hoge, Riviere, Wilk, Herrell, & Weathers, 2014).

The logistic regression model was applied to investigate the influence of risk factors on PTSD. Odds ratios (ORs) were calculated from exponential estimated coefficients. A 95% confidence interval (CI) and a *p*-value were also calculated. The significance level was set at 5%. Data management and analysis were carried out by SAS v9.4 (SAS Institute, Cary, NC).

Results

Among 607 subjects, 52% ($N = 310$) were garment workers. Their characteristics are presented in Table 1. Garment workers were younger, had more dependents, earned less, were employed for shorter tenure, worked fewer days a week, more likely to have only primary school education, were more likely to be married and were working full-time. In terms of traumatic events, participants experienced or witnessed (Table 2), the three most commonly reported were natural disasters (71.83%), fire/explosions (43.33%) and exposure to sudden accidental death (30.15%). Among them, 26.52% admitted to be a victim of physical assault. The participants encountered on average about 3.20 traumatic events (standard deviation (*SD*) = 0.99).

If the participant admitted being exposed to a traumatic event ($N = 108$), PCLS tool was then administered to screen for PTSD for the event that was deemed to be most traumatic by the subject. From the PCLS, 17.79% of the 108 participants screened positive for PTSD (Table 3). The data were further evaluated to determine if a certain type of traumatic event was more related to PTSD positive screening. Among participants with PTSD, most of them experienced and witnessed natural disasters ($N = 81$), fire/explosion ($N = 65$) and physical assault ($N = 65$). On an average, participants with PTSD suffered 4.90 traumatic events ($SD = 2.27$) – significantly higher – than participants without PTSD. In the univariate analysis, participants experiencing or witnessing more traumatic events had significantly higher odds of having PTSD, except for natural disaster and sudden violent death. In the multivariate analysis, only transportation accident (OR = 1.96; *p*-value = .0122; 95% CI = 1.16, 3.32) and physical assault (OR = 3.33; *p*-value < .0001; 95% CI = 1.99, 5.57) had significantly higher OR for PTSD. On an average, participants with PTSD had 3.83 traumatic stressful events ($SD = 0.50$), while participants

Table 1. Characteristics of garment workers and non-garment workers in Bangladesh surveyed in this study.

	Garment workers <i>N</i> = 310 (52%)		Non-garment workers <i>N</i> = 297 (48%)		<i>p</i> -value ^a
	Mean	<i>SD</i>	Mean	<i>SD</i>	
Age (years)	27.9	7.3	33.4	9.7	<.0001
Number of dependents	3.7	1.5	3.5	1.8	.0378
Household size	4.1	1.5	3.9	1.5	.1343
Monthly income (taka)	4,049	3,997	6,374	3,884	<.0001
Hours of work in a day	8.1	3–13 ^b	7.9	1–24 ^b	.2182
Duration of employment (years)	4.0	3.6	6.8	5.9	<.0001
Working days/week	6.0	0.3	6.3	1.1	<.0001
	<i>N</i>	%	<i>N</i>	%	<i>p</i> -value ^c
Received any education					<.0001
No	118	38.06	138	46.46	
Yes	192	61.94	159	53.54	
Marital status ^d					<.0001
Married	246	79.61	208	70.27	
Single	31	10.03	25	8.45	
Divorced	9	2.91	18	6.08	
Widowed	23	7.44	45	15.20	
Current employment					<.0001
Full time	308	99.35	211	71.04	
Part time	2	0.65	86	28.96	

SD: standard deviation.

^a*t*-test.

^brange.

^cChi-square test.

^dTwo missing values.

without PTSD had only 3.06 traumatic events ($SD = 0.05$). The OR for PTSD was statistically significant by 3.91 (*p*-value < .0001; 95% CI = 2.55, 6.00) among participants incurring one traumatic event.

Table 4 shows that PTSD was more likely among participants with younger age, lower income, no education, longer duration of chronic pain, no headaches, no heart diseases, and among those working in non-garment industries and experienced more traumatic events. Univariate analysis concluded that except for headache and heart disease, most other risk factors studied had significant association with PTSD. In multivariate analysis, PTSD was found to be significantly associated with age, income, chronic pain and number of traumatic events. Among these significant risk factors, participants aged 45–50 years had the greatest odds of getting PTSD by 15.68-fold (95% CI = 4.08, 60.29) compared with those aged younger than 24-year-olds. Moreover, participants who earned more than 6,000 taka had lower risk. Furthermore,

Table 2. Frequency and type of traumatic events experienced by garment workers and non-garment workers in Bangladesh.

Variable	N	%	p-value ^a
Natural disaster	436	71.83	<.0001
Fire/explosion	263	43.33	.001
Transportation accident	163	26.85	<.0001
Physical assault	161	26.52	<.0001
Life threatening illness/injury	146	24.05	<.0001
Severe human suffering	102	16.8	<.0001
Sudden violent death	109	17.96	<.0001
Sudden accidental death	183	30.15	<.0001
Serious accident	87	14.33	<.0001
Exposure to toxic substance	38	6.26	<.0001
Assaulted with a weapon	32	5.27	<.0001
Sexual assault	19	3.13	<.0001
Other unwanted or uncomfortable sex experience	18	2.97	<.0001
Combat/war exposure	8	1.32	<.0001
Captivity	19	3.13	<.0001
Serious injury harm or death you caused to someone else	10	1.65	<.0001
Any other stressful event	110	18.12	<.0001

^aChi-square test.

participants with chronic pain more than 6 months and who experienced at least three traumatic events had a significantly 2.48-fold (95% CI = 1.51, 4.07) and 11.25-fold higher (95% CI = 4.59, 27.59) odds of having PTSD compared with those with chronic pain less than 6 months and less than three traumatic events, respectively.

Discussion

This study reveals that PTSD is a highly prevalent health condition in working women in Bangladesh with about 17% screening positive out of those who reported experiencing a traumatic event in life, which the majority of participants reported, $n = 563$ (92%). To our knowledge, no studies of PTSD have been conducted in generally healthy working-age female population (i.e. not those exposed to any immediate large-scale natural or industrial disasters or war or conflict) in Bangladesh. Studies have shown that the prevalence of PTSD in the general population of high-income countries, such as the United States ranges from 3.5% to 7% (Kessler et al., 2005; National Comorbidity Survey, 2005). A meta-analysis of US veterans – a high-risk group – included studies that report a point prevalence of 2%–17% (Richardson, Frueh, & Acierno, 2010). Our data demonstrate a prevalence that is similar to the high-risk population of US veterans. This similarity in prevalence of PTSD among US veterans and Bangladeshi working women may likely be due to the number of traumatic events experienced by the study population as well as the psychosocial vulnerabilities (e.g. little or no social protection) of women in this country.

While our study found no significant difference between the garment-factory workers and the comparison group in terms of PTSD screening and the number of traumas, we did identify common associated factors with development of PTSD in both groups. Higher number of traumatic event exposures, lower income, chronic pain and older age were all statistically linked with PTSD in multivariate regression models. This information is immensely valuable for healthcare providers, health advocates, worker groups and employers to further examine the mental health issues of working-age women.

The World Health Organization World Mental Health Survey Initiative stated that 19.8% of respondents ($n = 51,295$) reported PTSD and PTSD was more likely to occur among those with multiple traumatic events (Karam et al., 2014). This is corroborated in our study as well, where many women had experienced multiple traumatic events (average of 4.9 events per person), and the more such events they experienced, the more likely they were to have PTSD. Not only are rates of PTSD higher in those with more traumatic events, but it was more prevalent among respondents with certain health conditions as well. Other studies have shown increases in morbidity, dysfunction in daily living and physical disabilities such as arthritis among people with PTSD. This is unrelated to whether a person develops PTSD from the trauma (Husarewycz, El-gabalawy, Logsetty, & Sareen, 2014; Karam et al., 2014; Keyes et al., 2013). These findings suggest better monitoring and health surveillance is warranted for people who suffer traumatic events in developing countries.

The types of traumas reported most commonly in this study were natural disaster, fire/explosions and witnessing a sudden or accidental death. However, positive screening of PTSD was more common who reported combat or who witnessed or caused serious injury or harm to another individual. The highest OR was observed in those who experienced physical assault. These results corroborate findings from other studies which have examined PTSD rates for certain types of traumas (Fitch et al., 2015; Richardson et al., 2010). The reported sexual assault was only 3% in this population. This report is likely to be an underestimate; women in this society and culture are very unlikely to discuss sexual trauma. This again greatly highlights the importance of building awareness among healthcare providers around the impact of traumas on young women of lower SES in developing countries. These respondents were mostly young women and this is most likely to be underestimate as women in this society and culture are very unlikely to talk or share this information. This again greatly highlights the requirement of awareness building among healthcare providers who treat young women of lower SES in developing countries.

Our study also identified that people with lower income were more likely to screen positive for PTSD. Other studies also support the association of low SES with PTSD as well as increased risk for people quitting schools earlier in

Table 3. Association of traumatic events with and without PTSD: garment workers and non-garment workers in Bangladesh.

Variable ^b	With PTSD (N = 108; 17.79%)		Without PTSD (N = 499; 82.21%)		Univariate analysis			Multivariate analysis ^a		
	N	%	N	%	OR	95% CI	p-value	OR	95% CI	p-value
Natural disaster	81	18.58	355	81.42	1.22	(0.76, 1.96)	.4795	1.05	(0.59, 1.85)	.8682
Fire/explosion	65	24.71	198	75.29	2.30	(1.50, 3.51)	.0001	1.82	(1.09, 3.02)	.0217
Transportation accident	49	30.06	114	69.94	2.80	(1.82, 4.32)	<.0001	2.49	(1.50, 4.14)	.0004
Serious accident	24	27.59	63	72.41	1.98	(1.17, 3.34)	.0147	0.84	(0.43, 1.64)	.6053
Exposure to toxic substance	17	44.74	21	55.26	4.25	(2.16, 8.37)	<.0001	2.27	(1.00, 5.16)	.0495
Physical assault	65	40.37	96	59.63	6.35	(4.07, 9.90)	<.0001	4.00	(2.41, 6.64)	<.0001
Assault with a weapon	13	40.63	19	59.38	3.46	(1.65, 7.24)	.0015	2.06	(0.82, 5.21)	.1264
Sexual assault	8	42.11	11	57.89	3.55	(1.39, 9.05)	.0105	1.64	(0.43, 6.20)	.4677
Other unwanted or uncomfortable sex experience	7	38.89	11	61.11	3.07	(1.16, 8.12)	.0268	1.04	(0.25, 4.24)	.9608
Combat/war exposure	4	50.00	4	50.00	4.76	(1.17, 19.34)	.0372	4.01	(0.72, 22.47)	.1139
Captivity	8	42.11	11	57.89	3.55	(1.39, 9.05)	.0105	0.97	(0.29, 3.26)	.9617
Life threatening illness/injury	36	24.66	110	75.34	1.77	(1.12, 2.78)	.0179	0.94	(0.51, 1.71)	.8274
Severe human suffering	34	33.33	68	66.67	2.91	(1.80, 4.71)	<.0001	2.01	(1.08, 3.75)	.0288
Sudden violent death	26	23.85	83	76.15	1.58	(0.96, 2.62)	.0026	0.71	(0.37, 1.39)	.3223
Sudden accidental death	46	25.14	137	74.86	1.96	(1.28, 3.01)	.0026	1.12	(0.65, 1.93)	.6762
Serious injury harm or death you caused to someone else	5	50.00	5	50.00	4.80	(1.36, 16.87)	.0194	2.91	(0.72, 11.76)	.1342
Any other stressful event	41	37.27	69	62.73	3.81	(2.40, 6.07)	<.0001	3.17	(1.82, 5.54)	<.0001

PTSD: post-traumatic stress disorder; OR: odds ratio; CI: confidence interval.

^aAll variables are included in the multivariate analysis.

^bThe reference level is not experiencing or witnessing in a corresponding traumatic event.

Table 4. Association of personal characteristics and health conditions of participants with PTSD and without PTSD: garment workers and non-garment workers in Bangladesh.

Variable	Level	With PTSD (N = 108; 17.79%)		Without PTSD (N = 499; 82.21%)		Univariate analysis			Multivariate analysis ^a		
		N	%	N	%	OR	95% CI	p-value	OR	95% CI	p-value
Age (years)	>50	6	46.15	7	53.85	9.86	(2.91, 33.37)	<.0001	5.20	(1.25, 21.63)	.0031
	45–50	11	68.75	5	31.25	25.3	(7.7, 83.13)		15.68	(4.08, 60.29)	
	40–44	8	28.57	20	71.43	4.6	(1.72, 12.32)		2.88	(0.93, 8.94)	
	35–40	13	18.31	58	81.69	2.58	(1.14, 5.81)		2.63	(1.04, 6.63)	
	31–34	16	17.58	75	82.42	2.45	(1.14, 5.29)		2.56	(1.09, 6.01)	
	25–30	40	18.78	173	81.22	2.66	(1.4, 5.07)		3.05	(1.49, 6.23)	
	<24 ^b	14	8.00	161	92.00	1.00	–		1.00	–	
Income (taka)	>8,000	15	9.93	136	90.07	0.40	(0.21, 0.76)	.0012	0.26	(0.13, 0.54)	<.0001
	6,001–8,000	16	14.41	95	85.59	0.62	(0.33, 1.16)		0.40	(0.19, 0.82)	
	4,001–6,000	12	15.38	66	84.62	0.67	(0.33, 1.35)		0.56	(0.25, 1.26)	
	2,000–4,000	24	31.58	52	68.42	1.69	(0.93, 3.06)		1.60	(0.79, 3.26)	
	<2,000 ^b	41	21.47	150	78.53	1.00	–		1.00	–	
Received any education	Yes	52	14.81	299	85.19	0.62	(0.41, 0.94)	.0254	1.05	(0.62, 1.80)	.8472
	No ^b	56	21.88	200	78.13	1.00	–		1.00	–	
Chronic Pain	>6 months	83	28.62	207	71.38	2.97	(1.93, 4.57)	<.0001	2.48	(1.51, 4.07)	.0003
	≤6 months ^b	25	7.89	292	92.11	1.00	–		1.00	–	
Occupation	Garment	44	14.19	266	85.81	0.60	(0.4, 0.92)	.0186	0.15	(0.36, 0.55)	.5495
	Non-garment ^b	64	21.55	233	78.45	1.00	–		1.00	–	

(Continued)

Table 4. (Continued)

Variable	Level	With PTSD (N = 108; 17.79%)		Without PTSD (N = 499; 82.21%)		Univariate analysis			Multivariate analysis ^a		
		N	%	N	%	OR	95% CI	p-value	OR	95% CI	p-value
# of stressful events	≥3	96	29.45	230	70.55	10.92	(4.67, 25.53)	<.0001	11.25	(4.59, 27.59)	<.0001
	2	6	5.08	112	94.92	1.40	(0.44, 4.46)		1.55	(0.47, 5.14)	
	0–1 ^b	6	3.68	157	96.32	1.00	–		1.00	–	
Headache	Yes	2	40.00	3	60.00	3.12	(0.52, 18.9)	.2178	4.29	(0.59, 31.01)	.1486
	No ^b	106	17.61	496	82.39	1.00	–		1.00	–	
Heart disease	Yes	3	27.27	8	72.73	1.75	(0.46, 6.72)	.4126	1.12	(0.21, 5.93)	.8925
	No ^b	105	17.62	491	82.38	1.00	–		1.00	–	

PTSD: post-traumatic stress disorder; OR: odds ratio; CI: confidence interval.

^aAll variables are included in the multivariate analysis.

^bReference level.

life, which limits social mobility (Kessler, Sonnega et al., 1995; Norris et al., 2003). In addition, other studies have shown association of unemployment with higher number of traumatic events (Karam et al., 2014). As our study focused on employed population, it is possible that women in Bangladesh who are unemployed, who we did not survey, are exposed to even higher number of traumatic events and PTSD prevalence might be higher among them.

Employers of this working population (e.g. factory owners) should be made aware about this health condition and its consequences. One study reported that 23.2% of individuals with PTSD reported severe impairment in work, 24.2% in home maintenance, 26.8% in relationships and 28.9% in social settings. They are at risk for other mental health disorders at an earlier age. That study also found that if a subject had experienced four or more traumatic events, they were more likely to have worse daily living (Karam et al., 2014). This should be of particular interest for the garment industry as the working women in this study experienced on an average of four or more traumatic events, meaning it is likely that many of these workers might have compromised working ability for their mental health conditions and this would reduce this industry's productivity making it difficult to stay competitive in this highly manual and labor intensive sector.

PTSD is a treatable health condition; the associated comorbid conditions (heart disease, chronic pain and arthritis) can be managed. Many of the external exposure and strain related to PTSD appear to be modifiable through improving economic determinants of health, creating social stability and social safety nets and improving law and order (Herrman & Swartz, 2007; Kessler et al., 2009; Ormel et al., 2007). Two mainstays of PTSD treatment are cognitive behavioral therapy and prolonged exposure therapy. Both involve a trained professional talking through the traumatic experience, with prolonged exposure needing the participant reporting in vivid detail about the traumatic

experience. Studies have shown that 64% of subjects with cognitive behavioral therapy and 68% with prolonged exposure achieve good functioning after 9 months (Resick, Nishith, Weaver, Astin, & Feuer, 2002). The regulators and policy makers in Bangladesh and other developing countries need to allocate resources and create training opportunities for health professionals for diagnosing and treating mental health conditions. Primary care physicians, hospitals and health NGOs should preferentially screen working-age younger women who are inherently at higher risk.

This study is likely underestimating the prevalence of certain traumatic events such as sexual assaults and abuse as well as PTSD rates due to difficulties in endorsing and reporting the symptoms to our translators. This was demonstrated by one participant asking at the end of the session not to share the results with her employers for fear of losing her job. Like translating any health survey questionnaires, translating the survey tools to Bengali for this study might have some inaccuracies. However, this should have been minimized as the team leader was a native Bengali speaker, the team had other Bengali researchers and data collectors as well, and there was extensive piloting of the translated surveys prior to administering it. In addition, the sampling method was not randomized; however, our researchers do not believe that this would significantly alter the results. Furthermore, the recent heightened level of international attention and scrutiny around garment-factory safety and work conditions in Bangladesh have made many factory owners and employers become critical of researchers in general. For this reason, a convenience sampling methodology was used for reasons of sensitivity and practicality.

Based on the study findings, we conclude that mental health conditions are highly prevalent among ES working women in developing countries and these may have serious consequences on their well-being, quality of life and working lives. These conditions including PTSD are likely

under-recognized in many countries where few resources are allocated for health surveillance and healthcare services and less awareness exists among healthcare professionals and care providers. Millions of factory workers are earning a barely living wage from Western outsourced industries. It would be in the best interest for the Western companies, donor and aid agencies and consumer groups to provide more resource and evidence support to improve the mental health along with physical health of these workers. This will ultimately benefit all stakeholders economically (in terms of productivity and profitability) by preserving a healthy workforce.

Ethical Approval

Ethical approval for this study was obtained from the School of Medicine at UT Health Science Center San Antonio, Texas and from the Centre for the Rehabilitation of the Paralyzed (CRP) in Bangladesh.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was supported by funding from the UT Health Science Center San Antonio's Global Health Program and Friends of CRP, Canada.

References

- Arnberg, F. K., Bergh Johannesson, K., & Michel, P. O. (2013). Prevalence and duration of PTSD in survivors 6 years after a natural disaster. *Journal of Anxiety Disorders*, 27, 347–352.
- Atwoli, L., Stein, D. J., Koenen, K. C., & McLaughlin, K. A. (2015). Epidemiology of post-traumatic stress disorder: Prevalence, correlates and consequences. *Current Opinion in Psychiatry*, 28, 307–311.
- Axinn, W. G., Ghimire, D. J., Williams, N. E., & Scott, K. M. (2013). Gender, traumatic events, and mental health disorders in a rural Asian setting. *Journal of Health and Social Behavior*, 54, 444–461.
- Begum, F. (2010). Harassment of women garment workers in Bangladesh. *Journal of the Bangladesh Agricultural University*, 8, 291–296.
- Blanchard, E. B., Jones-Alexander, J., Buckley, T. C., & Forneris, C. A. (1996). Psychometric properties of the PTSD Checklist (PCL). *Behaviour Research and Therapy*, 34, 669–673.
- Breslau, N., & Anthony, J. C. (2007). Gender differences in the sensitivity to posttraumatic stress disorder: An epidemiological study of urban young adults. *Journal of Abnormal Psychology*, 116, 607–611.
- Cardozo, B. L., Bilukha, O. O., Crawford, C. A., Shaikh, I., Wolfe, I., Gerber, M. L., & Anderson, M. (2004). Mental health, social functioning, and disability in postwar Afghanistan. *JAMA*, 292, 575–584.
- Fitch, T., Villanueva, G., Quadir, M. M., Sagiraju, H. K., & Alamgir, H. (2015). The prevalence and risk factors of post-traumatic stress disorder among workers injured in Rana Plaza building collapse in Bangladesh. *American Journal of Industrial Medicine*, 58, 756–763.
- Fitch, T. J., Moran, J., Villanueva, G., Sagiraju, H. K. R., Quadir, M. M., & Alamgir, H. (2017). Prevalence and risk factors of depression among garment workers in Bangladesh. *International Journal of Social Psychiatry*, 63, 244–254.
- Herrman, H., & Swartz, L. (2007). Promotion of mental health in poorly resourced countries. *The Lancet*, 370, 1195–1197.
- Hoge, C. W., Riviere, L. A., Wilk, J. E., Herrell, R. K., & Weathers, F. W. (2014). The prevalence of post-traumatic stress disorder (PTSD) in US combat soldiers: A head-to-head comparison of DSM-5 versus DSM-IV-TR symptom criteria with the PTSD checklist. *The Lancet Psychiatry*, 1, 269–277.
- Husarewycz, M. N., El-gabalawy, R., Logsetty, S., & Sareen, J. (2014). The association between number and type of traumatic life experiences and physical conditions in a nationally representative sample. *General Hospital Psychiatry*, 36(1), 26–32.
- Karam, E. G., Friedman, M. J., Hill, E. D., Kessler, R. C., McLaughlin, K. A., Petukhova, M., ... Koenen, K. C. (2014). Cumulative traumas and risk thresholds: 12-month PTSD in the World Mental Health (WMH) surveys. *Depression and Anxiety*, 31, 130–142.
- Kessler, R. C., Aguilar-Gaxiola, S., Alonso, J., Chatterji, S., Lee, S., Ormel, J., ... Wang, P. S. (2009). The global burden of mental disorders: An update from the WHO World Mental Health (WMH) surveys. *Epidemiologia e Psichiatria Sociale*, 18(1), 23–33.
- Kessler, R. C., Chiu, W. T., Demler, O., Merikangas, K. R., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey replication. *Archives of General Psychiatry*, 62, 617–627.
- Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry*, 52, 1048–1060.
- Keyes, K. M., McLaughlin, K. A., Demmer, R. T., Cerdá, M., Koenen, K. C., Uddin, M., & Galea, S. (2013). Potentially traumatic events and the risk of six physical health conditions in a population-based sample. *Depression and Anxiety*, 30, 451–460.
- Kodali, S. (2015). Depression in developing countries. *The Yale Global Health Review*. Retrieved from <https://yaleglobalhealthreview.com/2015/05/16/depression-in-developingcountries/>
- Lépine, J. P., & Briley, M. (2011). The increasing burden of depression. *Neuropsychiatric Disease and Treatment*, 7(Suppl. 1), 3–7.
- Miller, K. E., & Rasmussen, A. (2010). War exposure, daily stressors, and mental health in conflict and post-conflict settings: Bridging the divide between trauma-focused and psychosocial frameworks. *Social Science & Medicine*, 70(1), 7–16.
- National Comorbidity Survey. (2005). *NCS-R appendix tables: Table 1: Lifetime prevalence of DSM-IV/WMH-CIDI disorders by sex and cohort. Table 2: Twelve-month prevalence of DSM-IV/WMH-CIDI disorders by sex and cohort*. Retrieved from <http://www.hcp.med.harvard.edu/ncs/publications.php>
- Norris, F. H., Murphy, A. D., Baker, C. K., Perilla, J. L., Rodriguez, F. G., & Rodriguez Jde, J. (2003). Epidemiology of trauma and posttraumatic stress disorder in Mexico. *Journal of Abnormal Psychology*, 112, 646–656.

- Ormel, J., Von korff, M., Burger, H., Scott, K., Demyttenaere, K., Huang, Y. Q., ... Kessler, R. (2007). Mental disorders among persons with heart disease – Results from world mental health surveys. *General Hospital Psychiatry*, 29, 325–334.
- Resick, P. A., Nishith, P., Weaver, T. L., Astin, M. C., & Feuer, C. A. (2002). A comparison of cognitive-processing therapy with prolonged exposure and a waiting condition for the treatment of chronic posttraumatic stress disorder in female rape victims. *Journal of Consulting and Clinical Psychology*, 70, 867–879.
- Richardson, L. K., Frueh, B. C., & Acierno, R. (2010). Prevalence estimates of combat-related post-traumatic stress disorder: Critical review. *The Australian and New Zealand Journal of Psychiatry*, 44(1), 4–19.
- The World Bank. (2011). *GDP per capita, PPP (current international \$)*. Retrieved from http://data.worldbank.org/indicator/ny.gdp.pcap.pp.cd?order=wbapi_data_value_2014wbapi_data_valuwbapi_data_value-last
- The World Bank. (2014). *Bangladesh*. Retrieved from <http://data.worldbank.org/country/bangladesh>