

**THE JUDGEMENT OF RISK IN
TRAUMATISED AND NON-TRAUMATISED
EMERGENCY MEDICAL SERVICE PERSONNEL**

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DECLARATION

I, the undersigned, declare that the work contained in this thesis is my own original work and has not previously, in its entirety or in part, been submitted at any university for a degree.

C.B. Roberts

OPSOMMING

Oordeel oor risiko vir negatiewe gebeurtenisse in sekere situasies is ondersoek by 'n groep mediese nooddienpersoneel met 'n diagnose van posttraumatische stresversteuring (PTSV; $n = 27$) en 'n groep sonder PTSV ($n = 74$). Deelnemers het die PTSD Symptom Scale: Self-Report version (Foa, Riggs, Dancu, & Rothbaum, 1993), 'n mediese nooddien werkservaringe-vraelys, die Beck Depression Inventory (Beck, Rush, Shaw, & Emery, 1979), en 'n gebeurtenis-waarskynlikheidsvraelys wat opgestel is om oordeel oor risiko te meet, voltooi. Deelnemers met PTSV het die mate van risiko betrokke oorskakel in vergelyking met deelnemers sonder PTSV en sodoende 'n beoordelingsydigheid vir risiko-verbandhoudende situasies gedemonstreer. In die huidige studie is gevind dat beoordelingsydigheid by PTSV deelnemers nie beperk was tot eksterne skade-verbandhoudende gebeurtenisse nie, maar dat dit ook veralgemeen het na algemene negatiewe gebeurtenisse (sonder potensieel skadelike gevolge), negatiewe sosiale gebeurtenisse, en negatiewe werksverwante gebeurtenisse. Daar is gevind dat, wat PTSV-simptomatologie betref, vermyding die beste voorspeller van beoordelingsydigheid was. Die resultate van die huidige studie word bespreek in terme van kognitiewe klinies-sielkundige teorieë van PTSV, wat die aanwesigheid van beoordelingsydigheid voorspel, en kognitiewe eksperimentele-sielkunde verklarings van die effek van negatiewe emosionele toestande op beoordelingsprosesse.

ABSTRACT

Judgement of risk for negative events in certain situations was investigated in a group of emergency medical service (EMS) personnel with a diagnosis of posttraumatic stress disorder (PTSD; $n = 27$) and a group without PTSD ($n = 74$). Participants completed the PTSD Symptom Scale: Self-Report version (Foa, Riggs, Dancu, & Rothbaum, 1993), an EMS work experiences questionnaire, the Beck Depression Inventory (Beck, Rush, Shaw, & Emery, 1979), and an event probability questionnaire designed to assess judgement of risk. Participants with PTSD overestimated amount of risk involved in comparison to participants without PTSD, thereby demonstrating a judgement bias for risk related events. The present study found that the judgement bias in PTSD participants extended to include not just external harm related events but also general negative events (without potential threatening/harmful consequences), negative social events, and negative work-related events. Of the posttraumatic symptomatology assessed, avoidance symptomatology was found to be the best predictor of judgement bias. The results of the present study are discussed in terms of the cognitive clinical psychology theories of PTSD, which predict the manifestation of judgement bias in PTSD, and cognitive experimental psychology explanations of the effect of negative emotional states on judgement processes.

This work is the result of a research project, which is of the same extent as that required for master's theses

It is a rule of the Department of Psychology that the report of the research may take the form of an article, which is ready for submission for publication to a scientific journal.

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Dedicated to Denise with love and gratitude.

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1. Introduction

When an individual experiences a traumatic event certain negative psychological consequences may arise. Although no single outcome from exposure to a traumatic event can be expected a distinct cluster of symptoms is often identifiable and associated with a pathological reaction to a traumatic stressor. In 1980 the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III) of the American Psychiatric Association (APA, 1980) provided the framework for a concept termed posttraumatic stress disorder (PTSD). The diagnostic specification was largely influenced by Horowitz's (1976, 1979) work on the phenomenology of trauma-related reactions.

It is clear that the criteria that define PTSD are by no means exhaustive with respect to the types of reactions that individuals experience following a traumatic event. The concept does however provide a useful and coherent framework within which to consider these reactions. Consequently, the present discussion will concentrate on PTSD, as defined by the Diagnostic and Statistical Manual of Mental Disorders: Fourth Edition (DSM-IV; APA, 1994), as an exemplar of the kinds of emotional reactions that people experience. A diagnosis of PTSD is only made one month after the traumatic event. Psychopathological reactions with a similar symptom profile are diagnosed as an acute stress disorder (ASD) in the interim period (APA, 1994).

PTSD diverges from most other psychiatric disorders in that it includes an etiological variable in its criteria. PTSD is primarily characterised by the experience of a traumatic event. The traumatic event may be experienced in one of the following ways: directly experiencing a traumatic event, witnessing a traumatic event, or being confronted with an event that involves actual or threatened death or serious injury, or a threat to the physical integrity of self or others. The person's response to the traumatic event must involve fear, helplessness, or horror (APA, 1994).

Symptomatic experiences that typify PTSD are broadly divided into three distinct but related categories by the DSM-IV. The first category includes certain intrusive symptoms: re-experiencing of the traumatic event through nightmares, flashbacks, and/or intrusive memories. The second category contains certain avoidance symptoms: inhibitory cognitive and behavioural processes such as avoidance of associated stimuli, social withdrawal, and emotional numbing where the individual is unable to feel a range of emotions. Finally, in the third category one finds symptoms of hyperarousal, including hypervigilance, irritability and an exaggerated startle response.

Emergency medical service (EMS) personnel constitute one group who is at particular risk for developing PTSD (Weiss, Marmar, Metzler, & Ronfeldt, 1995). They are confronted with scenes of death, mutilation, personal risk, and involved in high anxiety situations by virtue of the task nature of their occupation (A.

Crossley, personal communication, August 1999; Paton & Violanti, 1996). For the purpose of the present study EMS personnel are defined as medical care workers (e.g., ambulance persons) who provide emergency and rescue services in the pre-hospital phase of care (i.e., before a patient is admitted to a hospital).

Grevin (1996) likened the trauma suffered by EMS personnel to that suffered by soldiers on the battlefield. She related this to the chronic high exposure to human suffering and death, and working in hazardous environments on a continuous basis. Grevin found that the level of posttraumatic stress was not related to years of experience in the EMS profession, indicating that factors other than chronic exposure to traumatic incidents play a significant role in the development of PTSD.

In order to assess the various occupational aspects that may be associated with posttraumatic stress reactions in EMS workers, Beaton, Murphy, Johnson, Pike, and Corneil (1998) asked urban EMS workers to rate the severity of actual and/or potential duty-related incident stressors. An analysis yielded five occupational component stressors. Catastrophic injury to self or one's co-worker was deemed to be the most stressful, followed by the witnessing of gruesome victim incidents, rendering aid to seriously injured persons, being exposed to vulnerable victims such as children, minor injury to one's self, and exposure to the death and dying of others. The results of this study illustrate the various pathways to psychological trauma experienced by EMS workers, indicating that the traumatic

event may be of a primary (e.g. catastrophic injury to self), or secondary nature (e.g., rendering aid to a seriously injured child).

The incidence and prevalence of acute stress reactions, and PTSD in EMS workers has been well-documented (Bryant & Harvey, 1995; Grevin, 1996; Oosthuizen, 1994; Strydom, 1995). Studies have consistently shown the prevalence rate of PTSD in EMS to be extremely high in comparison to that in the general population (Wagner, Heinrichs, & Ehler, 1998)

In recent years post-trauma research has begun to focus on the role of cognitive factors in the development and maintenance of PTSD. There is a growing body of evidence that suggests that cognitive factors may be at least as important as trauma severity and variations in pre-trauma experience (e.g., Foa, Steketee, & Rothbaum, 1989; Horowitz, 1986; Janoff-Bulman, 1985). In addition, research has begun to investigate the specific nature of cognitive biases found in PTSD (McNally, Kaspi, Riemann, & Zeitlin, 1990; Smith & Bryant, in press; Zeitlin & McNally, 1991).

Research on cognitive bias in PTSD has recently turned to the information-processing paradigm derived from experimental cognitive psychology (Thrasher & Dalgleish, 1999). This paradigm has proven useful in accounting for a range of cognitive phenomena in emotional disorders such as depression and anxiety disorders) (McNally, 1998; Williams, Watts, MacLeod, & Mathews, 1997).

Thrasher and Dalgleish (1999) pronounce the application of the information-processing paradigm to PTSD to be particularly compelling, as a number of symptoms of PTSD are suggestive of basic cognitive distortions. For example, several of the key defining features of PTSD are symptoms that reflect problems related to perception, attention, and memory processes.

Three main investigation areas within the information-processing approach to PTSD have been delineated namely attention bias, memory bias, and judgement bias. Thrasher and Dalgleish (1999) indicate that PTSD research into these cognitive processes is still in its infancy and that additional research is needed to investigate these processes. The present study focussed on the judgement of risk as an exemplar of a cognitive process that may become affected by PTSD, that is, where the risk for negative events is overestimated. This is referred to as judgement bias.

The investigation of judgement focuses on how individuals evaluate the probability of future events occurring under conditions of uncertainty. In a variety of circumstances individuals are required to make a prediction (judgement) about the likelihood of the occurrence of uncertain events. This is an everyday process and is common to all persons and found in all spheres of life. Examples of this process include estimating what time a spouse will return home after work, projecting the price of a loaf of bread next year, or judging the future prognosis of a patient under treatment.

Events that are judged in terms of the probability of their occurrence vary in nature. Some can be relatively mundane events such as the likelihood of receiving your post on time, while others refer to events that may have adverse consequences should they occur, such as the likelihood of being assaulted. It is evident that certain events involve a greater degree of negative consequences and risk. Estimating the likelihood of the occurrence of negative and threatening events is defined as the judgement of *risk*.

Individuals are required to make judgements of the likelihood of events happening in relation to themselves and in relation to other persons. When an individual judges the likelihood of an event happening to him or herself it is referred to as a self-referent judgement for example, judging the likelihood of personally being involved in an accident. When an individual judges the likelihood of an event happening to another person it is referred to as an other-referent judgement for example, judging the likelihood of a neighbour being burgled (Kahneman, Slovic, & Tversky, 1982).

Traditionally, research into the psychological processes underlying judgement has sought to develop normative idealised models that describe how persons judge the probability of an event's occurrence (Kahneman, et al., 1982). Perhaps not surprisingly, many of the decisions which individuals make diverge from the predictions of these idealised models. In addition it has been observed that some individuals will judge the probability of an event's occurrence to be much more

likely in comparison to other individuals (Johnson & Tversky, 1983). Empirical investigations of this question often come under the heading of judgement *bias* research.

Judgement research is traditionally conducted by asking research participants to rate the likelihood of an event's occurrence on a Likert-type scale. For example, when investigating judgement of risk, participants may be asked to rate the likelihood of having a heart attack, being robbed, or failing an exam. Judgement bias is in turn assessed by comparing two groups of participants who differ according to a predetermined variable such as level of anxiety. The participants are then compared to determine if participants with a high anxiety level judge the likelihood of the events differently to participants with a low anxiety level. If a significant difference in judgement of risk is found between the two groups, a judgement bias is said to be present in the group that gave the higher rating.

The present study considered judgement of risk in PTSD from the information-processing perspective. The information-processing approach to emotional disorders utilises theoretical propositions and research from the perspectives of both cognitive psychology and clinical psychology to conceptualise biases in cognitive processes (Williams, et al., 1997). Consequently the concept of judgement of risk bias in PTSD in the present study was examined from both these perspectives. The clinical psychology perspective (information-processing theories of PTSD) provides a conceptual framework that predicts the

manifestation and nature of judgement bias in PTSD while the cognitive psychology perspective provides a description of the mechanisms of judgement processes under conditions of negative emotion states (i.e., emotional disorders). The clinical perspective is discussed first, followed by the cognitive psychology perspective.

Certain information-processing theories of PTSD provide conceptual frameworks that predict judgement biases in PTSD. The theories of Foa et al. (1989) and Chemtob, Roitblat, Hamada, Carlson, and Twentyman (1988) are discussed accordingly.

Applying Lang's (1977, 1979) theory of fear structures as a network in memory and Foa and Kozak's (1986) adaptation of this analysis to anxiety disorders, Foa et al. (1989) have outlined an information-processing theory of PTSD. The theory focuses on the formation of a fear network in long-term memory. It is proposed that the fear structure (cf. Lang) present in PTSD consists of mental representations of trauma-related stimuli, information about cognitive, behavioural, and physiological reactions to the event, and meanings associated with the stimulus and response elements.

It is proposed that the activation of the fear structure will cause individuals with PTSD to evidence a range of cognitive biases (Foa et al, 1989). The theory posits that the activation of the network results in attentional bias to potential

threats, intrusive thoughts of the trauma (memory bias), and exaggerated beliefs about trauma-related issues (Litz & Keane, 1989). Judgement bias can be viewed as a component of exaggerated beliefs about trauma-related issues.

Foa et al. (1989) propose that in contrast to other anxiety disorders, in which fear structures are more circumscribed, the fear structure in PTSD is more pervasive regarding stimuli, responses, and meanings that connate danger. The fear network in PTSD extends to a wider array of situations due to the diffuse and loosely associated nature of the network (Foa et al. 1989). Consequently situations previously considered safe become cues for danger. This predicts that biases in the judgement of risk would extend to a range of threatening situations including those previously (before the trauma) perceived as benign. Judgement biases in PTSD are therefore predicted to be more pervasive and extend across a wide array of threatening situations.

Thrasher and Dalgleish (1999) state that the activation of the fear network makes it difficult for individuals with PTSD to distinguish between safe situations and threatening situations. It is proposed that this difficulty in distinguishing between safe and threatening situations occurs principally with respect to the self. It can therefore be expected that the exaggerated trauma-related beliefs and judgement bias in individuals with PTSD will be of a self-referent nature.

The cognitive action theory of Chemtob et al. (1988) constitutes a second clinical conceptualisation that predicts judgement bias in PTSD. Chemtob et al. use a hierarchical fear network model to describe the development and maintenance of PTSD. They argue that, in individuals with PTSD, the fear network is permanently activated causing them to function in a way that was adaptive during the experience of the traumatic incident.

The postulation that threat-related arousal is always activated to some degree (i.e., potentiated) increases the likelihood that individuals will search for and identify threatening information (Chemtob et al., 1988). The elements of the fear network are organised in a feedback loop such that threat-related arousal leads to threat-seeking behaviour that leads to a greater likelihood of interpreting ambiguous information as threatening (Jones & Barlow, 1990). The permanent activation of the fear network in individuals with PTSD causes them to function in a survival mode whereby attention and memory is biased toward threat-related information. A consequence of this is that individuals with high levels of PTSD symptomatology will show a judgement bias for threatening events.

The theories of Foa et al. (1989) and Chemtob et al. (1988) predict the manifestation of judgement bias in PTSD. A number of cognitive psychology descriptions of judgement processes serve to explain the mechanisms responsible for judgement bias in emotional disorders such as PTSD. These will be considered accordingly.

Tversky and Kahneman (1974) describe an 'availability heuristic' to explain how people estimate the probability of an event's occurrence in certain circumstances. The availability heuristic essentially states that the probability of the occurrence of an event is a function of the availability in memory of instances and scenarios similar to the event in question. When judging the probability of an uncertain event, for example, it may often be useful to base one's estimation on the ease with which similar examples can be accessed from memory.

The availability heuristic can be used as a framework for understanding how judgements are influenced by negative emotional states. Johnson and Tversky (1983) showed that subjects who had read newspaper reports vividly describing the death of an individual showed increases in the judgement of risk of all causes of death, rather than specific increases relating to similarity between the newspaper account and the causes of death to be rated. They proposed that this was due to the negative emotional reaction resulting from reading the newspaper report. Johnson and Tversky demonstrated that a negative emotional reaction to an event increased the availability in memory of similar events and was consequently a decisive factor in predicting elevated judgement risk.

The findings of Johnson and Tversky (1983) can also be considered from the "spreading activation" hypothesis (Kavanagh & Bower, 1985). This hypothesis suggests that a negative emotional state (e.g., fear in PTSD) leads to the activation in memory of events linked to a particular mood state as predicted by

the network theory of mood and memory of Bower (1981, 1987). It is argued that the activation spreads equally to all events linked to a particular emotional state resulting in an increase in the judgement of risk across a range of events. Research has provided support for this hypothesis showing that a negative emotional state has an effect on the judgement of risk (Kavanagh & Bower, 1985).

An alternative to the availability heuristic and “spreading activation” account is the “feelings as information” hypothesis that indicates that people use their own mood state as a source of information when making judgements of risk (Schwarz & Clore, 1983; 1988). This explanation suggests that a particular mood state serves as evidence for a wide range of judgements, as long as the events to be judged are congruent with the mood state of the person. When required to judge the likelihood of an event’s occurrence, a person will ask, “how do I feel about it?” and use their emotional reaction as a guide in estimating the likelihood of the event occurring. Schwarz and Clore (1988) suggest that the undifferentiated and unfocused nature of mood states make them informative for a wide range of judgements. Accordingly, an anxious mood state will result in an increase in the judgement of risk across a wide range of events.

The availability heuristic, “spreading activation” account, and the “feelings as information” hypothesis have been shown to have broad descriptive applicability in understanding the effects of emotional disorders on the judgement of risk

(Williams et al., 1997). These explanations provide insight into the manifestation of judgement bias in PTSD by providing explanations as to the cognitive mechanisms involved in the judgement of risk in negative emotional states.

Cognitive bias, in the form of exaggerated judgement of risk, has been studied in various anxiety disorders such as generalised anxiety (Butler & Mathews, 1983; 1987), agoraphobia (McNally & Foa, 1987), social phobia (Foa, Franklin, Perry, & Herbert, 1996; Warren, Zgourides, & Jones, 1989), social anxiety (Lucock & Salkovskis, 1988), and childhood anxiety (Dalglish et al., 1997). The studies have consistently shown that judgement bias is evident in anxiety disorders. In addition it was shown that judgement bias in anxious subjects was of a self-referent and not of an other-referent nature.

To date three studies have investigated judgement bias in posttraumatic stress disorders. In the first study Dalglish (1993) investigated survivors of a ferry disaster. He asked them to rate the probability of occurrence of a number of incidents, some relating specifically to transport events. Each item referred either to the self or another person. Results indicated that survivors with high levels of PTSD symptoms showed higher judgements of risk across all event types in comparison to survivors with low PTSD symptomatology. Dalglish found that the judgement bias in traumatised survivors was of a self-referent nature.

Warda and Bryant (1998) investigated judgement bias in ASD with motor-vehicle accident survivors. Individuals were required to rate the likelihood of the occurrence of a range of negative events. They found that individuals with ASD overestimated the likelihood that negative events would happen to them in comparison to individuals without ASD, that is, a judgement bias was found.

Warda and Bryant (1998) found that avoidance symptomatology was the most significant factor in accounting for the variance in judgement bias in comparison to intrusion symptoms and symptoms of depression and general anxiety. They suggested that this finding indicated that avoidance reactions contribute to cognitive biases over and above the influence of general anxiety or depression.

Smith and Bryant (in press) investigated the generality of judgement bias in this population. By diversifying the range of items in the questionnaire to include items which involve external harm, social anxiety or somatic complaints they showed that individuals with ASD overestimated the probability of a range of negative events in comparison to individuals without ASD. This finding provided support for the theory regarding the wide and diffuse nature of the fear structure in individuals with PTSD (Foa et al., 1989).

The research on judgement bias in PTSD has supported research conducted with other anxiety disorder groups. A significant finding is that judgement bias in PTSD appears to be diffuse and generalised to a variety of domains including

those not directly associated with traumatic events (e.g., somatic complaints). In other words it appears that judgement bias in PTSD globalises across a diverse range of events. Research on judgement bias in PTSD is still in its infancy however and Warda and Bryant (1998) indicate the need for research with other trauma populations.

EMS personnel can be considered an appropriate population in which to investigate judgement bias associated with PTSD. It has been shown that EMS personnel have to endure more traumatic events in a month than members of the general population can expect to encounter in a lifetime (Paton & Violanti, 1996). A consequence of this is that EMS personnel have greatly elevated levels of PTSD in comparison to the general population. EMS personnel constitute a convenient population in the investigation of judgement bias in PTSD.

The present study subsequently investigated judgement of risk in a group of EMS personnel. The primary aim of the current study was to establish whether a diagnosis of PTSD was associated with a judgement bias for negative events. It was predicted that EMS personnel with PTSD would overestimate the likelihood of the occurrence of negative events in comparison to EMS personnel without PTSD, thereby indicating a judgement bias.

In addition, the present study investigated whether judgement bias in PTSD was generalised across a range of events. This was investigated by determining if judgement bias was circumscribed to external threat-related events or if judgement bias was found in other types of negative events (e.g., social events). It was predicted that judgement bias in EMS personnel with PTSD would extend across a range of negative events to include events not associated with external harm or threat.

The present study also sought to determine which component of posttraumatic symptomatology was the best predictor of judgement bias in EMS personnel. It was predicted that avoidance symptomatology would be the best predictor of judgement bias.

2. Method

2.1. Design

A sample of EMS personnel on active duty was assessed for PTSD and associated symptoms by means of self-report instruments. Demographic and work-related information was also obtained. Participants were administered a self-report questionnaire which assessed the subjective judgement of risk. To determine whether PTSD was associated with a judgement bias, participants with PTSD were compared to participants without PTSD in terms of judgement of

risk scores. An investigation was subsequently conducted to determine which dimension of posttraumatic symptomatology was the best predictor of judgement bias.

2.2.Participants

The present study was conducted in co-operation with the personnel of the Western Cape Metropolitan Emergency Medical and Rescue Services and the Ambulance Training College in Cape Town. Permission was obtained from the Director of Health Support Services of the Western Cape to complete the research. One hundred and one EMS workers in the Western Cape were included in the final sample of the study. The group consisted of EMS personnel actively involved in emergency medical care work.

Participants were only included in the study if they had experienced a traumatic event in the previous year. Participants were categorised according to their scores on the PTSD Symptom Scale (PSS-SR; Foa, et al., 1993). Participants were considered to suffer from PTSD if they met the DSM-IV criteria for PTSD (APA, 1994) as diagnosed on the PSS-SR and if they scored 18 or more on the severity of symptoms scale of the PSS-SR. The aim of the inclusion of the '18 or more' severity score was to ensure that those participants who met the criteria for PTSD experienced at least moderate symptom severity.

The groups used in this study were as follows. The *No PTSD group* ($n = 74$; 70 men and 4 women) failed the criteria for PTSD as defined above. The *PTSD group* ($n = 27$; 24 men and 3 women) met the requirements for PTSD at the time of assessment.

2.3. Measures

2.3.1. EMS Work Experiences Questionnaire (EWEQ)

The EWEQ was specifically designed for the purpose of the present study. The first question assessed whether participants had experienced a traumatic event. (Criterion A of PTSD of the DSM – IV). The following section assessed the frequency of exposure to a list of 33 duty-related traumatic experiences. Participants were required to indicate frequency of exposure to each of the events, using a 4-point scale where 0 = never, 1 = seldom, 2 = sometimes, and 3 = often. The duty-related items were principally taken from a study by Beaton et al. (1998). Further items, which were specifically related to the work experiences of South African EMS personnel, were included. These items were generated by experienced paramedics of the Ambulance Training College and EMS personnel directly involved in the psychological debriefing of EMS personnel.

The purpose of the questionnaire was firstly, to assess whether participants had been exposed to a traumatic event (Criterion A of PTSD) and secondly, to determine frequency of exposure to duty-related traumatic stressors in the

preceding year. The questionnaire was not a formally standardised psychometric instrument. Data relating to the specific content of duty-related stressors was used for the purpose of another study and will not be discussed in the present study.

2.3.2. PTSD Symptom Scale: Self-Report version (PSS-SR; Foa et al., 1993)

The PSS–SR is a 17-item scale that measures the presence and severity of each of DSM – IV symptom criteria on a 4-point Likert-type scale. The PSS–SR was initially based on the criteria of the Diagnostic and Statistical Manual of Mental Disorders: Third Edition, Revised (DSM-III-R) criteria (APA, 1987) but has been altered by Foa and her colleagues to account for a minor change to DSM–IV criteria. It consequently corresponds to the symptom criteria of the DSM–IV in its present form with the three symptom clusters of intrusion, avoidance, and arousal represented. The PSS–SR serves as a self-report scale for diagnosing PTSD.

The PSS – SR has demonstrated highly satisfactory psychometric properties (Foa, Cashman, Jaycox, & Perry, 1997). Internal consistency of the total symptom scale (0.91) and the three symptom clusters (0.78 for Intrusion, 0.80 for Avoidance, and 0.82 for Arousal) were high. Moderate test-retest reliability over a 1-month period was obtained (correlation coefficient = 0.74). Foa et al. (1997) stated that moderateness in test-retest reliability was to be expected due to the differential rate of recovery of recently traumatised victims. The questionnaire

has also showed good agreement with the Structured Clinical Interview (SCID; Spitzer, Williams, Gibbons, & First, 1990), for DSM-III-R diagnoses of PTSD for which the kappa was found to be 0.68 (Foa et al., 1993).

2.3.3. Event Probability Questionnaire (EPQ)

The EPQ, a self-report scale designed to assess judgement of risk, consists of 25 items describing negative events that may, but not necessarily, have adverse consequences. Participants were required to rate the likelihood of each event occurring to them in the near future. Each item was rated on a 9-point Likert-type Scale (0 = “not at all likely” to 8 = “extremely likely”). The scale was based upon event probability questionnaires devised by Butler and Mathews (1983), Foa et al. (1996), McNally and Foa (1987), Dalgleish, (1993), and Warda and Bryant (1998). The scale was modified to address the hypotheses of the present study and the nature of the subject group. The questionnaire consisted of four subscales. The following section provides an explanation of the subscales included in the EPQ.

The first subscale, the External Harm Events Scale, involves events that may have traumatic consequences should they occur, for example: “The next train you board will derail”. Seven external harm events were included in the EPQ. The second subscale, the General Negative Events Scale, involves general unpleasant events without traumatic consequences, for example: “You will lock your keys in your car”. Eight general negative events were included in the EPQ.

The third subscale, the Social Events Scale, involves negative events within a social context, for example: "Someone will be unfriendly to you at a shopping centre". Five social items were included in the EPQ. The fourth subscale, Work-related Events, involves unpleasant events that may occur during the course of EMS work, for example: "You will receive a difficult emergency callout". Five work-related items were included in the EPQ. The EPQ was specifically designed for the purpose of the present study. Previous event probability questionnaires have not been standardised and consequently no psychometric data are available for the instrument.

2.3.4. Beck Depression Inventory (BDI; Beck, et al., 1979)

The BDI is a frequently used self-report measure for assessing depressive symptomatology. It consists of 84 self-evaluative statements grouped into 21 categories that assess the cognitive, motivational, and physiological symptoms of depression based on a 1-week time frame. For each category there is a graded series of four alternative statements, ranging from neutral to a maximum level of severity. The items are scored from 0 – 3 so that the BDI scores range from 0 – 63. A total score in the 0 – 9 range should be regarded as indicative of no depression, 10 – 15 range indicative of mild depression, 16 – 23 indicative of moderate depression, and 24 – 63 indicative of severe depression (Shaw, Vallis, & McCabe, 1985).

The BDI has a high level of internal consistency, with the split-half reliability coefficients averaging 0.86. Factor analyses conducted on the responses of depressed patients have yielded three factors: sad mood/negative sense of self, psychomotor retardation, and somatic depression. The BDI was included in the present study to measure depression, an associated posttraumatic emotional feature.

2.4. Procedure

Participants were visited at their places of work (duty stations) and asked to complete the questionnaires. This was done during working hours and at the beginning of a shift. Subjects were provided with written instructions. In addition verbal reminders on how to approach the questions were given just prior to completing the questionnaires. Participants completed the EWEQ, PSS-SR, EPQ, and the BDI in a single session. Selected demographic information was also obtained from participants during the assessment.

2.5. Statistical Analysis

In order to determine if a judgement bias was associated with PTSD, comparisons between the PTSD group and the No PTSD group in terms of scores on the EPQ were conducted using t-tests. T-tests were also conducted to determine if judgement bias was reflected in all the subscales of the EPQ. When

indicated by Levene's equality of variance test, t-tests based on unequal variances were conducted.

To determine which component of posttraumatic symptomatology best accounted for the variance in EPQ scores (judgement bias) a forward stepwise multiple regression was conducted. On the supposition that there were no differences between the subscales of the EPQ in terms of the difference between the PTSD group and the No PTSD group, the total EPQ score was used in the regression formula. PSS-SR-Intrusion, PSS-SR-Avoidance, PSS-SR-Arousal, and the BDI scores were entered into the regression analysis with EPQ scores.

3. Results

3.1. Comparison of PTSD and No PTSD groups

3.1.1. Age, work experience, and amount of exposure to trauma

Table 1 shows certain descriptive characteristics of the PTSD and the No PTSD groups. The t-tests on these variables indicated that the PTSD group and the No PTSD group did not differ significantly in terms of age, work experience (job duration), and frequency of exposure to traumatic events.

Table 1

Comparison of the PTSD and the No PTSD groups with regard to Age, Work Experience, and Amount of Exposure to Trauma

Variable	PTSD		No PTSD		<u>t</u>	<u>p</u>
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
Age	34.57	9.71	33.13	9.35	4.61	0.64
Experience	6.83	4.73	6.27	4.87	2.03	0.84
Exposure to trauma	47.92	18.03	45.77	19.60	0.49	0.62

Exposure to trauma presented as mean units on the EMS Work Experiences Questionnaire.

3.1.2. Psychopathology measures

Table 2 shows the characteristics of the groups in terms of psychopathology measurements. The t-tests indicate that the PTSD group scored significantly higher than the no PTSD group on the PSS-SR, PSS-SR subscales of Intrusion, Avoidance, and Hyperarousal; and the BDI ($p < 0.001$). The results indicate that the PTSD group differed significantly from the No PTSD group on all psychopathology measures.

Table 2

Comparison of the PTSD and the No PTSD groups on the PTSD Symptom Scale: Self – Report version and the Beck Depression Inventory

Scale	PTSD		No PTSD		<u>t</u>	<u>p</u>
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
PSS-SR: Total	22.81	7.98	5.54	6.22	-8.99	0.000
PSS-SR: Intrusion	6.59	3.10	1.17	1.83	-8.78	0.000
PSS-SR: Avoidance	9.44	3.70	2.18	2.67	-9.33	0.000
PSS-SR: Arousal	6.77	3.78	2.17	3.03	-5.68	0.000
BDI	16.59	9.29	6.95	5.47	-6.37	0.000

3.1.3. Judgement of risk

The results of the comparisons between the PTSD group and the No PTSD group on the measures of judgement of risk are shown in Table 3. Scores are presented as mean scores obtained on the EPQ. (Total score on the EPQ (EPQ-total), and the subscales of the EPQ where EPQ-THREAT refer to external harm events, EPQ-NEGATIVE to general negative events, EPQ-SOCIAL to social events, and EPQ-EMS to work-related events).

3.1.3.1. EPQ-total

As indicated by comparisons of the total EPQ scores the PTSD group demonstrated significantly higher ratings for the likelihood of future negative events in comparison to the No PTSD group, that is a significantly higher judgement of risk.

3.1.3.2. EPQ subscales

It is clear from the results shown in Table 3 that the PTSD group demonstrated significantly higher ratings for the likelihood of future negative events across all the subscales of the EPQ in comparison to the No PTSD group. The PTSD group rated the likelihood of the occurrence of external harm events, general negative events, social events, and work-related events significantly higher than the No PTSD group, that is a significantly higher judgement of risk with regard to these specific events.

Table 3

Comparison of the PTSD and the No PTSD groups on the Event Probability Questionnaire

Scale	PTSD		No PTSD		t	p
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
EPQ-Total	91.11	37.96	63.09	25.70	-4.11	0.000
EPQ-THREAT	22.44	12.32	14.58	8.11	-3.71	0.000
EPQ-NEGATIVE	33.14	18.78	21.17	11.01	-3.94	0.000
EPQ-SOCIAL	17.81	6.12	14.31	3.84	-2.446	0.016
EPQ-EMS	17.70	6.94	13.02	6.82	-3.008	0.004

The results of the t-test for equivalency of means on the EPQ indicates that traumatised EMS personnel showed an increased estimation of judgement of risk in comparison to non-traumatised EMS personnel, that is, a judgement bias was found. In addition, the judgement bias was pervasive and extended across a range of eventualities to include events that were externally harmful, negative (unpleasant without threatening/traumatic consequences), socially related, and work-related. Results of the current study indicated that judgement bias in PTSD is not restricted to threatening events and is generalised across a range of events.

3.2. Predictors of judgement bias

In order to establish which component of post-traumatic stress was the best predictor of judgement bias, a forward stepwise multiple regression analysis was carried out. PSS-SR Intrusion, PSS-SR Avoidance, PSS-SR Arousal, and BDI were entered as independent variables. The dependant variable was the total score on the EPQ.

Table 4 presents a model summary of the multiple regression analysis. PSS-SR Avoidance accounted for 14% of the variance of EPQ scores. The result of the regression analysis indicated that avoidance symptomatology was the best predictor of the psychopathology measures entered, although it did not account for a large percentage of the variance in judgement bias.

Table 4

Summary of Forward Stepwise Multiple Regression of the Event Probability Questionnaire

	Adjusted <u>R</u> ²	<u>β</u>	<u>SE</u>	Tolerance	<u>P</u>
PSS-SR Avoidance	0.14	0.31	0.39	2.76	0.001

PSS-SR = PTSD Symptom Scale Self Report

4. Discussion

The primary aim of the current study was to establish whether PTSD in EMS personnel was associated with a judgement bias for risk events and to determine whether the judgement bias extended across a range of negative events. Participants with PTSD exhibited greater judgement bias for risk events. This bias extended to include external harm events, general negative events, social events, and work-related events. A secondary aim of the present study was to determine what dimension of post-traumatic symptomatology best predicted the variance in judgement bias. Avoidance symptomatology accounted for 14% of the variance of judgement bias.

4.1. Judgement bias

EMS personnel with PTSD showed higher judgements of risk in comparison to EMS personnel without PTSD. The results are consistent with previous studies in which judgement bias was demonstrated in other anxiety disorders (Butler & Mathews, 1983; Foa et al., 1996) and other traumatised groups (Dalglish, 1993; Smith & Bryant, in press; Warda & Bryant, 1998). The finding that PTSD participants evidenced judgement bias supports the information processing theory of Foa et al. (1989) which states that post-traumatic stress involves exaggerated beliefs about one's own vulnerability.

The main findings of the present study can also be understood in terms of the cognitive action theory of Chemtob et al. (1988) which states that the threat arousal network is permanently activated in PTSD, thereby increasing the likelihood that individuals will search for and identify threatening information. The judgement bias found in this study can be seen as a consequence of the proclivity of individuals with PTSD to focus on threat-related information.

The finding that PTSD participants exhibited judgement bias can be viewed from the availability heuristic of Tversky and Kahneman (1974), the "spreading activation" account (Kavanagh & Bower, 1985), and the "feelings as information" hypothesis (Schwarz & Clore, 1988). Participants with PTSD did not differ from participants without PTSD in terms of frequency of exposure to duty-related

traumatic situations, indicating that factors besides the objective frequency of threat-related events in memory resulted in the observed judgement bias. The availability heuristic and the “spreading activation” account have shown that a negative mood state results in an increase in judgement of risk by expanding the availability in memory of events linked to the particular emotional state (Williams, et al., 1997). The “feelings as information “ hypothesis suggests that a negative mood-state serves as an information source in making judgements of risk.

Participants with PTSD exhibited judgement bias on the subscales of the EPQ, namely external harm, general negative, social, and work-related events. Judgement bias was consequently generalised across a range of events in PTSD in the present study. The findings of the present study support the results of Smith and Bryant (in press) which indicate that judgement bias extended to include not just externally harmful events, but also somatic and socially related negative events.

The finding that traumatised participants showed judgement bias across all the subscales of the EPQ can be understood in terms of the proposal of Foa et al. (1989) that the fear networks that develop following trauma involve larger, more diffuse, and more loosely associated fear structures than those of other anxiety disorders. The results of the present study support the proposition that judgement bias in PTSD generalises to a wider range of events (i.e., to less fear specific events). In other anxiety disorders, such as panic disorder and social

phobia, judgement biases are limited to those events that are related to the particular fear (Foa et al. 1996; McNally & Foa, 1987).

The finding that EMS personnel with PTSD showed judgement biases across a range of negative events is also consistent with the cognitive explanations of judgement processes in negative emotional states. The availability heuristic and the “spreading activation” account propose that negative mood results in an increase in the judgement of risk across a range of events by increasing the availability in memory of events linked to the particular emotional state. It can be argued that the activation in memory of all events linked to the mood-state characteristic of PTSD resulted in the generalised judgement bias demonstrated in this study.

The “feelings as information” hypothesis (Schwarz & Clore, 1988) proposed that individuals use their current mood state as a source of information when judging the likelihood of risk, the mood state serving as evidence for a wide range of judgements. The results of the present study can be viewed from this explanation, the mood state typical of PTSD served as evidence for a wide range of judgements and as a result all negative events were rated as more likely to occur.

The current study did not establish which cognitive explanation was the most pertinent in understanding the findings. Recent evidence has suggested that

availability, spreading activation, and mood state as evidence processes occur together, the dominant process depending on the situation (Forgas, 1995). Further research of judgement processes in PTSD can therefore be directed at investigating different cognitive mechanisms involved in the judgement of risk in emotional disorders.

4.2. Avoidance as a predictor of judgement bias

Avoidance symptomatology was the best predictor of the variance in judgement bias. This finding is similar to previous studies where avoidance was the most significant factor in accounting for the variance in judgement bias (Smith & Bryant, in press; Warda & Bryant, 1998). This may reflect a tendency for traumatised individuals to avoid threatening stimuli because they perceive them to be associated with adverse consequences (Smith & Bryant, in press).

Warda and Bryant (1998) reported a higher level of prediction for avoidance in a group of persons with ASD. The lower predictive power found for avoidance in the present study may reflect a different symptom phenomenology in ASD compared to PTSD. An alternative explanation may be that a wider range of post-traumatic symptomatology accounted for the judgement bias in the present study.

4.3. Study limitations and recommendations

The current study provided evidence of judgement bias in PTSD and of the generalisation of judgement bias in PTSD. In addition evidence was found for the role of avoidance symptomatology as a predictor of judgement bias.

It is however recognised that the present study has several limitations. Firstly, although the structure of previous measures of judgement of risk was followed (Butler & Mathews, 1983; Dalgleish, 1993; Foa et al., 1996; Warda & Bryant, 1998), the psychometric properties of the EPQ are unknown. The establishment of a standardised questionnaire and subsequent validation would enhance further studies of judgement bias in anxiety disorders. Secondly, the study did not include a sample of normal controls for comparison purposes. It is therefore not known to what extent the judgement bias observed in traumatised EMS personnel deviates from that of the non-traumatised general population. The establishment of norms for the EPQ in the general population will prove valuable for future investigations of judgement bias in clinical populations. Thirdly, the proposal that PTSD is characterised by more pervasive biases than in other anxiety disorders needs to be established by comparing PTSD and other anxiety disordered populations. Fourthly, the design utilised in this study does not index the extent to which the judgement bias observed in PTSD participants reflects either a response to a traumatic experience or a predisposing cognitive style. Prospective research is required to determine the extent to which judgement bias

is a vulnerability factor in the development of posttraumatic stress. Longitudinal studies of individuals before they become traumatised could determine the extent to which judgement bias is a vulnerability factor in the development of PTSD. EMS personnel constitute a convenient population for prospective research due to their availability for assessment in their initial training phase and then at a later stage. Finally, although avoidance was the most significant predictor of judgement bias, further research is required to determine the cognitive mechanisms responsible for the observed judgement bias and to determine if other psychopathology predicts judgement bias.

4.4. Study implications

Notwithstanding the above-mentioned limitations it is suggested that the evidence of judgement bias in PTSD in this study has relevant implications. The findings of the current study point towards the validity of cognitive models of PTSD and provided evidence for cognitive explanations of judgement processes. In addition, the utility of cognitive therapy for persons with PTSD is indicated by evidence of distorted cognitive processes. An increased understanding of the specific nature of cognitive biases in PTSD may clarify the precise focus of cognitive interventions with traumatised individuals.

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