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Citation:
Lassemo, E. & Sandanger, I. (2018). Potentially traumatic events as predictors of disability pension: A 10-year follow-up study in Norway. Scandinavian Journal of Public Health, 46(3), 340-346. https://doi.org/10.1177/1403494817722925

Potentially traumatic events as predictors of disability pension: a 10-year follow-up study in Norway

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Abstract

Aims

Are potentially traumatic events associated with subsequent disability pension? Traumatic exposure and post-traumatic stress disorder (PTSD) may represent a disabling state with both personal and professional consequences for the affected individual. Despite this, there is a scarcity of research studying effects of traumatic exposure on disability pension. This study examined the differences in risk for disability pension among unexposed, exposed to trauma and PTSD-cases.

Methods

An ambidirectional Norwegian cohort study, consisting 1238 individuals aged 18-66 years who were at risk for disability pension, were interviewed using the Composite International Diagnostic Interview (CIDI), and linked with registry data on disability pension. Registry follow-up in the Norwegian Insurance Database lasted ten years following interview in 2000-01. The risk of disability pension after traumatic exposure, divided into accidental and premeditated, was assessed by Cox proportional hazards regression analysis.

Results

In 10 years, 9.5% of the cohort had been granted disability pension. Overall exposure to traumatic events did not alter the risk of disability pension. However, among women, exposure to premeditated traumas did increase the risk (HR 2.96 (95% CI 1.54-5.68)), and was an independent risk factor. Fulfilling criteria for PTSD caseness further increased the risk (HR 4.69

(95% CI 1.78-12.40)). There was no increased risk found between traumatic exposure and disability pension for men.

Conclusion

Exposure to trauma, particularly premeditated trauma, seems to be an independent risk factor for, disability pension for women.

Keywords

Epidemiology, PTSD, trauma, disability pension

Declaration of interest

None.

Introduction

Potentially traumatic events (PTEs) are events that may be perceived and experienced as life threatening or dangerous by the individual affected. Such events are component causes for the post-traumatic stress disorder (PTSD) diagnosis, i.e. necessary, but not sufficient [1]. While exposure to PTEs is common [2-4], few exposed ever meet PTSD diagnostic criteria [2, 5]. Some exposed to PTE develop other psychiatric disorders [6, 7]. Additionally, PTE has repeatedly been found to predict both somatic illness [8]and disability [9, 10]. Gender differences in PTE exposure (more men experience PTE) and PTSD caseness (more women develop PTSD) are persistent [2], as are awards of disability pension (DP) (in Norway, approximately 11% women, 7.7% men) [11].

PTSD, as defined by diagnostic criteria [1], may represent a disabling state with both personal and professional consequences for the affected individual [5]. PTSD has a large life-time comorbidity with other psychiatric disorders [12]. In an earlier study, using the same population [13], we found that the sub-population of women exposed to PTE had significantly more pre-existing psychiatric disorders (depression, anxiety and/ or somatoform disorder) prior to trauma.

Mental health problems have gradually become a leading cause of DP. In Norway, 32% of incident DPs in 2013 (men 38%, women 30%) were based on psychiatric disorders [11]. This in accordance with reports from the Organization for Economic Cooperation and Development (OECD) stating that mental health problems account for, on average, one-third of incident DPs [14]. Psychological distress may not only cause psychiatric diagnoses specific DP, but has repeatedly been found to predict all-cause DP award [15-17]. Even though DP is medically defined, non-medical states may be risk factors [18].

Associations between DP and depression and anxiety [15] in a Norwegian study, and severe depressive symptoms [17] in a Danish study, has been reported. In a previous study, we found an increased risk for DP for both current- and life-time depression [13]. Non-significant increased risk for DP among women having been exposed to violence or sexual harassment at the work place has been found [19]. The effect of traumatic exposure on disability pension has thus far received little attention in the literature.

The specific aim of the present study was to assess differences in risk for subsequent DP among the PTE unexposed, PTE exposed, and PTSD cases. All by gender, and using a random Norwegian population sample.

Method

Study population

This study is an ambidirectional (with both retrospective and prospective components) cohort study utilizing a population sample with retrospective data collection and prospective registry follow-up. The data stems from the longitudinal OsLof population study examining mental health. The study sites, a borough of the capital Oslo and the Lofoten municipalities, together are representative of Norway. Statistics Norway (SSB) drew a random, representative sample of 2727 individuals ages 18 and above in 1989 (T_0), and a random supplement sample of 1000 in 2000 (T_1). Of 2727 potentially eligible individuals at T_0, 2014 (74%) were interviewed and thus became study participants. Of these, 1300 (64%) participated at T_1. From the 2000 (T_1) supplement, 525 individuals were eligible, resulting in 391 (74%) additional study participants. Hence, the cohort at T_1 consisted of 1,691 individuals.

Exclusion criteria for this study were incomplete interview (n=57), not providing consent to follow-up (n=10), not at risk for DP during T_1-T_2 (age 67+; n=236, on DP; n=150). The cohort for the present study consisted of 1238 individuals (641 women, 597 men). The OsLof study and its study population is presented in detail in Sandanger et al. [20].

The CIDI

To obtain accurate diagnoses based on ICD-10 criteria an updated electronic version – CIDI-M 1.1, of the Composite International Diagnostic Interview (CIDI) [21] was used. Health professionals and students, trained according to the formal CIDI training program, conducted the diagnostic interviews as part of the T_1 interviews. . Age at onset for first and last episode of disorder/ symptom was recorded with date of event. The CIDI maps symptoms throughout the

respondents' lifetime up to interview. The ICD diagnostic algorithms were derived from DSM-IV criteria.

Potentially traumatic events

A traumatic event is "an experience that causes physical, emotional, psychological distress, or harm" [22], a significant threat to physical or psychological wellbeing. As identical events may have severely different impact from person to person, the term 'potentially traumatic event' was used to convey this.

Based on earlier research [2], potentially traumatic events were categorized into accidental (war event, natural catastrophe, serious accident, witnessing potentially traumatic events happen to others, and verbal threat/ violence from non-close relation) and premeditated (physical threat (weapon), rape, sexual abuse as a child, imprisoned, taken hostage or kidnapped, and verbal threat/ violence from close relation).

Post-traumatic stress disorder

Exposure to traumatic event along with subsequent symptomatology was recorded through the CIDI interview. A questionnaire containing eight given traumas and an open "other" was presented study participants. Disorders with full positive criteria were included. Caseness of fulfilling diagnostic criteria was reported as PTSD (ICD-10 code F43.1).

The Norwegian Insurance Database

The self-reported data were linked with registry data on disability pension from the Norwegian Insurance Database (FD-Trygd). The follow-up period was continuous from T_1 throughout year 2010 (T_2). FD-Trygd contains disability information for every citizen in Norway since 1992 (prior DP status is known, but not dated), additionally data on emigration and death. The Norwegian Labour and Welfare Administration linked interview data with registry data.

In Norway, DP shall sustain income if the individual's wage earning capacity has been permanently impaired by at least 50% due to illness or injury. Wage earning capacity in all work, in which the individual currently may perform, is compared to that prior to the illness or injury. Only medical ailment, not economic or social difficulties, is considered in the DP process [23].

An individual is eligible to be evaluated for DP when s/he has been on sick leave for 12 consecutive months, and has undergone medical treatment and/ or employment schemes [24].

Adjustment factors

Age in years at T_1. *Educational attainment,* obtained from Statistics Norway at T_1, classified as mandatory (grades 0-9), intermediate (high school) and higher education (college or university). . *Alcohol consumption* dichotomized into healthy- and hazardous drinking habits using the WHO alcohol consumption scale with cut-off at 11 [25]. *Somatic illness* assessed at T_1. All respondents were asked whether they had or had had any given somatic illness affecting activities of daily living or work during the last year prior to T_1. Those answering positively to one or more illnesses, and confirming its severity during the previous 12 months, were coded as having somatic illness. The *Hopkins Symptom Checklist-25 (HSCL-25)* is a 25 item, four point likert scale symptom inventory measuring symptoms of depression and anxiety [26]. Scores >= 1.75 were case level, and scores between 1.55 and 1.75 were sub-case level.

Statistical analysis

The inclusion date was date of interview at T_1. The study outcome was DP award. Respondents were followed up to DP, and were censored at end of follow-up (December 31, 2010), age retirement (67 years), death or emigration. Descriptive analyses were conducted on characteristics of the study population. All results were weighted by gender and age to reflect the composition of the Norwegian population in 2000, i.e. adjusting them for difference in response rate. Age was categorized into four; 18-34, 35-49, 50-65 and 66+.

Potential causation between categories of traumatic exposure and DP were estimated using Cox proportional hazards regression, and reported as hazard ratios (HRs) with 95% confidence intervals (95% CIs). The analyses were stepwise adjusted for demographic and health variables. The Cox regressions were performed separately for no-trauma, trauma and PTSD with DP, and accidental vs. premeditated PTE with DP. Statistical analyses were performed using survey data commands svy for STATA, version 14.1.

Ethical aspects

This study was approved by the Norwegian Social Science Data Services (NSD). Permission to link interview data with registry data was requested and granted at time of interview.

Results

The sample had an underrepresentation of persons 18 – 34 years of age and an overrepresentation of persons 35 – 65 years of age, as compared with the Norwegian population. Inverse probability weighting adjusted for this. All reported results are weighted.

Baseline statistics are presented in Table 1. Overall, 9.5% (12.5% women and 6.7% men) were awarded DP during follow-up. Even though significantly fewer women (20.5%) than men (25.1%) were PTE exposed, there was no significant gender difference in PTE exposure among those awarded DP (27.3% and 25.3%, respectively). Of those PTE exposed, 22.4% and 5.0%, respectively, filled PTSD diagnostic criteria, and 16.7% and 6.8%, respectively, were awarded DP. Among women, 38.6% of those awarded DP filled diagnostic criteria for PTSD. In the sample, and thus in the results, no men filling diagnostic criteria for PTSD were awarded DP.

Traumatic events occurred from 2 to 50 years (wider spread for women than for men), with mean and median both of 25, prior to DP award. Maximum follow-up was 10.5 years, with a mean of 8.8 years and in total 10,940 person-years.

[Table 1 about here]

In the total sample, before excluding those not at risk for DP at T_1, 19.9% received DP by the end of follow-up. This is twice the 9.5% receiving DP amongst those at risk during follow-up (T_1 – T_2). The majority (57%) of those receiving DP following PTE exposure did so before the follow-up commenced.

Differences in Risk for DP among PTE Unexposed, PTE Exposed and PTSD Cases

With those unexposed to PTEs as reference, overall exposure to PTEs was not a risk for DP. This holds for both genders (Table 2, top panel). Among women, PTSD cases had a heightened risk of DP with an HR of 3.37 (95% CI 1.41-8.04) in the age-adjusted model. As factors, educational attainment, somatic illness, hazardous alcohol consumption, HSCL-25 score, were added to the model, the association attenuated, but remained significant. Among men, there was no difference in the risk for DP between the PTE unexposed and PTE exposed. No men having PTSD were awarded DP during the follow-up. For both women and men, older age and higher education

reduced the risk for DP, somatic illness increased the risk for DP. For men, HSCL-25 caseness was significant, with higher scores a risk for DP. Hazardous alcohol consumption had no effect.

For women, with those unexposed to PTEs as reference category, exposure to premeditated PTEs was associated with a heightened risk for DP with an HR of 2.44 (95% CI 1.29-4.59) in the age-adjusted model (Table 2, bottom panel). As factors, educational attainment, somatic illness, hazardous alcohol consumption, HSCL-25 score, were added to the model, the association attenuated, but remained significant. Contrary, exposure to accidental PTEs was not associated with DP. For men, no difference in the risk for DP between the PTE unexposed and those exposed to different categories of PTE was found. Again, for both women and men, older age and higher education reduced the risk for DP, somatic illness increased the risk for DP. For men, HSCL-25 caseness was significant, with higher scores a risk for DP. Alcohol consumption had no effect. For those few exposed to both accidental- and premeditated PTE, there were no significant results. There was no linearity between number of traumas experienced and DP.

Further probing into our data revealed that among women having experienced premeditated PTE, psychiatric diagnoses were the most common causes for DP. Concurrently, women having experienced accidental PTE, were most frequently granted DP based on musculoskeletal diagnoses. We saw a similar pattern among men (data not shown).

[Table 2 about here]

Discussion

Having experienced premeditated trauma and filling diagnostic criteria for PTSD predicted DP award among women in the Norwegian work force. Adjusting for demographic variables and health attenuated the risks, but they remained significant.

Main findings

Studying the literature, the path from PTE to DP goes through both mental and physical illness [8, 13, 15, 17, 27]. We found no increased risk from overall PTE exposure on DP, but women with a history of premeditated PTE had an increased risk for DP, adjusted for age, education,

somatic illness, alcohol consumption and psychiatric distress as measured by the HSCL-25. PTE was a risk factor not only for psychiatric-, but also for somatic conditions [27].

As reported in an earlier paper [2], women were to a greater extent than men exposed to premeditated PTEs. Recent studies have shown detrimental effects on children and women from premeditated traumas [6, 28].

Particularly among women, it was less common to report both accidental and premeditated traumas, and few of those who did were awarded DP. The risk for DP did not increase with number of PTEs, but with certain types (premeditated) of PTEs.

That no men PTSD cases were being awarded DP during follow-up might be attributable to that mainly young individuals got PTSD diagnosis, and this happened when the cohort was younger, i.e. before follow-up commenced.

Duration from trauma to DP might impact the outcome. One could argue that a recent trauma bothers the individual more. Contrary, one could argue that a distant trauma, for some reason kept alive or re-awakened, bothers the individual more. The latter is probably the case when having been e.g. abused or maltreated as a child [6, 28]. Also worth considering is that equally severe traumas may be perceived quite differently by different individuals, and thus cause different long-term health outcomes.

We found increasing age to reduce the risk of DP in PTE exposed and PTSD cases. This contrary to the general conception considering increasing age a risk factor for DP, but well-known regarding the mentally disabled, who almost all get their DP at an early age. Including those who received DP following PTE exposure, but before the follow-up commenced (T_1 in 2000), more individuals received DP prior to T_1, when the cohort was younger, than in the decade following T_1. This indicated that the risk for DP following PTE was higher at younger age. In an earlier study on the same population [2], we found exposure to premeditated events occurring at a younger age than accidental events, and men to be exposed to PTE at a younger age than women. Furthermore, we found that the incidence of PTSD tapered off from age 40. It seemed the damaging effects of PTE decreased with age. The results suggested that resilience might be acquired through life experience and maturing. Similarly, older individuals are typically in a

more established social network and work situation, making adaptations facilitating them to remain in the workforce easier than for younger individuals. It is thus natural that DP is awarded at a younger age for those exposed to PTE.

Strengths and limitations

This ambidirectional cohort study of 1238 working-age, at risk, members of the general population provided an unprecedented opportunity to study the effect traumatic exposures and PTSD diagnosis have on subsequent DP award. The combination of a retrospective cohort, a broad interview and prospective registry follow-up, facilitated the study of events as they appeared on the individuals' timeline utilizing survival analysis. Where previous studies tend to be disaster centred, and thus focused on a limited segment of the population, the present study's use of a randomly selected, representative cohort should make the results generalizable. The high participation rates (74%), add to generalizability.

While older people often have been excluded from mental health general population studies[27], this study set no upper age limit, other than retirement age 67 years. As physical, as well as mental, health challenges may follow PTE exposure [8], the outcome studied was all-cause DP.

Educational attainment served as proxy for workload and socioeconomic status (SES). Work environmental risk factors for DP previously identified, such as mental job strain, non-stimulating work, low decision latitude, high demands, and lack of social support from supervisors [19], have not been specifically considered. Educational attainment seemed to have equal effect on the outcome as workload and SES were expected to have. Less education predicted more DP and probably reflected established risk factors at work and lower SES.

The width of the confidence intervals (CI) is a marker for the precision level of the results. In search of differential effects from PTE in subgroups (gender, PTE categories, PTSD diagnosis), the CIs will include a wider range of HRs as possible outcomes. With this in mind, the present findings of particularly premeditated PTEs' effect on DP still seem important.

As we discovered that the majority (57%) of those receiving DP following PTE exposure did so before the follow-up commenced, this study might underestimate the true effect of PTE on DP.

Non-participant bias is a concern. This study population, as most epidemiological studies, has a slight selection bias towards being healthier than the general population [29]. Therefore, our results likely underestimated the occurrence of PTSD and DP. As stated in an earlier study [13], we found a lower incidence rate of DP in the study population than what occurred in the general population, also indicating a selection of healthier individuals.

In later years there has been an influx of migrants and refugees having experienced traumatic exposure. Thus, the share of the population who potentially will experience negative health outcomes based on PTE has increased, and our results will likely underestimate the true occurrence today.

During the lifetime of our study participants, up to end of follow-up, Norway saw no major terrorism, with exception of WWII (1940-45). Additionally, Norway had low rates of criminal violence. Natural catastrophes have been limited to avalanches and rock slides. There have been a number of shipwrecks and other industry related accidents throughout the period.

Implications

This study directs attention towards a potential for reduction in incident DP. To learn more about the effects of PTE exposure and PTSD caseness on DP, future studies should be done at a greater scale. E.g. register studies could be conducted, forming a cohort of PTE exposed general practitioner (GP) patients and following them prospectively in patient- and social services registries.

To conclude, this study showed that PTE, and particularly premeditated trauma, implied a significant risk of not only psychiatric disorders, but also DP, particularly among women. The implication of this is that one has to contemplate how to prevent in particular premeditated PTE exposure and be vigilant in supporting those exposed.

Acknowledgements

We are grateful to all those who took part in this study, and the interviewers collecting the data. The authors thank Tom Sørensen, University of Oslo, Knut Sørgaard and Guri Ingebrigtsen, Nordland Hospital, Jan F. Nygård (JFN), the Norwegian Cancer Registry, for contribution to study design and implementation of data collection. JFN for statistical guidance.

Conflict of interest statement

Authors have none to declare.

Funding

The study was funded by the Research Council of Norway.

Author contributions

EL participated in analysis and interpretation of data, and drafting and critical revisions for intellectual content. IS participated in conception and design of the study, analysis and interpretation of data, and drafting and critical revisions for intellectual content. Both authors approve of the final version to be published.

Conference presentations

Results from the present study have in parts been presented at the following conferences: The 8th psychiatric health congresses, January 23rd -25th , 2017. Trondheim, Norway. The 18th EPA Section Meeting in Epidemiology & Social Psychiatry, November 30th - December 3rd, 2016. Gothenburg, Sweden. The 23rd Norwegian Epidemiology Conference, September 26-27, 2016. Bergen, Norway.

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TABLE 1.

Characteristics of the Study Population (N=1238) at baseline interview 2000-01 (T_1), weighted to reflect national number, in %, unless otherwise noted.

	All		***PTSD=1***		***DP=1***	
Characteristics	*Women (N=641)*	*Men (N=597)*	*Women (N=27)*	*Men (N=6)*	*Women (N=89)*	*Men (N=51)*
Age (mean, 95% CI)	40.2 (39.2-41.2)	40.6 (39.6-41.6)	36.5 (32.8-40.2)	34.7 (26.8-42.5)	47.8 (44.9-50.7)	53.5 (52.1-54.8)
PTE exposure	20.5	25.1 ♂	100.0	100.0	27.3	25.3
Trauma type given PTE exposure						
Premeditated	48.5 ♀	25.3	66.7	79.0 *	59.4 ♀*	23.0
Accidental	34.6	51.0 ♂	2.3 *	10.7 *	26.2	69.5 *
Both	15.3	22.6 ♂	31.1 *	10.4	14.5	7.6 *
PTSD given PTE exposure	22.4 ♀	5.0	100.0	100.0	38.6 *	0
DP award	12.5 ♀	6.7	28.8 *	0	100.0	100.0
DP given PTE exposure	16.7 ♀	6.8	28.8	0	100.0	100.0
Hscl-25 score						
<1.55	77.9	83.6 ♂	31.2 *	54.3	58.8 *	70.8 *
>=1.55 x <1.75	9.2	6.8	25.6 *	-	14.6	11.8
>=1.75	12.9	9.6	43.2 *	45.8 *	26.6 *	17.4
Somatic illness	34.2	31.8	41.0	33.2	63.1 *	62.7 *
Educational attainment						
Mandatory	10.7	15.0 ♂	8.8	33.2	20.2 *	29.5 *
Intermediate	58.1	56.3	66.5	56.1	65.2	54.9
Higher education	31.2	28.7	24.6	10.7	14.6 *	15.6 *
Hazardous drinking behaviour	12.1	32.0 ♂	9.0	33.5	7.3	14.7 *

♂ /♀ Gender difference at p<=0.05

* Difference from "all" at p<=0.05

Table 2.

HRs with 95% CI for disability pension according to exposure group and gender. Weighted to reflect the Norwegian population at baseline.

	Model 1		**Model 2**		**Model 3**	
	Women	Men	Women	Men	Women	Men
	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)
Unexposed	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
PTE exposed	1.34 (0.78 - 2.31)	0.96 (0.51 - 1.82)	1.34 (0.78 - 2.31)	1.00 (0.53 - 1.91)	1.37 (0.79 - 2.39)	0.78 (0.38 - 1.59)
PTSD cases	3.37* (1.41 - 8.04)	-	4.13* (1.79 - 9.53)	-	3.10* (1.35 - 7.14)	-
Unexposed	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Premeditated[a] PTE	2.44* (1.29 - 4.59)	0.96 (0.27 - 3.39)	2.55* (1.36 - 4.77)	0.93 (0.25 - 3.41)	2.37* (1.26 - 4.47)	0.50 (0.10 - 2.46)
Accidental PTE[b]	1.15 (0.54 - 2.48)	1.17 (0.56 - 2.42)	1.27 (0.59 - 2.71)	1.18 (0.56 - 2.48)	1.33 (0.62 - 2.84)	1.12 (0.51 - 2.43)
Both PTE groups	1.64 (0.40 - 6.69)	0.32 (0.04 - 2.44)	1.55 (0.38 - 6.38)	0.40 (0.05 - 3.19)	1.30 (0.35 - 4.89)	0.23 (0.03 - 1.90)

Model 1: Adjusted for age

Model 2: Adjusted for age and educational attainment

Model 3: Adjusted for age, educational attainment, somatic illness, hazardous alcohol consumption and HSCL-25 score

[a] (physical threat (weapon), rape, sexual abuse as a child, imprisoned, taken hostage or kidnapped, and verbal threat/ violence from close relation)

[b] (war event, natural catastrophe, serious accident, witnessing potentially traumatic events happen to others, and verbal threat/ violence from non-close relation)

* $p<0.05$