

## BRIEF REPORT

# The Effect of Employment Status in Postdisaster Recovery: A Longitudinal Comparative Study Among Employed and Unemployed Affected Residents

Mark W. G. Bosmans<sup>1</sup> and Peter G. Van der Velden<sup>2,3</sup>

<sup>1</sup>Research Institute for Flexicurity, Labour Market Dynamics and Social Cohesion (Reflect), Tilburg University, Tilburg, The Netherlands

<sup>2</sup>International Victimology Institute Tilburg (INTERVICT), Tilburg University, Tilburg, The Netherlands

<sup>3</sup>NETHLAB, Tilburg University's Network on Health and Labor

Population studies have shown that employed adults are healthier than unemployed adults. In this study, we examined whether this “healthy worker effect” is relevant in postdisaster mental health by examining whether trauma-exposed employed individuals have lower postdisaster initial mental health problems and/or whether they recover faster than trauma-exposed unemployed individuals. We compared the course of postevent intrusion and avoidance reactions, anxiety, depression, and sleeping difficulties of employed residents ( $n = 291$ ) and unemployed residents ( $n = 269$ ) affected by a fireworks disaster in a residential area of Enschede, The Netherlands. Measurements took place at 2–3 weeks (T1), 18 months (T2), and 4 years (T3) postdisaster. We used linear mixed-effect models to examine the course of mental health problems. Employment status was relevant, to a degree, in posttrauma recovery; although affected employed residents had significantly lower levels of mental health problems (initially and over time) than the unemployed,  $d_s = 0.41$ – $0.72$ , the recovery rate was the same for both groups. At T1 (neglecting the *DSM* 1-month criterion), T2, and T3, the prevalence of probable posttraumatic stress disorder was 45.4%, 18.9%, and 11%, respectively, among employed individuals, and 70.1%, 32.5%, and 30% among unemployed individuals. We concluded that research into the mental health of disaster victims should take employment status into account. Regarding postdisaster care, unemployed individuals may need special attention; although they may recover at the same rate as employed individuals, they suffer from more severe mental health problems, even years after the disaster.

Research has demonstrated that adults react very differently to potentially traumatic events, such as traffic accidents, sexual and nonsexual violence, burglaries, and disasters. A variable minority will develop severe and ongoing mental health problems such as anxiety, depression, and posttraumatic stress disorder (PTSD) symptomatology (Bonanno, 2004; Breslau, 2002; Keane, Marshall, & Taft, 2006; Norris, Friedman, & Watson, 2002; Roberts, Gilman, Breslau, Breslau, & Koenen, 2011).

This study is part of a longitudinal study among adult victims of a fireworks disaster, which took place on May 13, 2000, in the city of Enschede in the Netherlands. We thank all respondents for their time and effort.

Correspondence concerning this article should be addressed to Mark W. G. Bosmans, Reflect, Tilburg University, Warandelaan 2, 5037 AB, PO Box 90153 Tilburg, The Netherlands. E-mail: m.w.g.bosmans@tilburguniversity.edu

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Authors of several studies have also shown that adjustment to traumatic events varies not only in terms of severity of mental health problems but also in terms of duration and rate of recovery (Bonanno, 2004; Bonanno & Mancini, 2012; Norris, Tracy, & Galea, 2009; Van der Velden, Wong, Boshuizen, & Grievink, 2013).

The question of why some victims suffer from ongoing and/or severe posttrauma mental health problems whereas others do not has led to a wide body of recent research. This research on risk and protective factors for adverse mental health outcomes that occur after potentially traumatic events has mainly focused on (a) the influence of different aspects of the affected person, such as mental health history, coping styles, personality, and demographics; (b) the specifics of the event, such as the number of casualties, perceived threat, and peritraumatic responses; and (c) an individual's environment, such as variables like social support, loneliness, and social context (Breslau, 2002; Brewin, Andrews, & Valentine, 2000; Ozer, Best, Lipsey, & Weiss, 2008; Vogt, Erbes, & Polusny, 2017). These studies have clearly demonstrated that the development and course of posttrauma mental health problems are complex and determined by multiple factors, but a reliable prediction of an individual's

posttrauma mental health problems in the short, medium, and/or long term is still in its infancy.

Remarkably, to date, no studies on trauma have systematically assessed whether being employed or having a job decreases the risk for postevent mental health problems at different stages postevent. Previous researchers have shown that employed individuals may benefit from resources related to work, including income, status, relationships, and esteem (Chen, Westman, & Hobfoll, 2015; Paul & Batinic, 2010), and thus may have more resources to help them cope with adverse events. In previous studies not dealing with trauma, authors have demonstrated that employed adults have fewer physical and mental health problems than the general adult population. For instance, meta-analyses by McKee-Ryan, Song, Wanberg, and Kinicki (2005) and Paul and Moser (2009) have shown that the average proportion of individuals with psychological problems is more than twice as high in unemployed groups as it is in employed groups. Because of the lower prevalence of physical and mental health problems among employed individuals, this effect is often called the “healthy worker effect” (e.g., Li & Sung, 1999; Agerbo, 2005).

Based on the outcomes of the meta-analyses by McKee-Ryan et al. (2005) and Paul and Moser (2009), it can be hypothesized that employed adult victims have significantly lower levels of postevent mental health problems as compared to those who are unemployed adult victims. As such, employment status may be a relevant factor in posttrauma recovery and represent an additional way to identify individuals who are at risk for adverse outcomes. If the differences between the health of the working population and the nonworking population extend to mental health outcomes in people who have survived traumatic events (such as disasters), nonworking survivors are a group that needs special attention in posttrauma care.

To the best of our knowledge, there are no longitudinal studies that have assessed and compared the course of postevent mental health problems in the short, medium, and long term among affected employed and unemployed victims of traumatic events, despite the fact that work status may be associated with posttrauma mental health. The aim of the present study was to fill this gap in scientific knowledge and determine if employment status is indeed relevant for the early identification of adults affected by potentially traumatic events. For this purpose, we extracted data from a three-wave longitudinal study conducted following the large-scale fireworks disaster that took place in May 2000 in a residential area in the city of Enschede in the Netherlands (see Method section). Based on the aforementioned findings, we hypothesized that affected employed adults would have significantly lower levels of posttrauma mental health problems than unemployed affected adults (i.e., that the so-called healthy worker effect would be present after these events). In addition, we examined whether affected employed adults would recover from their mental health problems faster than their unemployed counterparts (i.e., whether there would be a significant Group  $\times$  Time interaction effect). Given the resources related to working and their potential benefits for the

employed, we hypothesized that a significant interaction effect would be present.

## Method

### Participants and Procedure

Data were extracted from a research project on the Enschede fireworks disaster that was conducted on behalf of the Dutch Ministry of Health, Welfare, and Sports. The study design, procedures, participants, and outcomes of the nonresponse analyses have been previously described in detail by Van der Velden, Yzermans, and Grievink (2009). The disaster occurred in May 2000, and involved a series of explosions in a fireworks storage facility that was in the middle of a residential neighborhood. This technological disaster resulted in 22 fatalities and wounded approximately 1,000 people; among the deceased individuals were four firefighters. The study protocol was approved by the Medical Ethical Testing committee of TNO-Zeist, The Netherlands. Participants received a €12 (approximately \$15 USD) token gift at the time they took the second and third surveys. Surveys were administered to exposed adult residents at 2–3 weeks (Time 1 [T1]), 18 months (Time 2 [T2]), and 4 years (Time 3 [T3]) postdisaster. Response rates were 33.3%, 79.5% and 73.0% at T1, T2, and T3, respectively. Nonresponse analyses showed that nonresponse had little effect on the prevalence rates of mental health problems (Grievink, Van der Velden, Yzermans, Roorda, & Stellato, 2006). The same was true for loss to follow-up (Dijkema, Grievink, Stellato, Roorda, & Van der Velden, 2005). For the present study, we compared the course of mental health among employed affected adults (defined as those who worked 19 hr per week or more;  $n = 291$ ) with that of affected adults who were not active in the work force (including individuals who had lost their employment or those who were retired, disabled, or homemakers, but not students;  $n = 269$ ). We selected only those residents who were either employed or not employed at all three times of measurement.

### Measures

**Disaster exposure.** Disaster exposure was assessed at T1 using a list of 21 items that indexed experiences during or immediately after the disaster, such as “felt air pressure from the fatal explosion,” “experienced intense fear,” or “seen injured or dead people.” Participants were asked to respond yes or no, and responses were coded as 0 for no and 1 for yes.

**Posttraumatic stress symptoms.** We measured event-related intrusion and avoidance reactions using the original 15-item Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979), as the revised version (i.e., the IES-R) was not yet available in Dutch at T1. Previous studies of different traumatic events have proven the construct validity and reliability of the Dutch version of this instrument (Van der Ploeg, Mooren, Kleber, Van der Velden, & Brom, 2004). Cronbach’s

Table 1  
Descriptive Characteristics of the Sample

Characteristic	Employed ( <i>n</i> = 291)			Unemployed ( <i>n</i> = 269)			<i>p</i> <sup>a</sup>
	%	<i>M</i>	<i>SD</i>	%	<i>M</i>	<i>SD</i>	
Sex (male)	62.9			25.7			<.001
Education							
None/primary	5.3			22.3			<.001
Lower	26.0			50.0			
Intermediate	42.1			16.9			
Higher	26.7			10.8			
Exposure		11.05	5.25		10.78	5.18	.539
Age, years		38.67	9.45		51.84	13.46	<.001
IES							
T1		32.71	16.89		43.72	16.41	<.001
T2		17.47	16.90		26.47	18.20	<.001
T3		11.62	15.09		23.00	19.80	<.001
SCL-90-R Depression							
T1		27.13	11.79		32.32	13.28	<.001
T2		22.76	9.55		28.00	12.54	<.001
T3		21.69	9.25		26.95	12.82	<.001
SCL-90-R Anxiety							
T1		16.42	7.19		21.34	9.63	<.001
T2		13.80	5.92		17.79	8.13	<.001
T3		12.94	5.14		16.63	8.15	<.001
SCL-90-R Sleep Difficulties							
T1		6.64	3.56		8.00	3.72	.343
T2		5.16	2.81		6.82	3.43	<.001
T3		4.83	2.53		6.65	3.63	<.001

Note. T1 = Time 1; T2 = Time 2; T3 = Time 3; IES = Impact of Events Scale; SCL-90-R = Symptom Checklist-90-Revised

<sup>a</sup>Comparison between samples.

alpha values for the IES were high across all time points and for both samples ( $\alpha = .92-.95$ ).

**Anxiety, depression, and sleeping difficulties.** We assessed anxiety, depression, and sleeping difficulties using the appropriate subscales of the Dutch version of the Symptom Checklist-90-R (SCL-90-R; Derogatis, 1979). The validity and reliability of the Dutch version of this measure has been demonstrated (Arindell & Ettema, 1986). In the current samples and across all time points, the Cronbach's alpha values for the Anxiety ( $\alpha = .82-.94$ ), Depression ( $\alpha = .88-.95$ ), and Sleeping Difficulties subscales ( $\alpha = .73-.90$ ) were high.

### Data Analysis

We first assessed differences in demographics and study variables using *t* tests and chi-square statistics, and used Cohen's *d* for effect size. The courses of posttrauma mental health problems were analyzed using linear mixed-effect models. To rule out the possibility that differences in the course of problems between both groups could be attributed to expected differences in

demographics between employed and unemployed participants as well as possible differences in disaster exposure, we added these variables into our analyses as fixed effects. The models included random intercepts. The estimated fixed effects were age, sex, education, exposure, time, group, and Time  $\times$  Group interaction. Maximum likelihood estimation was used to deal with missing values for any of the study variables. Model fit was assessed using Bayesian Information Criterion (BIC). In model comparisons, the model with the lowest BIC is the better fitting model. We used IBM SPSS, version 23, to conduct all statistical analyses.

### Results

The descriptive characteristics of both groups are presented in Table 1. Our results showed that the average levels of mental health problems were significantly different at all three time points between groups, and the groups differed in demographic characteristics (see Table 1). Unemployed residents had significantly higher levels of posttraumatic stress, depression, and anxiety than employed residents. Effect sizes (Cohen's *d*) were

medium-to-large for posttraumatic stress,  $d_s = 0.51-0.67$ , and anxiety,  $d_s = 0.56-0.72$ ; and medium for depression,  $d_s = 0.41-0.45$ , at all waves and for sleeping difficulties,  $d_s = 0.53-0.59$ , at T2 and T3,  $d_s = 0.53-0.59$ ). To give an indication of the severity of mental health problems, we investigated the proportion of each group who scored above the commonly used IES cutoff score for probable PTSD of 35 or higher (Neal, Busuttill, Rollins, Herepath, & Turnbull, 1994; Wohlfarth, van den Brink, Winkel, & Ter Smitten, 2003). Among the employed residents, 45.4% scored above the cutoff at T1, 18.9% at T2, and 11.0% at T3. Among unemployed participants, the probable PTSD prevalence was 70.1%, 32.5%, and 30.0% at T1, T2, and T3, respectively.

Results of linear mixed-effects modeling showed that whereas both group membership (employed or unemployed) and the effect of time were significant, the interaction between time and group was not (see Tables 2 and 3). In other words, although mean symptom levels were different among employed and unemployed residents, the rate of recovery was similar for both groups. Longitudinal results were similar for posttraumatic stress, depression, anxiety, and sleeping difficulties. All other main effects in the analyses were significant, except for the effect of sex.

### Discussion

The goal of this longitudinal study was to examine to what extent employment status affects the course of posttrauma mental health problems. We assessed this using a sample of employed and unemployed adult victims of a large-scale disaster. Results of the comparisons between employed residents and unemployed residents indicated that employment status is relevant for posttrauma recovery. As hypothesized, unemployed residents suffered from higher levels of posttraumatic stress symptoms, anxiety, depression, and sleeping difficulties in the first weeks postevent, but also in the long term (i.e., both at 18 months and at 4 years postevent). However, the Time  $\times$  Group interaction effects were not significant, indicating that the rate in which symptom levels of depression, anxiety, sleeping problems, and PTSD declined over time was very similar for both groups. These findings signify two things: Employed residents did not recover at a swifter pace than those who were unemployed; however, the unemployed participants not only suffered from higher levels of mental health problems initially, but they continued to do so in the long term, even years after exposure. The difference in average symptom levels between the two groups did not diminish as time progressed. This could be the result of a higher baseline of mental health problems that were already present before the disaster or of a more severe reaction when a person was confronted with a traumatic event. To determine which scenario is true, additional research using pre-event measurements of mental health would be needed.

Another question is whether employment status helps to explain the differences in posttrauma recovery often found

Table 2  
Tests of Fixed Effects

	<i>df</i>	<i>F</i>	<i>p</i>
<b>Posttraumatic Stress</b>			
Intercept	1, 524.86	10.988	.001
Age	1, 523.87	5.708	.017
Sex	1, 526.87	3.157	.076
Education	3, 529.07	5.486	.001
Exposure	1, 527.96	65.192	<.001
Time	2, 715.22	388.692	<.001
Group	1, 526.81	16.213	<.001
Time $\times$ Group	2, 715.18	.799	.450
BIC (BIC 0-model)		12713.10 (13256.67)	
<b>Depression</b>			
Intercept	1, 533.66	156.750	<.001
Age	1, 533.59	13.151	<.001
Sex	1, 534.77	2.681	.102
Education	3, 534.43	2.923	.033
Exposure	1, 533.77	41.827	<.001
Time	2, 702.32	70.463	<.001
Group	1, 535.09	33.419	<.001
Time $\times$ Group	2, 702.33	.096	.909
BIC (BIC 0-model)		11410.86 (11890.58)	
<b>Anxiety</b>			
Intercept	1, 530.07	147.355	<.001
Age	1, 530.87	12.273	<.001
Sex	1, 527.70	.499	.480
Education	3, 528.44	3.330	.019
Exposure	1, 527.83	47.201	<.001
Time	2, 720.54	84.942	<.001
Group	1, 528.06	47.275	<.001
Time $\times$ Group	2, 720.56	1.506	.223
BIC (BIC 0-model)		10241.54 (10718.16)	
<b>Sleeping Difficulties</b>			
Intercept	1, 536.30	52.255	<.001
Age	1, 535.28	.181	.671
Sex	1, 535.96	2.055	.152
Education	3, 535.89	3.389	.018
Exposure	1, 535.28	51.141	<.001
Time	2, 765.29	71.794	<.001
Group	1, 535.38	14.208	<.001
Time $\times$ Group	2, 765.29	2.039	.131
BIC (BIC 0-model)		7824.05 (8190.70)	

Note. BIC = Bayesian information criterion.

between affected civilians and rescue workers (e.g., Norris, Friedman et al., 2002; Zhang et al., 2016). Rescue workers are often mostly healthy and relatively young individuals. As such, they are generally considered to be a healthier group than the general population, just as the working population has been found to be healthier than the general population (e.g., Van der Velden et al., 2013). The fact that rescue workers are healthier as

Table 3  
Parameter Estimates

	Posttraumatic Stress			Depression			Anxiety			Sleeping Difficulties		
	B	95% CI	p	B	95% CI	p	B	95% CI	p	B	95% CI	p
Intercept	23.61	[16.72, 30.49]	< .001	34.46	[29.59, 39.33]	< .001	21.61	[18.54, 24.67]	< .001	5.68	[4.33, 7.04]	< .001
Age	0.13	[0.02, 0.24]	.017	-0.14	[-0.22, -0.07]	< .001	-0.09	[-1.33, -0.04]	< .001	0.01	[-0.02, 0.03]	.671
Sex (male)	-2.30	[-4.83, 0.24]	.076	-1.50	[-3.30, 0.30]	.102	-0.41	[-1.54, 0.72]	.480	-0.37	[-0.86, 0.14]	.152
Education (no/primary)	8.16	[3.78, 12.54]	< .001	2.43	[-0.67, 5.52]	.124	2.10	[0.15, 4.04]	.035	0.97	[0.107, 1.824]	.028
Education (lower)	3.51	[0.19, 6.82]	.038	-1.31	[-3.67, 1.04]	.274	-0.05	[-1.54, 1.43]	.943	0.38	[-0.27, 1.04]	.251
Education (intermediate)	0.56	[-2.754, 3.874]	.740	-1.133	[-3.489, 1.223]	.345	-0.78	[-2.26, 0.70]	.300	-0.28	[-0.93, 0.38]	.411
Exposure	0.92	[0.69, 1.14]	< .001	0.52	[0.36, 0.68]	< .001	0.35	[0.25, 0.45]	< .001	0.16	[0.12, 0.20]	< .001
Time 2	-16.39	[-18.41, -14.37]	< .001	-3.99	[-5.14, -2.85]	< .001	-3.40	[-4.19, -2.61]	< .001	-1.14	[-1.49, -0.78]	< .001
Time 3	-20.11	[-22.36, -17.86]	< .001	-5.02	[-6.41, -3.63]	< .001	-4.41	[-5.33, -3.48]	< .001	-1.23	[-1.63, -0.83]	< .001
Group (employed)	-6.33	[-9.75, -2.91]	< .001	-6.07	[-8.42, -3.72]	< .001	-5.32	[-6.81, -3.82]	< .001	-0.85	[-1.51, -0.19]	.012
Time 2* Employed	1.09	[-1.65, 3.83]	.434	-0.31	[-1.86, 1.24]	.694	0.85	[-0.22, 1.92]	.119	-0.31	[-0.79, 0.18]	.222
Time 3* Employed	-0.61	[-3.68, 2.47]	.699	-0.38	[-2.26, 1.51]	.695	0.98	[-0.27, 2.24]	.125	-0.56	[-1.11, -0.02]	.044

Note. Reference categories for categorical variables: sex = female, education = higher, group = unemployed, time = T1.

a group is often seen as one of the main reasons there is a lower mental health burden among them as compared to the general population; additional explanations, such as intensive training, self-selection, and mental preparation, have also been given to explain postdisaster outcomes among rescue workers (Dyregov, Kristofferson, & Gjestad, 1996; North et al., 2002). It would be interesting to examine to what degree their employment status is responsible for this. It is possible that if rescue workers were compared to employed civilians only, the differences in mental health outcomes would be smaller, or they would even disappear. A secondary finding that should be discussed, although it was not a research question in the present study, is the lack of effect sex had on mental health levels among participants in our sample. Although disaster studies often find higher PTSD levels among female victims (e.g., Galea, Nandi, & Vlahov, 2005; Norris, Foster, & Weisshaar, 2002), this is far from a universal finding (e.g., Bosmans, Benight, Van der Knaap, Winkel, & Van der Velden, 2013; Stuber, Resnick, & Galea, 2006).

We assessed the healthy worker effect in the perspective of posttrauma recovery among a large sample of disaster victims. Future research is warranted to assess the extent to which the differences and similarities found between employed and unemployed affected residents can be generalized to victims of other potentially traumatic events, such as traffic incidents, intimate partner violence, and terrorist attacks. Although we used well-validated measures and questionnaires, a possible limitation of the current study is that we did not conduct clinical interviews or assess clinician-rated symptoms. The unemployed sample in this study was a mixed group that included individuals who were unemployed and looking for work, retirees, and homemakers. Due to cell count limits, we were not able to assess and compare the course of posttrauma mental health problems for these subgroups. However, this is common practice when investigating the healthy worker effect: The control groups are generally unemployed, general population samples (e.g., Agerbo, 2005; Li & Sung, 1999).

In addition to the limitations described, this study had important strengths, such as the longitudinal design, the long-term follow-up, and the use of several different mental health outcomes used to investigate the effect of employment status in posttrauma recovery. Future research on the mechanisms behind the effect of employment in the light of posttrauma recovery is warranted, such as the role of social capital, financial resources, sense of purpose, and other benefits of employment.

Employment status is relevant in posttrauma recovery, yet only to a degree. Although workers have better posttrauma mental health levels—both initially and over time—the rate of recovery is the same for employed and unemployed individuals, which indicates enduring worse mental health problems among the unemployed. Results have implications for both research and policy. Research into the mental health of disaster victims should take employment status into account. The clinical implication of these findings is that the unemployed are

a group that needs special attention and monitoring, as on the group level they suffer from a greater degree of mental health problems than the general public. Differences in mental health did not disappear or diminish in this group, even years postevent. Targeted mental health care might help this vulnerable group recover more quickly after future mass traumatic events.

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