



Prevalence and risk factors of secondary traumatic stress in emergency call-takers and dispatchers – a cross-sectional study

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ABSTRACT

Background: Emergency call-takers and dispatchers (ECDs) field emergency calls and dispatch the appropriate emergency services. Exposure to the callers' traumatic experiences can lead to psychological stress and even to secondary traumatic stress (STS). In addition, previous studies suggest that ECDs may also suffer from posttraumatic stress disorder (PTSD), depression and anxiety disorders.

Objectives: To investigate the prevalence of STS and to screen for PTSD, depression and anxiety disorders in ECDs. We further aimed to identify sociodemographic variables and attachment styles as possible risk factors for higher STS symptom load in ECDs.

Methods: STS and PTSD regarding lifetime traumatic events, as well as depression and anxiety disorders, were investigated in $N = 71$ ECDs. Multiple regression analysis was performed to identify possible risk factors for higher STS symptom load.

Results: The analysis determined a prevalence of 8.5% for moderate STS and 2.8% for severe STS. A total of 11.3% of the ECDs screened positive for PTSD, 15.5% for depression and 7.0% for anxiety disorders. A higher number of children and the absence of a secure attachment style were identified to be significantly associated with higher STS symptom load.

Conclusions: STS resulting from exposure to traumatic emergency caller content is a common phenomenon among ECDs. Specific sociodemographic variables and the attachment style are significant risk factors of STS symptom load. ECDs should receive regular psychoeducational interventions and supervision to identify and mitigate mental distress at an early stage.

Prevalencia y factores de riesgo de estrés traumático secundario en operadores de llamadas de emergencia y despachadores – un estudio transversal

Antecedentes: Los Operadores y Despachadores de Llamadas de Emergencia (ECD, en su sigla en inglés) reciben llamadas de emergencia y despachan los servicios de emergencia apropiados. La exposición a las experiencias traumáticas de las personas que llaman puede conducir a estrés psicológico e incluso a estrés traumático secundario (ETS). Además, estudios previos sugieren que los ECD pueden también sufrir de trastorno de estrés posttraumático (TEPT), depresión y trastornos de ansiedad.

Objetivos: Investigar la prevalencia de ETS y detectar TEPT, depresión y trastornos ansiosos en los ECD. Además, buscamos identificar las variables sociodemográficas y estilos de apego como posibles factores de riesgo para carga sintomática de ETS más alta en los ECD.

Método: Se investigó los ETS y el TEPT relacionados a eventos traumáticos a lo largo de la vida, así como depresión y trastornos de ansiedad en $N = 71$ ECD. Se condujo análisis de regresión múltiple para identificar posibles factores de riesgo para carga sintomática de ETS más alta.

Resultados: El análisis determinó una prevalencia del 8.5% para ETS moderado y de 2.8% para ETS grave. Un total de 11.3% de los ECD dieron positivo para TEPT, 15.5% para depresión y 7.0% para trastornos de ansiedad. Se identificó que un mayor número de hijos y la ausencia de un estilo de apego seguro están significativamente asociados con una mayor carga sintomática de ETS.

Conclusiones: Variables sociodemográficas específicas y el estilo de apego son factores de riesgo significativos de la carga sintomática de ETS. Los ECD deberían recibir intervenciones y supervisión psicoeducativas periódicas para identificar y mitigar el estrés mental en una etapa temprana.

ARTICLE HISTORY

Received 6 May 2020

Revised 16 July 2020

Accepted 16 July 2020

KEYWORDS

emergency call taker; emergency dispatcher; secondary traumatization; posttraumatic stress disorder; attachment style

PALABRAS CLAVE

operadores de llamadas de emergencia; despachador de emergencia; traumatización secundaria; trastorno de estrés posttraumático; estilo de apego

关键词

紧急呼叫接听员; 紧急调度员; 二次创伤; 创伤后应激障碍; 依恋风格

紧急呼叫接听员和调度员二次创伤应激的流行率和风险因素——一项横断面研究

背景: 紧急呼叫接听员和调度员 (ECD) 应答紧急呼叫并调度适当的紧急服务。暴露于呼叫者的创伤经历可能会导致心理应激, 甚至导致二次创伤应激 (STS)。此外, 前人研究表明, ECD也可能患有创伤后应激障碍 (PTSD), 抑郁和焦虑障碍。

目的: 考查STS的流行率, 并筛查ECD中的PTSD, 抑郁和焦虑障碍。我们进一步的目标是识别ECD人群中社会人口统计学变量和依恋风格中较高STS症状负荷的可能风险因素。

方法: 在71个ECD中考查了终身创伤事件相关的STS和PTSD, 以及抑郁和焦虑障碍。进行了多元回归分析, 以确定可能导致更高STS症状的风险因素。

结果: 分析确定了中度STS的流行率为8.5%, 重度STS的流行率为2.8%。共有11.3% ECD的PTSD筛查为阳性, 15.5%抑郁阳性, 7.0%焦虑阳性。有更多子女和欠缺安全依恋风格被识别出与更高STS症状负荷显著相关。

结论: 暴露于有创伤的紧急呼叫者内容导致的STS是ECD中的常见现象。特定的社会人口统计学变量和依恋风格是STS症状负荷的显著风险因素。ECD应接受定期的心理教育干预和监督, 以在早期阶段识别和缓解心理痛苦。

1. Introduction

Emergency service personnel are often confronted with distressing rescue situations in which callers require immediate medical attention. The spectrum of possible emergencies ranges from serious injuries, life-threatening illnesses and resuscitation scenarios. The exposure to such severe situations, sometimes including the death of an individual, can have a traumatizing effect on emergency workers which can cause them to develop symptoms of posttraumatic stress (Kessler et al., 2017; Kirby, Shakespeare-Finch, & Palk, 2011). Compared to the prevalence of 1.1–2.9% for posttraumatic stress disorder (PTSD) in the general European population (Wittchen et al., 2011), Berger et al. found a prevalence of 14.6% for PTSD in ambulance personnel (Berger et al., 2012). However, within the ‘chain of survival’ of prehospital emergency care, which describes the different steps from activating emergency medical services to early basic life support and advanced life support (Cummins, 1993; Nolan, Soar, & Eikeland, 2006), some individuals are less exposed to the initial emergency situation than others. For example, while injuries and death at the accident scene expose emergency paramedics to direct sensory impressions, emergency call-takers and dispatchers (ECDs) located in an emergency control centre only learn about the emergency situation or the course of the accident via telephone, hence, indirectly. Nevertheless, by becoming an auditory witness, they may also be emotionally affected by the respective incident (Adams, Shakespeare-Finch, & Armstrong, 2015).

The function of ECDs consists in accepting emergency calls, dispatching available rescue vehicles and guiding the caller through first aid procedures using standardized protocols (Dunford, 2002; Stipulante et al., 2014; Stratton, 1992). In this context, ECDs must rapidly identify specific symptom constellations by gathering critical information and effectively conveying appropriate first aid instructions. Difficulties in communication (e.g. Meischke, Chavez, Bradley, Rea, & Eisenberg, 2010) and the provision of only little information by the caller can result in high psychological burden in the ECD,

whose initial triage and evaluation of the described emergency situation may have existential consequences for the individual in need (Forslund, Kihlgren, & Kihlgren, 2004). Previous studies have demonstrated that long-term exposure to organizational or structural job-related stressors may result in job burnout, which develops gradually and is most frequently characterized by symptoms of exhaustion and energy depletion (Lee, Lim, Yang, & Lee, 2011; Maslach, Schaufeli, & Leiter, 2001; Shirom & Melamed, 2006). Furthermore, different conceptualizations have described the negative consequences of being professionally exposed to traumatic narratives of individuals suffering from psychological traumatization or PTSD (Cieslak et al., 2014). In this context, Figley (1995) developed the concept of secondary traumatic stress (STS), which enfolds the established PTSD symptomatology of intrusions, avoidance, and hyperarousal (Bride, Robinson, Yegidis, & Figley, 2004; Figley, 1995); however, in contrast to PTSD, STS symptoms occur after *indirect* exposure to traumatic material, for example, by listening to the graphic descriptions of a traumatized individual. Within a ‘trauma transmission model’, Figley hypothesized that empathic engagement with another person’s traumatic narrative may play a key role in the onset of STS symptoms (Figley, 1995; MacRitchie & Leibowitz, 2010). STS has to be distinguished from the concept of vicarious traumatization (VT), which mainly refers to changes of an individual’s cognitive schemas of self, of others, and of the world in general as well as to a disruption in the basic needs for safety, trust, esteem, intimacy, and control as a sequela of close contact to psychologically traumatized individuals (Baird & Kracen, 2006; McCann & Pearlman, 1990; Pearlman & Mac Ian, 1995). In addition, STS must be differentiated from the concept of compassion fatigue (Figley, 2013). The phenomenon of compassion fatigue can be defined as a limited empathic capacity as well as emotional and physical exhaustion due to chronic empathic engagement with traumatizing experiences of other individuals (Adams, Boscarino, & Figley, 2006; Sodeke-Gregson, Holttum, & Billings, 2013).

However, the present study focused on STS in ECDs, which may be a possible consequence of indirect exposure to traumatic experiences of an emergency caller. The phenomenon of STS has already been investigated for various professional groups, e.g. interpreters for refugees (Kindermann et al., 2017), trauma therapists (Hesse, 2002; Pearlman & Mac Ian, 1995; Rzeszutek, Partyka, & Gołab, 2015), social workers (Lee, Gottfried, & Bride, 2018), combat veterans' spouses (Waysman, Mikulincer, Solomon, & Weisenberg, 1993) and first responders (Greinacher, Derezza-Greeven, Herzog, & Nikendei, 2019). Furthermore, previous studies have suggested that ECDs are at risk of developing STS in consequence of their exposure to the graphic description of emergency situations during emergency calls (Miller, 1995; Shakespeare-Finch, Rees, & Armstrong, 2015). However, to the best of our knowledge, quantitative data on STS in ECDs are not yet available. In summary, ECDs may be exposed to different work-related stressors during their emergency service work, which may result in different psychological sequelae. Therefore, the first aim of the study was to investigate the prevalence of STS and to screen for PTSD, depression and anxiety disorders in ECDs. Although symptomatology of PTSD and STS is identical, the disorders differ in their type of exposure. While STS results from *indirect* exposure, PTSD requires *direct* sensory exposure to traumatic experiences.

Secondly, we aimed to identify sociodemographic variables and attachment styles as possible risk factors of higher STS symptom load in ECDs. Several studies have already identified different predictors of STS, such as a personal history of trauma and previous mental health status (Ensel & Lin, 2000; Ghahramanlou & Brodbeck, 2000; Lerias & Byrne, 2003; Marmar, Weiss, Metzler, & Delucchi, 1996; Osofsky, Putnam, & Lederman, 2008; Van der Kolk, McFarlane, & Weisath, 1996; Zimering, Munroe, & Gulliver, 2003). In regard to the latter, it was demonstrated that especially a history of anxiety or depression can be associated with a higher symptom load after being indirectly exposed to traumatic material (Ensel & Lin, 2000; Orbach, Lamb, Sternberg, Williams, & Dawud-Noursi, 2001; Van der Kolk et al., 1996). In the occupational group of trauma therapists, a higher number of traumatized patients, low experience in trauma therapy, and high degrees of emotional reactivity were shown to be associated with higher rates of STS, while participating in clinical supervision, the availability of self-care techniques, and high degrees of sensory reactivity were associated with lower rates of STS (Chrestman, 1995; Creamer & Liddle, 2005; Figley, 2013; Rzeszutek et al., 2015). Furthermore, sociodemographic variables, such as younger age, female gender, lower educational achievement, as well as lack of social and familial support were found to predict higher STS symptom burden in various occupational groups (Adams, Matto, & Harrington, 2001; Baum, 2016; Choi, 2011; De Jong, van Sonderen, & Emmelkamp, 1999; Ensels &

Lin, 2000; Lerias & Byrne, 2003; Rzeszutek et al., 2015; Zimering et al., 2003). Eventually, preliminary evidence suggests that a secure attachment style may also be a protective factor against STS (Denkinger et al., 2018; Kindermann et al., 2017; Lahav, Kanat-Maymon, & Solomon, 2016). This seemingly protective effect of a secure attachment has previously been demonstrated for the development of PTSD (Dieperink, Leskela, Thuras, & Engdahl, 2001; O'Connor & Elklit, 2008; Woodhouse, Ayers, & Field, 2015). According to attachment theory, the early relationships to caregivers result in internal representations or 'working models' (Bowlby, 1973, 1982), which subsequently are prototypes for later social interactions (Griffin & Bartholomew, 1994). In this context, the attachment style of an individual can be categorically characterized as secure, preoccupied, fearful-avoidant or dismissive-avoidant; the last three attachment styles are commonly summarized under the umbrella term of insecure attachment (Bartholomew & Horowitz, 1991). Several studies have identified an association between specific attachment style and the vulnerability to mental health disorders (Bifulco, Moran, Ball, & Bernazzani, 2002; Dozier, Stovall-McClough, & Albus, 2008; Murphy & Bates, 1997; Rosenstein & Horowitz, 1996).

1.1. The present study

The prevalence and possible risk factors of STS have already been investigated in different occupational groups. Although a few studies suggested a risk of STS in ECDs due to being confronted with traumatic descriptions during emergency calls, so far there have been no studies to provide quantitative data in terms of the prevalence of STS and general psychological burden in ECDs. In the present study, we, therefore, aimed to investigate the prevalence of STS and to screen for PTSD, depression and anxiety disorders in ECDs. PTSD symptoms were assessed regarding lifetime traumatic events including work-related and other events. A further aim was to identify risk factors for higher STS symptom load. Building on previous studies (Adams et al., 2001, 2015; Baum, 2016; Choi, 2011; De Jong et al., 1999; Denkinger et al., 2018; Ensels & Lin, 2000; Ghahramanlou & Brodbeck, 2000; Kindermann et al., 2017; Lahav et al., 2016; Lerias & Byrne, 2003; Marmar et al., 1996; Orbach et al., 2001; Rzeszutek et al., 2015; Van der Kolk et al., 1996; Zimering et al., 2003), we investigated sociodemographic variables (gender, age, relationship status, number of children and educational level) as well as the total of working years in emergency medical services and attachment styles as possible risk factors. We hypothesized that (1) sociodemographic variables are differentially associated with STS symptom load in ECDs: (1a) female gender, (1b) younger age, and (1c) the absence of relationship are associated with higher STS symptom load; whereas (1d) higher

education, and (2) a secure attachment style are associated with lower STS symptom load. The present study may thus make an important contribution to the field of psychological burden and STS in the emergency service sector. By identifying possible risk factors for higher STS symptom load, our study may furthermore help to reduce the burden of STS in emergency personnel.

2. Methods

2.1. Participants and eligibility

The study was conducted between February and December 2018 in the (i) rescue service unit 'Bodensee-Oberschwaben' of the German Red Cross in Ravensburg, Germany, and (ii) German Red Cross state school of Baden-Wuerttemberg in Pfalzgrafenweiler, Germany. In the German federal state of Baden-Wuerttemberg about 800 individuals work as German Red Cross ECDs. Most of the individuals of our sample only worked as ECDs, while some also sometimes worked as paramedics. The participants had different training levels in the context of the German paramedic training system. This system distinguishes the following degrees of training: 'Rettungssanitäter' ('rescue paramedic') is the lowest level of training, followed by 'Rettungsassistent' ('rescue assistant') with moderate training, and 'Notfallsanitäter' ('emergency paramedic') with advanced training. Inclusion criterion for our study was: currently working as an ECD. The sample was a convenience sample. $N = 97$ ECDs met the inclusion criterion and were invited to participate in the study. Of those, 26 individuals declined participation in the study. As the main reason for non-participation, ECDs stated that they did not want to disclose their emotional state. The final sample included $N = 71$ individuals (73% response rate). We computed the sensitivity for the data using the software G-Power (Faul, Erdfelder, Lang, & Buchner, 2007). Detectable effect sizes of $f^2 = .26$ were found for multiple regression analyzes with $\alpha = .05$, $1 - \beta = .80$, $n = 71$, and number of explanatory variables = 10, indicating sufficient statistical power to detect medium effects with our sample size.

2.2. Setting and procedure in the emergency control centre

In Germany, emergency calls are answered by emergency control centre employees operated either by the rescue or fire services. Call-takers and dispatchers work together closely: the call-takers make initial contact with the caller and collect basic information about the emergency via the telephone using standardized procedures, in some cases in the form of electronic protocols. The callers may themselves be the affected person or a second party who could potentially provide first aid. The standardized procedures

guide the call-taker through the initial questioning of the caller in order to collect essential information and to screen for emergencies, e.g. heart attacks or strokes. The call-taker then forwards the information electronically to the dispatcher, while maintaining the emergency call. The dispatcher, in turn, schedules rescue personnel and vehicles for the respective emergency. Through the standardized protocols, the call-taker can also guide the caller through defined first aid steps, such as cardiopulmonary resuscitation, while the emergency services are on their way. Generally, the call is not ended before the emergency services have arrived at site or the caller feels assured enough to continue alone.

2.3. Recruitment

ECDs of the German Red Cross in the German federal state of Baden-Wuerttemberg regularly attend mandatory training seminars covering different topics, such as organizational and procedural aspects of the work in the emergency control centre. These training seminars are conducted by trained German Red Cross staff and regularly take place in the (i) rescue service unit 'Bodensee-Oberschwaben', Germany, and (ii) the German Red Cross state school of Baden-Wuerttemberg, Germany. As one of the several topics during those regular training seminars, we specifically informed groups of approximately 20 ECDs about psychological distress in emergency service personnel. The ECDs were subsequently provided with information about the present study and were invited to participate. After the participants had given their written informed consent, the psychometric questionnaires were distributed among the ECDs. The participants were, therefore, a convenience sample.

2.4. Ethics

Ethical approval was granted by the ethics committee of the University of Heidelberg (Nr. S-139/2016). Study participation was voluntary and all candidates were assured of anonymity and confidentiality. The study was conducted in accordance with the most recent version of the Declaration of Helsinki (World Medical Association, 2013). Written consent was obtained from all participants.

2.5. Data collection

2.5.1. Sociodemographic data of sample

Participants provided sociodemographic data including group characteristics, such as gender, age, relationship status, number of children, educational achievement, total number of years working in the emergency control centre and their training level according to the German paramedic training system.

2.5.2. Assessment of secondary traumatic stress (*Fragebogen für Sekundäre Traumatisierung; FST*)

We investigated symptoms of secondary traumatization by using the German Questionnaire for Secondary Traumatization (FST = Fragebogen für Sekundäre Traumatisierung; Daniels, 2008; Weitkamp, Daniels, & Klasen, 2014). The instructions of the FST explicitly point out that the included questions focus on those burdens which may have arisen in the participants after learning about a traumatic narrative of *another* person (Daniels, 2008). For example, item 3 is: 'I had intrusive images or sensations that are connected to what I was told'; item 12 is: 'I avoided objects, places or activities that reminded me of my clients' [the callers'] experience' (Weitkamp, Daniels, & Klasen, 2014). The questionnaire contains 31 items covering the four PTSD symptom clusters according to the DSM-5 and, additionally, includes questions referring to their sense of threat and safety behaviour. The items can be answered via a 5-point Likert scale ranging from 1 (never) to 5 (very often). The questionnaire total score ranges from 31 to 155. Sum scores between 65 and 82 points were classified to show moderate secondary traumatization, while sum scores above 82 were classified to indicate severe secondary traumatization (Weitkamp et al., 2014). Internal consistency was shown to be high for the FST total score with Cronbach's Alpha = .94 (Weitkamp et al., 2014).

2.5.3. Assessment of posttraumatic stress disorder (*Primary Care PTSD Screening; PC-PTSD-5*)

In order to assess symptoms of posttraumatic stress disorder (PTSD), we used the Primary Care PTSD Screening (PC-PTSD-5; Cameron & Gusman, 2003; Prins et al., 2015), which was derived from the respective DSM-5 criteria of PTSD. The German version of the PC-PTSD-5 begins with an entry question, which refers to the possible existence of a traumatic event ('A-criterion'), which the participant has experienced *personally* (Prins et al., 2015). In this short screening instrument, the type of traumatic event which may have led to posttraumatic symptoms is not further differentiated and can, therefore, refer to work-related as well as other events (Prins et al., 2015). The following four items focus on PTSD symptoms and are assessed via a dichotomous (yes/no) response format. Individuals without previous exposure to traumatic events did not have to answer the subsequent questions on PTSD symptoms. The overall score of the German version of PC-PTSD-5 lies between 0 and 4, the cut-off score is set at 3. Internal consistency was shown to be high for the PC-PTSD-5 with Cronbach's Alpha = .79 (Maguen et al., 2010). The PC-PTSD-5 is a PTSD screening tool and further examination is required for a definite diagnosis.

2.5.4. Assessment of depression and anxiety symptoms (*Patient Health Questionnaire-4; PHQ-4*)

Depressive symptoms and symptoms of anxiety were assessed using the German version of the PHQ-4 (Kroenke, Spitzer, Williams, & Löwe, 2009; Löwe et al., 2010) which combines the 2-item short screener PHQ-2 for depressive symptoms (Kroenke, Spitzer, & Williams, 2003; Löwe, Kroenke, & Gräfe, 2005) and the 2-item short screener GAD-2 for anxiety symptoms (Kroenke, Spitzer, Williams, Monahan, & Löwe, 2007). The PHQ-4 exhibits good reliability and validity measures (Löwe et al., 2010). Internal consistency was shown to be high for the PHQ-4 with Cronbach's Alpha = .85 (Kroenke et al., 2009). The PHQ-4 screener's four items assess the occurrence of depressive symptoms as well as anxiety symptoms across the past 2 weeks. Each item can be answered as 0 (not at all), 1 (several days), 2 (more than half the days), or 3 (nearly every day) (Kroenke et al., 2009). The sum score ranges from 0 (no symptoms) to 12 (all symptoms occurring daily) and can serve as a general marker of psychological distress (Kroenke et al., 2009). In addition to the composite measure of PHQ-4, the depression subscale (PHQ-2) and the anxiety subscale (GAD-2) can be evaluated individually. For PHQ-2, a sum score of ≥ 3 on a 0-to-6-point scale displayed high sensitivity and specificity for major depressive disorder (Kroenke et al., 2003); for GAD-2, a sum score of ≥ 3 on the 0 to 6 scale indicates generalized anxiety disorder, panic disorder and social anxiety disorder with high sensitivity and specificity, respectively (Kroenke et al., 2007). The PHQ-4 is a screening tool for depression or anxiety disorder. Further examination is required to reach a definite diagnosis.

2.5.5. Assessment of adult attachment style (*Relationship Questionnaire; RQ-2*)

Adult attachment style was assessed using the German version of the Relationship Questionnaire (RQ-2; Asendorpf, Banse, Wilpers, & Neyer, 1997; Bartholomew & Horowitz, 1991). The RQ-2 is a four-item questionnaire designed to measure adult attachment style (Bartholomew & Horowitz, 1991). Each item describes one of the four established attachment styles (secure, preoccupied, fearful-avoidant, dismissive-avoidant) and is rated via a 7-point Likert scale ranging from 1 (disagree strongly) to 7 (agree strongly). The questionnaire can be used to a) categorically identify one of the four established attachment styles or to b) determine the degree of the two dimensions 'model of self' and 'model of other', which are described to underlie the four attachment styles (Bartholomew & Horowitz, 1991; Griffin & Bartholomew, 1994). In the present study, we used a categorical approach as described by Bartholomew and Horowitz (Bartholomew & Horowitz, 1991).

2.6. Study design

We conducted a cross-sectional study using established psychometric questionnaires (FST, PC-PTSD-5, PHQ-4, RQ-2).

2.7. Statistical analyses

Depending on the scale level Pearson- (r_p), Spearman- (r_s), Phi- (r_ϕ), and Eta (η) coefficients were used to determine the correlations between the study variables. To determine the relationship between STS symptom load and the study variables, multiple regression analyses were conducted with the statistics program R (R Core Team, 2019). In the model, STS symptom load was defined as criterion variable. Sociodemographic variables (gender, age, relationship status, number of children and educational level), total number of working years in emergency medical services and the attachment styles (secure and dismissive-avoidant attachment style; please also see results section) were included as independent variables in the model. The selection of these variables as possible explanatory variables was based on an in-depth literature review (Adams et al., 2001, 2015; Baum, 2016; Choi, 2011; Cieslak et al., 2014; De Jong et al., 1999; Denking et al., 2018; Ensel & Lin, 2000; Ghahramanlou & Brodbeck, 2000; Kindermann et al., 2017; Lahav et al., 2016; Lérias & Byrne, 2003; Marmar et al., 1996; Orbach et al., 2001; Rzeszutek et al., 2015; Van der Kolk et al., 1996; Zimering et al., 2003). The partial regression coefficients provide information about the unique strength of the association between the independent variables and STS symptom load with other independent variables held constant. As it is unclear whether depression and anxiety symptoms are antecedents or accompanying secondary traumatization, we decided to only use them as control variables in the statistical model. The violation of standard regression assumptions (residual normality, homoscedasticity, and independence of explanatory variables) was examined by the R-package *olsrr* (Hebbali, 2018). Multicollinearity was not an issue according to the variance inflation factor as all VIFs were below 1.94. However, the assumptions of residual normality (Shapiro-Wilk & Kolmogorov-Smirnov Tests), and homoscedasticity (Breusch Pagan-Test) were violated so that we used robust regression analyses by the 'rlm' algorithm of the R-package 'MASS' (Venables & Ripley, 2013). The function 'rlm' fits the model using M -estimation by iterated re-weighted least squares (IWLS) and minimize the influence of outliers on an effective way (Almetwally & Almongy, 2018). Model fit was tested by likelihood ratio test ('lrtest' function of the R package 'lmtest'; Zeileis & Hothorn, 2002), where a significant χ^2 -test indicates better fit of the model than the intercept only model. Standardized regression

coefficients ('lm.beta' function of the R package 'lm.beta'; Behrendt, 2015) and pseudo weighted determination coefficients (Willett & Singer, 1988) were calculated.

3. Results

3.1. Sample description and response rate

Sociodemographic data are displayed in Table 1. $N = 71$ individuals out of 97 (73% response rate) participated in this study. A total of 85.9% of the participants were male; on average, they were 33.73 ($SD = 7.17$) years old and had worked in emergency medical services for 3.08 years ($SD = 4.86$, range 0–26 years) including ECD and paramedics functions. Overall, 76.1% of the participants worked as emergency call-takers and dispatchers, 15.5% only worked as dispatchers and 8.5% only worked as call-takers. In total, 98.6% of the participants were trained paramedics of varying degrees of qualification. According to the German paramedic training system, 20.8% of the participants were 'Rettungssanitäter' ('rescue paramedics', lowest training level), 61.1% were 'Rettungsassistenten' ('rescue assistants', moderate training level), and 15.3% were 'Notfallsanitäter' ('emergency paramedics', highest training level); only one participant had no prior paramedic training.

We initially tested for gender differences. Male participants were more likely to be in a committed relationship and more frequently had a secure attachment style than female participants. Female participants were significantly more likely to show PC-PTSD-5 scores above the cut-off value and significantly more likely to exhibit a dismissive-avoidant attachment style than male participants.

3.2. Secondary traumatic stress (STS)

In the FST questionnaire for STS, participants showed a mean value of $M = 46.71$ ($SD = 14.29$), which is below the cut-off score of 65 (see Table 1). On an individual level, eight participants (11.3%) scored above the cut-off score. Hereof, six participants (8.5% of the total sample) reported a moderate symptom load (score 65–82) and two participants (2.8% of the total sample) reported an identical total score of 82, which means a severe symptom load (see Table 1).

3.3. Posttraumatic stress disorder (PTSD)

In the PC-PTSD-5 questionnaire for PTSD, participants showed a mean value of $M = .68$ ($SD = 1.13$) which is clearly below the recommended cut-off score of 3. On an individual level, eight participants (11.3% of the total sample) scored above the cut-off value (see Table 1). In sum, 7% of the participants reported sum scores above the cut-offs for both STS and PTSD.

Table 1. Descriptives of study variables and gender differences.

Study variables (range/code)	Total (<i>N</i> = 71)	Males (<i>n</i> = 61)	Females (<i>n</i> = 10)	Difference tests		
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>t</i>	<i>p</i>	<i>Cohen's d</i>
(1) Sec. traumatization (31–110)	46.71 (14.29)	46.17 (14.36)	50 (14.13)	-.79	.443	.27
(2) Depression (0–6)	1.20 (1.50)	1.13 (1.45)	1.60 (1.15)	-1.13	.445	.31
(3) Anxiety (0–6)	.75 (1.27)	.66 (1.78)	1.30 (1.83)	-1.08	.305	.51
(4) Age (22–51)	33.73 (7.17)	33.70 (7.03)	33.90 (8.37)	-.07	.946	.03
(5) Working years (0–26)	3.08 (4.86)	3.34 (5.18)	1.48 (1.17)	2.45	.017	.38
	<i>n%</i>	<i>n%</i>	<i>n%</i>	χ^2	<i>p</i>	<i>Phi coeff</i>
(6) Gender (0/1)		61 (85.9)	10 (14.1)			
(7) Educational level (0–3)				2.13	.545	.17
no school degree	3 (4.2)	3 (4.9)	0 (.0)			
Junior high school	8 (11.3)	8 (13.1)	0 (.0)			
Senior high school	30 (42.3)	25 (41)	5 (50)			
A- Level	30 (42.3)	25 (41)	5 (50)			
Marital status (0–2)				.68	.713	.10
Single	40 (56.3)	34 (55.7)	6 (60)			
Married	21 (29.6)	19 (31.1)	2 (20)			
Divorced	10 (14.1)	8 (13.1)	2 (20)			
(8) Relationship status (0/1)	51 (71.8)	47 (77)	4 (40)	4.11	.041	-.29
(9) No. of children (0–3)				1.54	.672	.15
no children	41 (57.7)	34 (55.7)	7 (70)			
1 child	12 (16.9)	10 (16.4)	2 (20)			
2 children	15 (21.1)	14 (23)	1 (10)			
3 children	3 (4.2)	3 (4.9)	0 (.0)			
Function				2.38	.299	.18
emergency call takers and dispatchers	54 (76.1)	48 (78.7)	6 (60)			
dispatchers	11 (15.5)	9 (14.8)	2 (20)			
call takers	6 (8.5)	4 (6.6)	2 (20)			
Degree of training				.33	.952	.07
no training	1 (1.4)	1 (2.6)	0 (.0)			
rescue paramedics	15 (20.8)	13 (21.3)	2 (20.0)			
rescue assistants	44 (61.1)	38 (62.3)	6 (60.0)			
emergency paramedics	11 (15.3)	9 (14.8)	2 (20)			
PTSD cut-off (0/1)	8 (11.3)	5 (8.2)	3 (30)	4.08	.042	.24
STS cut-off (0–2)				2.26	.324	.17
0	63 (88.7)	55 (90.2)	8 (80)			
1 (moderate)	6 (8.5)	4 (6.6)	2 (20)			
2 (severe)	2 (2.8)	2 (3.3)	0 (.0)			
Depression cut-off (0/1)	11 (15.5)	9 (14.8)	2 (20)	.18	.671	.05
Anxiety cut-off (0/1)	5 (7)	4 (6.6)	1 (10)	.16	.693	.05
(10) Secure attachment (0/1)	39 (54.9)	38 (62.3)	1 (10)	9.49	.002	-.37
(11) Dismissive-a. attachment (0/1)	16 (22.5)	11 (18)	5 (50)	5.03	.025	.27
Fearful-a. attachment (0/1)	2 (2.8)	0 (.0)	2 (20)	12.55	<.001	.42
Preoccupied attachment (0/1)	2 (2.8)	2 (3.3)	0 (.0)	.34	.561	-.07

Numbers in front of variables correspond to numbers in Table 2.

3.4. Depression and anxiety

In the PHQ-4 questionnaire for depression and anxiety disorders, participants showed a mean value of $M = 1.20$ ($SD = 1.50$) for depressive symptoms and a mean value of $M = .75$ ($SD = 1.60$) for symptoms of anxiety disorders. On an individual level, 11 participants (15.5% of the total sample) screened positive for depression, while five participants (7.0% of the total sample) showed signs of an anxiety disorder (see Table 1).

3.5. Attachment styles

In sum, 54.9% of the participants reported a secure attachment style and 22.5% a dismissive-avoidant attachment style. A fearful-avoidant and a preoccupied attachment style were only reported by each 2.8% of the participants and were hence excluded from the subsequent regression analysis (see Table 1).

3.6. Study variable correlations and results of the regression analysis

Correlations between study-variables used in the regression analysis are shown in Table 2. Strongest positive correlations were found between STS and depression ($r_p = .62$), and anxiety ($r_p = .80$); between depression and anxiety ($r_p = .59$); between female gender and anxiety ($\eta = .18$), being in a relationship ($r_\phi = .29$), and secure attachment ($r_\phi = .37$); between age and educational level ($r_s = -.31$), working years ($r_s = .39$), and number of children ($r_s = .45$); and between being in a relationship and secure attachment ($r_\phi = .31$). Strongest negative correlations were found between STS and being in a relationship ($\eta = .19$) and secure attachment ($\eta = .24$); between depression and number of children ($r_s = -.31$); between male gender and secure attachment ($r_\phi = -.37$); between age and educational level ($r_s = -.31$); between being in a relationship and dismissive-avoidant attachment ($r_s = -.34$); as well as

Table 2. Means, standard deviations, percentage rates, and bivariate correlations.

Variable (range)	M %	SD	1	2	3	4	5	6	7	8	9	10
1. STS (31–110)	46.71	14.29										
2. Depression (0–6)	1.20	1.50	.62**									
3. Anxiety (0–6)	.75	1.27	.70**	.59**								
4. Gender (male = 0)	85.9		.09	.11	.18							
5. Age (22–51)	33.73	7.17	-.20	-.16	-.07	.01						
6. Educational level (0–3)	2.23	.81	.07	.09	-.06	.17	-.31**					
7. Working years (0–26)	3.08	4.86	-.13	-.12	-.07	-.13	.39**	-.06				
8. Relationship (0/1)	71.8		-.19	-.09	-.08	-.29*	.03	.28	.10			
9. No. of children (0–3)	.72	.94	-.11	-.31**	-.05	.15	.45**	-.14	.25*	.31		
10. Secure attachment (0/1)	54.9		-.24	-.15	-.14	-.37**	.11	.14	.19	.31**	.30	
11. Dismiss.-a. attachment (0/1)	22.5		.10	.02	-.08	.27*	.04	.11	-.07	-.34**	.16	-.60**

M and SD are used to represent mean and standard deviation, respectively. Percentages for nominal variables. Person-, Spearman- and Phi- Coefficients with significant correlations at * $p < .05$, ** $p < .01$. In framed areas Eta coefficients are shown with Eta < .01 = no correlation, Eta between .01 and .04 = small correlation, Eta between .04 and .16 = medium correlation, and Eta > .16 = large correlation.

between secure attachment and dismissive-avoidant attachment ($r_s = -.60$).

Results of the regression analyses are shown in Table 3. The highly significant Likelihood ratio-test indicates that the regression model with the defined explanatory variables fits the data better than the models with no independent variables. A total of 62% of the variance could be explained by the explanatory variables in the model. Significant explanatory variables of STS symptom burden were a higher number of children and the absence of a secure attachment style. Depression and anxiety were also significantly associated with STS symptom load. Especially, anxiety showed substantial incremental validity over the other explanatory variables in the model and explained 51% of the variance above and beyond all other variables. Although there was a bivariate correlation close to zero between the number of children and STS symptom load, a significant positive regression weight for this variable emerged in the multiple regression analysis. The number of children showed significant positive bivariate correlations with age and working years in emergency services as well as a significant negative correlation with depression. Therefore, the shared variance of lower symptom load of depression, higher age and a higher number of working years in emergency services

Table 3. Regression results using secondary traumatic stress as the criterion.

Independent variables	B	SE B	β	p
(Intercept)	49.58	6.73	.00	<.001
Gender	-3.13	2.83	-.08	.274
Age	-.29	.15	-.15	.054
Educational level	1.46	1.20	.08	.229
Working years	-.07	.21	-.02	.748
Relationship	-3.38	2.25	-.11	.138
No. of children	2.94	1.19	.19	.017
Depression	2.53	.77	.26	.002
Anxiety	5.69	.90	.51	<.001
Secure attachment	-5.70	2.44	-.20	.023
Dismiss.-a. attachment	-1.42	2.79	-.04	.613
<i>Model fit</i>				
Pseudo weighted R^2	.62			
Likelihood ratio test χ^2 (df)	70.94 (-10)			<.001

B represents unstandardized regression weights. SE = standard error. β represents standardized regression weights. Pseudo weighted R^2 sensu Willett and Singer (1988).

leads to a significant positive unique semi-partial regression weight of the explanatory variable number of children in the multiple regression analysis.

4. Discussion

The present study is the first to investigate the prevalence and possible risk factors of secondary traumatic stress (STS) in emergency call-takers and dispatchers (ECDs). The study further aimed to screen for PTSD, depression and anxiety disorders in this occupational group using validated psychometric measures. We found a prevalence rate of 8.5% for moderate STS and 2.8% for severe STS. A total of 11.3% of the ECDs showed signs of PTSD, 15.5% of depression and 7% of anxiety disorders. In sum, 7% of the participants reported sum scores above the cut-offs for both STS and PTSD. We identified a higher number of children and the absence of a secure attachment style to be significantly associated with higher STS symptom load with depression and anxiety variables held constant.

4.1. Prevalence of psychological burden among ECDs

Previous investigations suggested ECDs to be at risk of developing secondary traumatization due to indirect exposure to traumatic material during emergency calls (Adams et al., 2015; Miller, 1995; Shakespeare-Finch et al., 2015). In the present study, we identified an overall prevalence rate of 11.3% for STS, which is lower than the rate of 21% for interpreters in refugee care (Kindermann et al., 2017) and lower than the rate of 33% observed in trauma therapists (Püttker, Thomsen, & Bockmann, 2015). However, the ECD's work environment is very different to interpreters' and trauma therapists' workspace: ECDs are usually only in contact with potentially traumatized individuals via telephone. ECDs, therefore, have no direct contact to affected callers, which may be associated with a lower risk of developing STS in comparison to other professions who meet traumatized individuals

in a face-to-face setting. Nevertheless, the prevalence rate for STS in ECDs is still higher than in US veterans' spouses with 5% (Bjornestad, Schweinle, & Elhai, 2014) and volunteer medical students working in a state registration and reception centre for refugees with 3.2% (Kindermann et al., 2019). In general, our finding is in line with the results of a systematic review by Greinacher et al. (2019) that reported prevalence rates of 4–13% for STS in rescue service personnel, firefighters and police officers (Greinacher et al., 2019). Also taking subthreshold sum scores into account, two studies even suggest that up to 35% of the first responders may be at risk of developing STS (LaFauci Schutt & Marotta, 2011; Robinson, 2016).

In the present investigation, we also found that 11.3% of the ECDs showed signs of PTSD, which is higher than in a European representative norm sample with a proportion of 1.1–2.9% with PTSD (Wittchen et al., 2011) and comparable with US Iraq war veterans showing prevalence rates ranging between 4% and 17% (Richardson, Frueh, & Acierno, 2010). In a meta-analysis, Berger et al. (2012) investigated the prevalence of PTSD among rescue workers (Berger et al., 2012). The sample included police officers and firefighters as well as ambulance personnel; a pooled prevalence rate of 10% for PTSD was determined. Among the rescue workers, the subgroup of ambulance personnel displayed the highest prevalence rate of PTSD with 14.6% (Marmar, Weiss, Metzler, Ronfeldt, & Foreman, 1996).

Our current study's data suggests a high overlap between PTSD and STS. The high overlap of these two constructs has already been controversially discussed (Kadambi & Ennis, 2004). As the diagnostic criteria for PTSD in the DSM-5 were extended to include indirect exposure to a traumatizing event, the differentiation between the two constructs has become even more problematic (American Psychiatric Association, 2013). In their 2019 decennial review of psychotraumatology, Olf et al. therefore state that future research needs to clarify conceptualizations of PTSD and STS (Olf et al., 2019). The results of the present study indicate that individuals can potentially suffer from both STS and PTSD to varying degrees. We, therefore, think it is crucial to distinguish between these two disorders. Adequate differentiation, however, cannot be based on symptoms but must be determined by the type of exposure. Therefore, future scientific studies should attach great importance to the question of whether a person was directly or indirectly exposed to a traumatic experience. On the one hand, the large overlap between the constructs of PTSD and STS also found in previous studies (Kadambi & Ennis, 2004), may be explained by the fact that the differentiation of these conceptualizations is not clear when using

DSM-5 PTSD criteria. In contrast, the ICD-11 criteria proposal for PTSD does not explicitly include indirect exposure as a stressor criterion (Arvay, 2001). The application of the ICD 11 criteria for PTSD may, therefore, lead to a more homogeneous group of individuals diagnosed with PTSD, resulting from direct exposure to traumatic experiences only. As a consequence, the differentiation of the PTSD and STS concepts would be more distinct, which in turn may lead to a smaller overlap. On the other hand, the large overlap may also be explained by the assumption that a pre-existing PTSD could be a significant risk factor for subsequent STS and vice versa, possibly resulting in the comorbidity of these conditions. In this context, several studies focusing on the psychological burden in trauma therapists have already pointed to a possible association between a personal history of trauma or PTSD and the development of STS (Arvay, 2001; Pearlman & Mac Ian, 1995). Longitudinal studies should, therefore, be carried out to gain a better understanding of the time-dependent development of PTSD and STS in future.

We found signs of depression in 15.5% and of anxiety disorders in 7.0% of the investigated sample. The prevalence of depression was higher than in a European representative norm sample with a rate of 6.9% (Wittchen et al., 2011). This may be explained by the ECDs' particularly stressful working context and the specifics of emergency calls (Forslund et al., 2004). Conversations can be characterized by several difficulties of communication, such as an unstable telephone connection or insufficient language skills of the caller (Meischke et al., 2010). Moreover, ECDs often have to deal with a limited availability of information and, furthermore, only have limited control over events on the other side of the line, which can be very distressing and, ultimately, lead to feelings of helplessness (Berger et al., 2012). The continuous exposure to such stressors may partly explain the higher prevalence rate for depressive symptoms among the ECDs.

4.2. STS symptom load

A total of 62% of the variance of STS symptom load in ECDs could be statistically explained by the applied multiple regression model. The regression analysis revealed a higher number of children to be significantly associated with higher STS symptom burden. To the best of our knowledge, no studies have indicated to date that the number of children may be a risk factor for STS symptom burden. At first glance, our finding seems to be contrary to previous investigations, if the number of children is seen as an indicator for general familial and social support. In this context, previous studies have documented familial and social support to be protective against STS

(Kindermann et al., 2017; Lerias & Byrne, 2003; Zimering et al., 2003). However, ECDs with children may have a particular vulnerability to emergency calls requesting help for children in life-threatening situations or with serious injuries, which are fielded regularly in emergency control centres. In this situation, some of the verbally described details of the children in the emergency situation may remind the ECDs of their own children, which may lead to an identification with the affected and ultimately make ECDs more prone to secondary traumatic experiences (Kirby et al., 2011). Furthermore, the number and the age of the children may have an impact on the general stress level of the ECDs, including quality of sleep. An elevated general stress level could, in turn, increase the vulnerability to STS (Ensel & Lin, 2000; Lerias & Byrne, 2003). Eventually, more research is needed to further examine the association of the number of children with the onset, persistence or symptom load of STS.

Furthermore, the absence of a secure attachment style was shown to be significantly associated with higher STS symptom load among ECDs. This finding is in accordance with previous studies identifying a secure attachment style as a protective factor against STS in various occupational groups (Denkinger et al., 2018; Kindermann et al., 2017; Lahav et al., 2016). In this context, previous studies described a secure attachment style as facilitating psychological adjustment in adverse situations and buffering the burdening psychological effects of traumatic stressors (Dekel, 2007; Mikulincer, Florian, & Weller, 1993; Muller, Sicoli, & Lemieux, 2000). Moreover, Bowlby (1973) identified a securely attached individual as having a positive attitude towards interpersonal experiences and a tendency to believe that others will help them in times of need (Bowlby, 1973). This attitude may allow affected individuals to cope with traumatic experiences and post-traumatic stress more effectively by actively seeking social support (Barbee & Cunningham, 1995; Dieperink et al., 2001; Kobak & Sceery, 1988; Mikulincer et al., 1993).

4.3. Implications for ECDs' working context

Our results may have important implications for ECD selection interviews. Employers could partly focus on sociodemographic variables, such as the number of children. Employees with a risk profile could consequently be offered help and support measures at an early stage. All ECDs should be properly informed about the risks of traumatization, depression and anxiety as possible sequelae of this specific working context during their training and regular meetings. Psychoeducational programmes for employees in the emergency service sector have already exhibited high effectiveness (Kagan & Watson, 1995). Moreover, the implementation of a standard

screening protocol for ECDs may help to identify psychological distress at an early stage and provide appropriate treatment, if necessary (Catherall, 1995). In addition, regular supervision by trained psychotherapists should be implemented as an obligatory measure to mitigate possible mental health consequences.

5. Strengths and limitations

The present investigation is the first study to examine the prevalence and possible risk factors of STS in ECDs resulting from the exposure to traumatic content during emergency calls. Furthermore, while most of the previous studies examined either PTSD or STS in different occupational groups, we examined both constructs simultaneously, demonstrating a high overlap of these constructs in the present study. However, several limitations of the present investigation should be addressed: First, our study is limited by the relatively small number of participants. However, compared to the existing literature, this investigation constitutes one of the largest studies to examine the prevalence of PTSD, depression, and anxiety as well as to characterize the attachment styles of ECDs. Second, generalizability is limited by the fact that the participants belonged to a convenience sample. Thirdly, the cross-sectional design is a limitation as the data obtained only represent one point in time and cannot be used to analyse the time-dependent development of psychological burden. Fourthly, the present investigation is limited by the administration of short screening questionnaires to ascertain the prevalence rates of PTSD, depression and anxiety, which do not allow making a definite diagnosis. A further limitation is the fact that we only investigated a selection of possible independent variables, which was based on an in-depth literature review. However, further variables may also be associated with symptom load of STS. Furthermore, generalizability may be limited in regard to the following aspects: a) the functional division into call-takers and dispatchers is not established in all German emergency control centres; b) some of the study's participants worked as ECDs and paramedics at times, which, again, may not be the case in other German emergency control centres.

6. Conclusions

Due to exposure to traumatic content during emergency calls, ECDs can develop STS. In addition, they frequently showed signs of PTSD and depression. A higher number of children and the absence of a secure attachment style were identified to be significantly associated with higher STS symptom load. Psychoeducational programmes, standard screening protocols for ECDs and regular supervision by

trained psychotherapists should progressively be implemented in emergency control centres to help identifying psychological distress in ECDs at an early stage and to provide appropriate treatment.

Authors' contributions

DK, MS, AN, and CN designed the study and its protocol. DK, MS, AN, CN and HCF were responsible for the realization of the study. CN and HCF were general supervisors of the study and were most helpful in assisting throughout. EN, AG and DK were responsible for the calculation of statistics. DK, MS, EN, AC, AG and CN conducted the main body of the work on this article. EN, AG, AC, AN, HCF and CN were involved in proofreading the article and gave their final approval.

Disclosure statement

No potential conflict of interest was reported by the authors.


Availability of data

The datasets used and analyzed in the present study are available from the corresponding author upon reasonable request.

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References

- Adams, K., Shakespeare-Finch, J., & Armstrong, D. (2015). An interpretative phenomenological analysis of stress and well-being in emergency medical dispatchers. *Journal of Loss & Trauma, 20*(5), 430–448.
- Adams, K. B., Matto, H. C., & Harrington, D. (2001). The Traumatic Stress Institute Belief Scale as a measure of vicarious trauma in a national sample of clinical social workers. *Families in Society, 82*(4), 363–371.
- Adams, R. E., Boscarino, J. A., & Figley, C. R. (2006). Compassion fatigue and psychological distress among social workers: A validation study. *American Journal of Orthopsychiatry, 76*(1), 103–108.
- Almetwally, E., & Almongy, H. (2018). Comparison between m estimation, s estimation, and mm estimation methods of robust estimation with application and simulation. *International Journal of Mathematical Archive, 9*(11), 1–9.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5®)*. American Psychiatric Pub.
- Arvey, M. J. (2001). Secondary traumatic stress among trauma counsellors: What does the research say? *International Journal for the Advancement of Counselling, 23*(4), 283–293.
- Asendorpf, J. B., Banse, R., Wilpers, S., & Neyer, F. J. (1997). Beziehungsspezifische Bindungsskalen für Erwachsene und ihre Validierung durch Netzwerk- und Tagebuchverfahren. *DIAGNOSTICA-GOTTINGEN-, 43*, 289–313.
- Baird, K., & Kracen, A. C. (2006). Vicarious traumatization and secondary traumatic stress: A research synthesis. *Counselling Psychology Quarterly, 19*(2), 181–188.
- Barbee, A. P., & Cunningham, M. R. (1995). An experimental approach to social support communications: Interactive coping in close relationships. *Annals of the International Communication Association, 18*(1), 381–413.
- Bartholomew, K., & Horowitz, L. M. (1991). Attachment styles among young adults: A test of a four-category model. *Journal of Personality and Social Psychology, 61*(2), 226.
- Baum, N. (2016). Secondary traumatization in mental health professionals: A systematic review of gender findings. *Trauma, Violence & Abuse, 17*(2), 221–235.
- Behrendt, S. (2015). *Add standardized regression coefficients to lm-objects*. Retrieved from <https://cran.r-project.org/web/packages/lm.beta/lm.beta.pdf>
- Berger, W., Coutinho, E. S. F., Figueira, I., Marques-Portella, C., Luz, M. P., Neylan, T. C., & Mendlowicz, M. V. (2012). Rescuers at risk: A systematic review and meta-regression analysis of the worldwide current prevalence and correlates of PTSD in rescue workers. *Social Psychiatry and Psychiatric Epidemiology, 47*(6), 1001–1011.
- Bifulco, A., Moran, P., Ball, C., & Bernazzani, O. (2002). Adult attachment style. I: Its relationship to clinical depression. *Social Psychiatry and Psychiatric Epidemiology, 37*(2), 50–59.
- Bjornestad, A. G., Schweinle, A., & Elhai, J. D. (2014). Measuring secondary traumatic stress symptoms in military spouses with the posttraumatic stress disorder checklist military version. *The Journal of Nervous and Mental Disease, 202*(12), 864–869.
- Bowlby, J. (1973). *Attachment and loss: Volume II: Separation, anxiety and anger* (pp. 1–429). London: The Hogarth Press and the Institute of Psycho-Analysis.
- Bowlby, J. (1982). Attachment and loss: Retrospect and prospect. *American Journal of Orthopsychiatry, 52*(4), 664.
- Bride, B. E., Robinson, M. M., Yegidis, B., & Figley, C. R. (2004). Development and validation of the secondary traumatic stress scale. *Research on Social Work Practice, 14*(1), 27–35.
- Cameron, R. P., & Gusman, D. (2003). The primary care PTSD screen (PC-PTSD): Development and operating characteristics. *Primary Care Psychiatry, 9*(1), 9–14.
- Catherall, D. R. (1995). Coping with secondary traumatic stress: The importance of the therapist's professional peer group. In B. H. Stamm (Ed.), *Secondary traumatic stress: Self-care issues for clinicians, researchers, and educators* (pp. 80–92). Derwood, MD: The Sidran Press.
- Choi, G.-Y. (2011). Organizational impacts on the secondary traumatic stress of social workers assisting family violence or sexual assault survivors. *Administration in Social Work, 35*(3), 225–242.
- Chrestman, K. R. (1995). Secondary exposure to trauma and self reported distress among therapists. *Professional Psychology, Research and Practice, 30*, 386–393.
- Cieslak, R., Shoji, K., Douglas, A., Melville, E., Luszczynska, A., & Benight, C. C. (2014). A meta-analysis of the relationship between job burnout and secondary traumatic stress among

- workers with indirect exposure to trauma. *Psychological Services*, 11(1), 75.
- Creamer, T. L., & Liddle, B. J. (2005). Secondary traumatic stress among disaster mental health workers responding to the September 11 attacks. *Journal of Traumatic Stress*, 18(1), 89–96.
- Cummins, R. O. (1993). Emergency medical services and sudden cardiac arrest: The “chain of survival” concept. *Annual Review of Public Health*, 14(1), 313–333.
- Daniels, J. (2008). Sekundäre Traumatisierung. *Psychotherapeut*, 53(2), 100–107.
- De Jong, G. M., van Sonderen, E., & Emmelkamp, P. M. (1999). A comprehensive model of stress. *Psychotherapy and Psychosomatics*, 68(6), 290–298.
- Dekel, R. (2007). Posttraumatic distress and growth among wives of prisoners of war: The contribution of husbands’ posttraumatic stress disorder and wives’ own attachment. *American Journal of Orthopsychiatry*, 77(3), 419–426.
- Denkinger, J. K., Windthorst, P., Rometsch-Ogioun El Sount, C., Blume, M., Sedik, H., Kizilhan, J. İ., ... Junne, F. (2018). Prevalence and determinants of secondary traumatization in caregivers working with women and children who suffered extreme violence by the ‘Islamic State’. *Frontiers in Psychiatry*, 9, 234.
- Dieperink, M., Leskela, J., Thuras, P., & Engdahl, B. (2001). Attachment style classification and posttraumatic stress disorder in former prisoners of war. *American Journal of Orthopsychiatry*, 71(3), 374–378.
- Dozier, M., Stovall-McClough, K. C., & Albus, K. E. (2008). Attachment and psychopathology in adulthood. In J. C. P. R. Shaver (Ed.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 718–744). New York: The Guilford Press.
- Dunford, J. V. (2002). Emergency medical dispatch. *Emergency Medicine Clinics of North America*, 20(4), 859–875.
- Ensel, W. M., & Lin, N. (2000). Age, the stress process, and physical distress: The role of distal stressors. *Journal of Aging and Health*, 12(2), 139–168.
- Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39(2), 175–191.
- Figley, C. R. (1995). *Compassion fatigue: Coping with secondary traumatic stress in those who treat the traumatized*. New York: Brunner/Mazel, Publishers.
- Figley, C. R. (2013). *Compassion fatigue: Coping with secondary traumatic stress disorder in those who treat the traumatized*. New York, NY: Routledge.
- Forslund, K., Kihlgren, A., & Kihlgren, M. (2004). Operators’ experiences of emergency calls. *Journal of Telemedicine and Telecare*, 10(5), 290–297.
- Ghahramanlou, M., & Brodbeck, C. (2000). Predictors of secondary trauma in sexual assault trauma counselors. *International Journal of Emergency Mental Health*, 2(4), 229–240.
- Greinacher, A., Derezza-Greeven, C., Herzog, W., & Nikendei, C. (2019). Secondary traumatization in first responders: A systematic review. *European Journal of Psychotraumatology*, 10(1), 1562840.
- Griffin, D. W., & Bartholomew, K. (1994). Models of the self and other: Fundamental dimensions underlying measures of adult attachment. *Journal of Personality and Social Psychology*, 67(3), 430.
- Hebbali, A. (2018). *olsrr: Tools for building OLS regression models*. Retrieved from <https://cran.r-project.org/web/packages/olsrr/olsrr.pdf>
- Hesse, A. R. (2002). Secondary trauma: How working with trauma survivors affects therapists. *Clinical Social Work Journal*, 30(3), 293–309.
- Kadambi, M. A., & Ennis, L. (2004). Reconsidering vicarious trauma: A review of the literature and its’ limitations. *Journal of Trauma Practice*, 3(2), 1–21.
- Kagan, N. I., & Watson, M. G. (1995). Stress reduction in the workplace: The effectiveness of psychoeducational programs. *Journal of Counseling Psychology*, 42(1), 71.
- Kessler, R. C., Aguilar-Gaxiola, S., Alonso, J., Benjet, C., Bromet, E. J., Cardoso, G., & Koenen, K. C. (2017). Trauma and PTSD in the WHO world mental health surveys. *European Journal of Psychotraumatology*, 8(sup5), 1353383.
- Kindermann, D., Jenne, M. P., Schmid, C., Bozorgmehr, K., Wahedi, K., Junne, F., ... Nikendei, C. (2019). Motives, experiences and psychological strain in medical students engaged in refugee care in a reception center—a mixed-methods approach. *BMC Medical Education*, 19(1), 1–14.
- Kindermann, D., Schmid, C., Derezza-Greeven, C., Huhn, D., Kohl, R. M., Junne, F., ... Nikendei, C. (2017). Prevalence of and risk factors for secondary traumatization in interpreters for refugees: A cross-sectional study. *Psychopathology*, 50(4), 262–272.
- Kirby, R., Shakespeare-Finch, J., & Palk, G. (2011). Adaptive and maladaptive coping strategies predict posttrauma outcomes in ambulance personnel. *Traumatology*, 17(4), 25–34.
- Kobak, R. R., & Sceery, A. (1988). Attachment in late adolescence: Working models, affect regulation, and representations of self and others. *Child Development*, 59, 135–146.
- Kroenke, K., Spitzer, R. L., & Williams, J. B. (2003). The Patient Health Questionnaire-2: Validity of a two-item depression screener. *Medical Care*, 41, 1284–1292.
- Kroenke, K., Spitzer, R. L., Williams, J. B., & Löwe, B. (2009). An ultra-brief screening scale for anxiety and depression: The PHQ-4. *Psychosomatics*, 50(6), 613–621.
- Kroenke, K., Spitzer, R. L., Williams, J. B., Monahan, P. O., & Löwe, B. (2007). Anxiety disorders in primary care: Prevalence, impairment, comorbidity, and detection. *Annals of Internal Medicine*, 146(5), 317–325. PubMed PMID: 17339617.
- LaFauci Schutt, J. M., & Marotta, S. A. (2011). Personal and environmental predictors of posttraumatic stress in emergency management professionals. *Psychological Trauma: Theory, Research, Practice, and Policy*, 3(1), 8.
- Lahav, Y., Kanat-Maymon, Y., & Solomon, Z. (2016). Secondary traumatization and attachment among wives of former POWs: A longitudinal study. *Attachment & Human Development*, 18(2), 141–153.
- Lee, J., Lim, N., Yang, E., & Lee, S. M. (2011). Antecedents and consequences of three dimensions of burnout in psychotherapists: A meta-analysis. *Professional Psychology, Research and Practice*, 42(3), 252.
- Lee, J. J., Gottfried, R., & Bride, B. E. (2018). Exposure to client trauma, secondary traumatic stress, and the health of clinical social workers: A mediation analysis. *Clinical Social Work Journal*, 46(3), 228–235.
- Lerias, D., & Byrne, M. K. (2003). Vicarious traumatization: Symptoms and predictors. *Stress and Health: Journal of the International Society for the Investigation of Stress*, 19(3), 129–138.
- Löwe, B., Kroenke, K., & Gräfe, K. (2005). Detecting and monitoring depression with a two-item questionnaire (PHQ-2). *Journal of Psychosomatic Research*, 58(2), 163–171.

- Löwe, B., Wahl, I., Rose, M., Spitzer, C., Glaesmer, H., Wingenfeld, K., ... Brähler, E. (2010). A 4-item measure of depression and anxiety: Validation and standardization of the Patient Health Questionnaire-4 (PHQ-4) in the general population. *Journal of Affective Disorders*, 122(1-2), 86-95.
- MacRitchie, V., & Leibowitz, S. (2010). Secondary traumatic stress, level of exposure, empathy and social support in trauma workers. *South African Journal of Psychology*, 40(2), 149-158.
- Maguen, S., Lucenko, B. A., Reger, M. A., Gahm, G. A., Litz, B. T., Seal, K. H., & Marmar, C. R. (2010). The impact of reported direct and indirect killing on mental health symptoms in Iraq war veterans. *Journal of Traumatic Stress*, 23(1), 86-90.
- Marmar, C. R., Weiss, D. S., Metzler, T. J., & Delucchi, K. (1996). Characteristics of emergency services personnel related to peritraumatic dissociation during critical incident exposure. *The American Journal of Psychiatry*, 153(Suppl), 94-102.
- Marmar, C. R., Weiss, D. S., Metzler, T. J., Ronfeldt, H. M., & Foreman, C. (1996). Stress responses of emergency services personnel to the Loma Prieta earthquake Interstate 880 freeway collapse and control traumatic incidents. *Journal of Traumatic Stress*, 9(1), 63-85.
- Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology*, 52(1), 397-422.
- McCann, I. L., & Pearlman, L. A. (1990). Vicarious traumatization: A framework for understanding the psychological effects of working with victims. *Journal of Traumatic Stress*, 3(1), 131-149.
- Meischke, H., Chavez, D., Bradley, S., Rea, T., & Eisenberg, M. (2010). Emergency communications with limited-English-proficiency populations. *Prehospital Emergency Care*, 14(2), 265-271.
- Mikulincer, M., Florian, V., & Weller, A. (1993). Attachment styles, coping strategies, and posttraumatic psychological distress: The impact of the Gulf War in Israel. *Journal of Personality and Social Psychology*, 64(5), 817.
- Miller, L. (1995). Tough guys: Psychotherapeutic strategies with law enforcement and emergency services personnel. *Psychotherapy: Theory, Research, Practice, Training*, 32(4), 592.
- Muller, R. T., Sicoli, L. A., & Lemieux, K. E. (2000). Relationship between attachment style and posttraumatic stress symptomatology among adults who report the experience of childhood abuse. *Journal of Traumatic Stress*, 13(2), 321-332.
- Murphy, B., & Bates, G. W. (1997). Adult attachment style and vulnerability to depression. *Personality and Individual Differences*, 22(6), 835-844.
- Nolan, J., Soar, J., & Eikeland, H. (2006). The chain of survival. *Resuscitation*, 71(3), 270-271.
- O'Connor, M., & Elklit, A. (2008). Attachment styles, traumatic events, and PTSD: A cross-sectional investigation of adult attachment and trauma. *Attachment & Human Development*, 10(1), 59-71.
- Olf, M., Amstadter, A., Armour, C., Birkeland, M. S., Bui, E., Cloitre, M., ... Thoresen, S. (2019). A decennial review of psychotraumatology: What did we learn and where are we going? *European Journal of Psychotraumatology*, 10(1), 1672948.
- Orbach, Y., Lamb, M. E., Sternberg, K. J., Williams, J., & Dawud-Noursi, S. (2001). The effect of being a victim or witness of family violence on the retrieval of autobiographical memories. *Child Abuse & Neglect*, 25(11), 1427-1437.
- Osofsky, J. D., Putnam, F. W., & Lederman, J. C. S. (2008). How to maintain emotional health when working with trauma. *Juvenile & Family Court Journal*, 59(4), 91-102.
- Pearlman, L. A., & Mac Ian, P. S. (1995). Vicarious traumatization: An empirical study of the effects of trauma work on trauma therapists. *Professional Psychology, Research and Practice*, 26(6), 558.
- Prins, A., Bovin, M. J., Kimerling, R., Kaloupek, D. G., Marx, B. P., Pless Kaiser, A., & Schnurr, P. P. (2015). *The Primary Care PTSD Screen for DSM-5 (PC-PTSD-5)* [Measurement instrument]. Retrieved from <http://www.ptsd.va.gov>
- Püttker, K., Thomsen, T., & Bockmann, A.-K. (2015). Sekundäre traumatisierung bei traumatherapeutinnen. *Zeitschrift für Klinische Psychologie und Psychotherapie*, 44, 254-265.
- R Core Team. (2019). *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing.
- Richardson, L. K., Frueh, B. C., & Acierno, R. (2010). Prevalence estimates of combat-related post-traumatic stress disorder: Critical review. *Australian and New Zealand Journal of Psychiatry*, 44(1), 4-19.
- Robinson, T. M. (2016). *Predictive factors of compassion fatigue among firefighters*. Retrieved from <https://scholarworks.waldenu.edu/cgi/viewcontent.cgi?referer=http://scholar.google.de/&httpsredir=1&article=3435&context=dissertations>
- Rosenstein, D. S., & Horowitz, H. A. (1996). Adolescent attachment and psychopathology. *Journal of Consulting and Clinical Psychology*, 64(2), 244.
- Rzeszutek, M., Partyka, M., & Gołąb, A. (2015). Temperament traits, social support, and secondary traumatic stress disorder symptoms in a sample of trauma therapists. *Professional Psychology, Research and Practice*, 46(4), 213.
- Shakespeare-Finch, J., Rees, A., & Armstrong, D. (2015). Social support, self-efficacy, trauma and well-being in emergency medical dispatchers. *Social Indicators Research*, 123(2), 549-565.
- Shirom, A., & Melamed, S. (2006). A comparison of the construct validity of two burnout measures in two groups of professionals. *International Journal of Stress Management*, 13(2), 176.
- Sodeke-Gregson, E. A., Holttum, S., & Billings, J. (2013). Compassion satisfaction, burnout, and secondary traumatic stress in UK therapists who work with adult trauma clients. *European Journal of Psychotraumatology*, 4(1), 21869.
- Stipulante, S., El Fassi, M., Donneau, A.-F., Van Troyen, B., Hartstein, G., D'Orio, V., ... Ghuysen, A. (2014). Implementation of the ALERT algorithm, a new dispatcher-assisted telephone cardiopulmonary resuscitation protocol, in non-Advanced Medical Priority Dispatch System (AMPDS) Emergency Medical Services centres. *Resuscitation*, 85(2), 177-181.
- Stratton, S. J. (1992). Triage by emergency medical dispatchers. *Prehospital and Disaster Medicine*, 7(3), 263-269.
- Van der Kolk, B. A., McFarlane, A. C., & Weisath, L. (1996). *Traumatic stress: The effects of overwhelming stress on mind*. New York: Guilford.
- Venables, W. N., & Ripley, B. D. (2013). *Modern applied statistics with S*. New York: Springer.
- Waysman, M., Mikulincer, M., Solomon, Z., & Weisenberg, M. (1993). Secondary traumatization among wives of posttraumatic combat veterans: A family typology. *Journal of Family Psychology*, 7(1), 104.

- Weitkamp, K., Daniels, J. K., & Klasen, F. (2014). Psychometric properties of the questionnaire for secondary traumatization. *European Journal of Psychotraumatology*, 5, 21875. Epub 2014/01/16. PubMed PMID: 24427450; PubMed Central PMCID: PMC3888907.
- Willett, J. B., & Singer, J. D. (1988). Another cautionary note about R 2: Its use in weighted least-squares regression analysis. *The American Statistician*, 42(3), 236–238.
- Wittchen, H.-U., Jacobi, F., Rehm, J., Gustavsson, A., Svensson, M., Jönsson, B., ... Steinhausen, H.-C. (2011). The size and burden of mental disorders and other disorders of the brain in Europe 2010. *European Neuropsychopharmacology*, 21(9), 655–679.
- Woodhouse, S., Ayers, S., & Field, A. P. (2015). The relationship between adult attachment style and post-traumatic stress symptoms: A meta-analysis. *Journal of Anxiety Disorders*, 35, 103–117.
- World Medical Association. (2013). World Medical Association Declaration of Helsinki: Ethical principles for medical research involving human subjects. *Jama*, 310(20), 2191.
- Zeileis, A., & Hothorn, T. (2002). Diagnostic checking in regression relationships. *R News*, 2, 7–10. Retrieved from <http://CRAN.R-project.org/doc/Rnews/>
- Zimering, R., Munroe, J., & Gulliver, S. (2003). Secondary traumatization in mental health care providers. *Psychiatric Times*, 20(4). Retrieved from <http://www.georgiadisaster.info/Healthcare/HCI13%20SecondaryStress/Link%20-%20Secondary%20Traumatization%20in%20MH%20Care%20Providers.pdf>