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Brief Report

Depression, Anxiety, and Traumatic Stress Symptoms among Emergency Service Workers in Finland after a Post-Critical Incident Seminar—A Pilot Study

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Abstract: Emergency service workers encounter potentially traumatic incidents as part of their normal work duties. They are, therefore, at an increased risk of symptoms of poor mental health. In the past, post-critical incident seminars (PCIS) were offered to police officers in Finland who had suffered mental health consequences from a critical incident at work. Recently, the same seminar has been offered to emergency service workers in Finland. In this pilot study, the effects of PCIS on the symptoms of depression, anxiety, and traumatic stress are tentatively mapped using self-assessment inventories. Fifteen emergency service workers who attended a PCIS in April 2021 filled out the inventories at the beginning of the PCIS and one, three, and six months after the PCIS. All symptoms measured in this study (depression, anxiety, and traumatic stress) decreased after the PCIS, but the clearest decrease was observed in traumatic stress symptoms. Future similar research should use a control group and a larger sample, track mental health symptom scores over a longer period, and compare qualitative and quantitative data to contribute to a richer understanding of this issue.

Keywords: depression; anxiety; traumatic stress; post-critical incident seminar; firefighter; paramedic

Citation: Korpela, S.; Nordquist, H. Depression, Anxiety, and Traumatic Stress Symptoms among Emergency Service Workers in Finland after a Post-Critical Incident Seminar—A Pilot Study. *Psych* **2023**, *5*, 53–59. https://doi.org/10.3390/psych5010006

Academic Editor: Nicola Magnavita

Received: 17 November 2022
Revised: 28 December 2022
Accepted: 24 January 2023
Published: 27 January 2023

1. Introduction

Emergency service workers, such as firefighters and paramedics, have an on-call duty to respond to emergencies in various locations and situations that are not always under their control. This puts them under exceptional stress and may expose them to traumatic incidents, which can negatively impact their mental health. PTSD, depression, and anxiety are significantly more prevalent among firefighters [1] and paramedics [2] than in the general population.

Symptoms of depression, anxiety, and traumatic stress can often co-exist. Traumatic stress symptoms are often reported under a diagnosis of post-traumatic stress disorder (PTSD). Symptoms of PTSD and depression have also been linked to higher anxiety sensitivity [3], which, along with emotion dysregulation, has, in turn, been linked to symptoms of post-traumatic stress, depression, and social anxiety [4]. However, some studies also found that, despite frequent exposure to potentially traumatic incidents, individuals in the early years of a firefighting career may not yet experience high rates of mental health disorders [5].

Post-critical incident seminars (PCIS), as a part of Critical Incident Stress Management (CISM) Program, were originally developed to support Federal Bureau of Investigation (FBI) police officers who have been exposed to critical incidents during work in the form of a four-day seminar that is open for spouses too [6]. Participants receive peer support, psychoeducation about trauma, and coping strategies, and eye movement desensitization and reprocessing (EMDR) as follow-up support and promotion for resolution [6]. Currently, PCIS are offered in several locations, primarily in the United States. In Finland, PCIS in

a modified form have been offered regularly to police officers since 2010. The first PCIS for emergency service personnel in Finland, which was modified from the original setup but included peer support, psychoeducation, and support sessions/EMDR provided by a psychotherapist in the form of a three-day seminar and without spouses, took place in 2019. To measure the effects of the PCIS, we examined changes in depression, anxiety, and traumatic stress symptom scores among emergency service workers before and after they participated in a PCIS in Finland in 2021.

2. Materials and Methods

This descriptive four-timepoint follow-up pilot study is a part of a research project, which aims to investigate the effectiveness of PCIS among emergency service workers.

In Finland, all employees have statutory occupational health care, which is free for the employees and individually planned in accordance with the Current Care Guidelines, being the standard care. The PCIS is not part of the statutory occupational health care, instead organized by the Finnish Association of Fire Officers. When applying to take part in the PCIS, participants reported either single or multiple traumatic incidents at work or a cumulative burden not related to a specific traumatic incident. The selection criterion was the effect of the mental burden on life: The incident that happened at work and its effects were reflected in whole life or an incident that happened in private life and also affected work performance. The exclusion criteria were, in principle, that there had been at least six months since the incident and that there was no long-term psychotherapy already provided. In addition, it was assessed if the person could benefit from the PCIS. The participation was fully voluntary and based on the person's will to apply. The authors of this study were not included in the selection process of the PCIS participants. The participants of this study consisted of firefighters, paramedics, and firefighter/paramedics who attended a PCIS in April 2021 in Finland. This PCIS included psychoeducational lectures about work, its psychological effects, and recovery given by a psychotherapist, emergency service professional, or police officer. Each participant was provided with two support sessions run by an experienced psychotherapist that could include EMDR/EMD or other interventions assessed to fit best according to the psychotherapist.

2.1. Questionnaires

This study utilized three validated questionnaires: The Beck Depression Inventory-II (BDI-II), the Beck Anxiety Inventory (BAI), and the Impact of Event Scale–Revised (IES-R).

The BDI-II has 21 items, and scores range from 0 to 63. A lower score indicates fewer symptoms of depression. In Finnish clinical health care settings, a score of $\leq$13 indicates no depression, a score of 14 to 19 indicates mild depression, a score of 20 to 28 indicates moderate depression, and a score of 29 to 63 indicates severe depression [7]. A recent meta-analysis recommends that a score of $\geq$13 be considered to indicate depression in primary care and healthy populations, and a score of $\leq$19 should be used to indicate depression in psychiatric settings [8]. The BAI has 21 items, and scores range from 0 to 63. A lower score indicates fewer symptoms. A score of $\leq$7 indicates minor anxiety, a score of 8 to 15 indicates mild anxiety, a score of 15 to 25 indicates moderate anxiety, and a score of 26 to 63 indicates severe anxiety [9]. The IES-R has 22 items, and scores range from 0 to 88. A lower score indicates fewer symptoms. A score of $\geq$24 indicates cause for clinical concern [10], and a score of $\geq$33 indicates that PTSD is likely [11]. The IES-R also includes three subscales: avoidance, intrusion, and hyperarousal. These subscales are scored with mean values ranging from 0 to 4.

The BDI-II, BAI, and IES-R have been previously used [12] to measure improvement in mental well-being after participants attended a PCIS. A previous study also used IES-R scores to measure the effects of a PCIS on mental health [13].

2.2. Data Collection

In April 2021, 16 emergency service workers attended the second PCIS held in Finland for this target group. All of the participants were invited and agreed to participate in this study. Participants filled out the BDI-II, BAI, and IES-R questionnaires at the start of the PCIS. The same questionnaires were sent to the participants one month, three months and six months after the PCIS, either by post with a return envelope or via email with an individual link to the Webropol questionnaire online, according to the participant's preference. One of the participants did not fill out any of the follow-up questionnaires and has thus been excluded from the analysis (final participation: 94%). The participants were not asked to indicate if they had experienced a single incident, single incidents, or a cumulative burden when filling in the questionnaires.

2.3. Statistical Methods

Due to the small sample size, the results are presented descriptively with mean and standard deviation for each questionnaire. Statistical significance is calculated based on individual scores with the several related samples' non-parametric Friedman test. Changes from the beginning of the seminar to the one-month and six-month follow-ups have been measured. Due to the small number of participants, decreases in scores are described as a range of points. All analyses were conducted using SPSS version 28.

2.4. Ethical Considerations

The research plan was approved by the ethics committee of South-Eastern Finland University of Applied Sciences. Permission for the study was also received from the organizer, the Finnish Association of Fire Officers. Participation was voluntary, and all participants provided informed consent. The researchers did not participate in the selection of the PCIS participants. One of the researchers was present at the beginning of the PCIS to collect data, but none of the researchers were present during the entire PCIS. The follow-up questionnaires were returned to the researcher with pseudonym codes, and they contained no identifying information. The document linking the pseudonym codes to participants' personal data was kept secure and separate from other data and not used during the analysis. The minimum and maximum scores are not provided here due to the small number of participants.

3. Results

Fifteen emergency service workers participated in this pilot study. Two of them had five to ten years of work experience, and the remaining 13 had more than ten years of work experience. Five participants were 30 to 39 years old, six were 40 to 49 years old, and four were 50 years old or older.

Before the PCIS, the mean value of the BDI-II scores was at the cut-off point for mild or moderate depression. Individual scores covered a wide range (Table 1). The mean and standard deviation for the BDI-II were lowest one month after the PCIS. They increased three months after the seminar and remained steady six months after the seminar. The mean BDI-II scores three and six months after the PCIS indicate mild depression, suggesting potentially clinically relevant changes in the scores.

The BAI scores follow a similar pattern during the follow-up period (Table 1). At the beginning of the PCIS, the mean BAI score indicated moderate anxiety. Again, individual scores ranged widely. Unlike the BDI-II scores, the range of BAI scores across the sample decreased at follow-up. Mean follow-up BAI scores indicate mild anxiety, suggesting potentially clinically relevant change.

Participants' IES-R scores decreased from the start of the PCIS to six months after the seminar (Table 1). The mean score at the beginning of the seminar indicated being close to the cause for clinical concern, but again, individual scores covered a wide range. Follow-up scores were considerably lower, clearly under the threshold of clinical concern, thus indicating that the change could be strongly clinically relevant. A similar pattern can

be seen in the sub-scale mean scores of intrusion and avoidance. The scores decreased from the start of the PCIS to six months after the seminar. Hyperarousal symptoms decreased clearly from the start of the seminar to one month after and then had a slight increase to the three months after point, followed by a decrease to six months after the seminar.

Table 1. Mean scores with standard deviation by questionnaire.

Questionnaire (Possible Min–Max Scores)	At the Start of the PCIS (n = 15)	One Month Later (n = 15)	Three Months Later (n = 14)	Six Months Later (n = 14)	p * (n = 13)
BDI-II (0–63)	19.47 (9.52)	11.20 (6.53)	14.00 (9.45)	13.21 (8.75)	0.033
BAI (0–63)	16.87 (9.41)	8.00 (7.88)	10.00 (6.24)	9.21 (6.44)	0.002
IES-R (0–88)	30.87 (15.32)	13.07 (9.49)	12.21 (10.33)	9.86 (7.69)	<0.001
IES-R, Intrusion (0–4)	1.45 (0.69)	0.62 (0.45)	0.51 (0.45)	0.37 (0.34)	<0.001
IES-R, Avoidance (0–4)	1.39 (0.77)	0.59 (0.51)	0.57 (0.60)	0.53 (0.54)	<0.001
IES-R, Hyperarousal (0–4)	1.36 (0.79)	0.57 (0.47)	0.61 (0.50)	0.45 (0.44)	<0.001

* Significance level: $p \leq 0.05$.

All the differences in the mean scores were statistically significant ($p \leq 0.05$) (Table 1).

The BDI scores of 12 participants (n = 15) decreased by four to 18 points from the beginning of the seminar to the one-month follow-up. The BAI scores of 13 participants decreased by two to 21 points one month after the PCIS. The scores of the other participants either remained the same or increased. The IES-R scores of 15 participants decreased by one to 43 points.

Participants' scores at the start of the seminar were also compared to their results six months later. Six months after the seminar, the BDI scores of ten participants (n = 14) decreased by five to 21 points. BAI scores of 12 participants decreased by two to 27 points six months after the seminar. The scores of other participants either remained the same or increased six months after the seminar. The IES-R scores of 14 participants decreased by eight to 44 points.

4. Discussion

Both depression and anxiety mean scores were lowest one month after the seminar but increased at three- and six-month follow-ups. However, both mean scores were lower six months after PCIS than at the beginning of it. In contrast, traumatic stress symptoms decreased steadily from the start of the PCIS until six months later. Considering intrusion and avoidance aspects, as the overall traumatic stress symptoms scores, a decrease over time was found. However, relating to the hyperarousal aspect, the scores did not decrease linearly. This may be due to various reasons, and this study does not provide the basis for a solid interpretation. It could be assumed that hyperarousal symptoms can be more sensitive to change over time after the support received but can be decreased again due to reasons that would be needed to be studied more to define them. The findings of this study suggest that PCIS could have more long-term, clinically relevant impacts on symptoms of traumatic stress than on those of depression or anxiety. However, due to the absence of a control group, direct conclusions regarding the PCIS impact cannot be drawn, although a clear change was discovered. The closest time point to the PCIS (one month) could highlight the effects of the PCIS with the least possible effect of further possible incidents. Moreover, the furthest timepoint to the PCIS (six months) could emphasize the possible

longer-term effects of the PCIS with an increased possibility of further incidents affecting the scores too.

Clinical relevance can help to assess how much PCIS can generally help its participants and what type of follow-up support or interventions may still be needed after attending it. Two researchers have used similar inventories in PCIS-related doctoral dissertations. Lamphear (2011) compared participants' IES-R scores before they attended a PCIS (pre-test) and six months after the PCIS (post-test) [13]. Lamphear (2011) also compared the impact of a basic PCIS to that of a PCIS that also included EMDR and found that IES-R scores were significantly lower at the post-test for both groups of participants, indicating clinically relevant change, at least for those who attended PCIS, including EMDR [13]. Similarly, Sparn (2015) found that IES-R scores decreased significantly from baseline to two-month and six-month follow-ups indicating potentially clinically relevant change from beyond to under the clinical threshold [12]. These results are in line with the findings of the present study. In addition, Lamphear (2011) found out that other variables (time since the incident and gender) can affect the hyperarousal subscale scores in PCIS without EMDR setting but not in the PCIS with EMDR [13]. This finding indicates that the possible interfering variables would need to be measured in further studies in order to explain the changes in the hyperarousal sub-scale.

However, in contrast to the present study, Sparn (2015) also found that BDI-II and BAI scores decreased significantly from baseline to two-month and six-month follow-ups [12]. There are several possible explanations for this difference. In the present study, the baseline BDI-II and BAI mean scores were higher than those in Sparn's study (2015). This could mean that the participants in the present study were suffering from more difficult depression and anxiety symptoms from the start. It is possible that the participants in Sparn's study (2015) were able to take part in a PCIS sooner after a traumatic incident, as, in that study, the same organizer who provides first-aid interventions also offers PCIS for employees who have experienced a traumatic incident at work. However, in the present study, the PCIS we examined was only the second offered to emergency service workers in Finland and beyond the standard, statutory occupational health care, so it can be assumed that participants may have experienced the traumatic incidents some time before the study began. There is evidence from the mental health care provision system level that a longer waiting time before treatment begins is negatively associated with the outcome of the treatment [14]. However, there is also a result found that waiting less time to attend PCIS since the incident did not lead to a greater decrease in traumatic symptoms [13].

There is a tentative indication that young senior firefighters (aged around 30 years) are more likely to experience severe PTSD, depression, and anxiety than firefighters in other age groups [15]. Most participants in the present study were older than this, but no age groups were compared in this study. Furthermore, potentially traumatizing incidents at work are not the only possible source of mental health problems for firefighters and paramedics. Mental health problems can also be caused by different work-related occupational or operational stressors [16]. In addition, mental health symptoms can be linked to somatic symptoms. For example, chronic pain has been shown to have likely links with PTSD, major depressive disorder, and generalized anxiety disorder in a study sample that included firefighters and paramedics [17].

Emergency service workers' symptoms of PTSD, depression, and anxiety should be measured, and support should be provided even if those symptoms fall below the diagnostic threshold. For example, significant exposure to traumatic incidents can lead to certain differences in information processing, even if symptoms are not severe enough to indicate a PTSD diagnosis [18]. In addition, the results of this pilot study are encouraging for further studies and indicate the need for a randomized controlled trial aiming to evaluate PICS against standard care.

5. Methodological Considerations

Due to the lack of a control group and a small number of participants, the results of this pilot study cannot be generalized. The findings should be understood as tentative and used to guide future research. In self-assessment inventories, such as those used in the present study, participants' response styles always vary. The stigma around mental health may have also hindered some participants from honestly reporting the severity of their symptoms. In this study, scores exceeding certain clinical threshold points did not lead to any clinical interventions but were collected purely for research purposes.

This study has also drawn no conclusions about the source of participants' symptoms of depression, anxiety and/or traumatic stress or the received standard or other care prior to the PCIS. It is possible that the mental health symptoms reported by the participants could have been caused by something other than specific traumatic incidents at work. This is even probable since some participants did not mention a specific traumatic incident when applying for the PCIS, instead reporting the cumulative burden of their work as their reason for applying. The symptoms reported in this study may also relate to something outside participants' work. In addition, the possibility that some other factors in participants' lives, a further incident, willingness to emphazise the experienced effect of the PCIS or seasonality may have caused variation and changes to their symptom scores after they attended the PCIS cannot be excluded. These should be taken into account in future studies.

6. Conclusions

This pilot study finds that symptoms of depression, anxiety, and traumatic stress among emergency service workers decreased after participants attended a PCIS. The positive impact of PCIS may last the longest for traumatic stress symptoms.

Future research should study the development of depression, anxiety, and traumatic stress scores (also the sub-score differences and potential variables affecting them) over longer periods among larger groups of participants and with a standard care control group. It would also be interesting to study connections between mental health and somatic pain, as well as to compare the impact of PCIS on the mental health of emergency service workers based on age or work experience. It would also be interesting to explore both quantitative and qualitative results in a single study.

Author Contributions: Conceptualization, H.N.; methodology, H.N.; investigation, H.N.; writing—original draft preparation, S.K. and H.N.; writing—review and editing, S.K. and H.N.; project administration, S.K. and H.N.; funding acquisition, H.N. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by Fire Protection Fund, grant number VN/6293/2021, and South-Eastern Finland University of Applied Sciences. The APC was funded by South-Eastern Finland University of Applied Sciences.

Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics Committee of South-Eastern Finland University of Applied Sciences on 13 November 2020.

Informed Consent Statement: Written informed consent to participate in the present study was obtained from all the PCIS participants.

Data Availability Statement: Data not available.

Conflicts of Interest: The authors declare that they have no conflict of interest. Neither the PCIS organizers nor the funders of this study played any role in the design, interpretation or writing of the study.

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