Trauma-related Symptoms after Violent Crime: The Role of Risk Factors before, during and Eight Months after Victimization

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Abstract: The aim of this study was to explore the prevalence of current suffering and the role of peritraumatic emotions and other risk factors for development of post-traumatic and general symptoms eight months post crime. Questionnaires assessing trauma-specific symptoms (HTQ) and general psychiatric symptoms (SCL-90) was used along with a semi-structured interview covering subjective reactions of 41 civilian victims of interpersonal crime. Victims proved to still be suffering, in varying degrees, from post-traumatic symptoms and other psychological distress. Females reported more trauma-specific symptoms and other comorbid conditions than males. Prior trauma, adverse childhood, being female, previous psychiatric history, and unemployment were all associated with more distress. Peritraumatic reactions (especially secondary emotions following cognitive appraisals after the event) predicted the three core PTSD symptoms and comorbid conditions. Apart from the PTSD symptoms, an assessment of background factors, general psychiatric symptoms, peritraumatic emotions and their cognitive associated scripts in the initial post-trauma period could be helpful in identifying victims who are at risk of developing trauma symptoms.

INTRODUCTION

Traumatic events are commonly experienced among the general population. Originally, post-traumatic stress disorder (PTSD) [1] was conceptualized as a normal reaction to overwhelming psychic trauma. Today, we know that exposure to a traumatic event may not always be sufficient for the development of PTSD and that individual vulnerability factors are important in understanding this condition [2, 3]. The association between the traumatic event and PTSD and other trauma-related symptoms, however, is complex, and different metaanalyses clearly point out the heterogeneity of the disorder in different settings. In one metaanalysis [4], such factors as female gender and younger age at trauma predicted PTSD in some populations but not in others. Poor education, previous traumatic experiences, general childhood adversity and trauma severity predicted PTSD more consistently but to varying extents. Previous mental health problems and childhood abuse had a more uniform predictive effect. With respect to the predictive effect of the risk factor *trauma severity*, a larger effect was received in military studies than in civilian studies. The measures of trauma severity were much more disparate in the civilian studies, and the effect sizes of the risk factors varied considerably. Of the separate risk factors for PTSD social support showed to have the strongest weighted average effect size with a higher risk factor for women than men in civilian samples [4]. Negative

responses from family and friends have also been shown to mediate the relationship between gender and later symptoms [5]. In a recent lifetime prevalence study of trauma experiences and PTSD in Sweden, the highest PTSD risk was associated with sexual and physical assault, robbery, and multiple trauma experiences; the least risk with motor accidents. Trauma type did not seem to account for gender differences while experienced distress did [6]. Further research seems to be required to understand more about the gender differences in experienced distress.

In sum, the individual reactions to traumatic events vary and studies have yielded contradictory results, due, for example, to the heterogeneity of the nature of the trauma, different definitions of constructs, the subjective meaning of the event, the developmental phase of the individual having been subjected to the trauma, socio-demographic factors, sampling (e.g., civilian vs. military), timeframe, measurement and statistical analysis [5, 7, 8].

Apart from the more general risk factors stated by Brewin *et al.* [4], Ozer and colleagues [8] found in their metaanalysis the importance of perceived death threat during trauma and peritraumatic emotions and dissociation for the development of PTSD and analogous psychological distress. These studies showed that individuals who described intense negative emotional responses, such as fear, helplessness and horror (Criterion A for PTSD) during or immediately after the trauma, reported appreciably higher levels of symptomatology. They concluded that peritraumatic emotions were the strongest predictor for PTSD symptoms or rates of current PTSD. Roemer, Orsillo, Borkovec, & Litz [9] found that only helplessness was significantly correlated with post-

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traumatic symptomatology and that reports of peritraumatic emotional numbing uniquely predicted subsequent PTSD symptoms beyond coincident emotional responses. Recently, Fikretoglu *et al*. [10] showed that panic reactions mediate the relationship between the intense emotion of fear, helplessness and horror and dissociation at the time of trauma. Brewin and others, however, emphasize the importance of separating the effects of reactions at the time of the trauma (primary emotions) from reactions arising from subsequent cognitive appraisal (secondary emotions) [11, 12]. Shame and anger directed at others, which may reflect secondary emotions, have been found to be strong predictors of PTSD symptoms longitudinally [13]. According to Krystal [14], disturbances of affect are central to all descriptions of traumatic stress and its sequalae, and it is the affective response to perception, modified through cognition and behavior, that determines the degree to which any event is to be considered traumatic. Other studies have highlighted the importance of the secondary appraisals themselves; Ehring *et al*. found in a recent study that the actual cognitions after trauma had a great predictive power for posttraumatic distress [15].

PTSD has often been described as a mediator for negative health effects such as depression [16] and interpersonal problems [7]. Occurrence of depression during the months following a traumatic event has shown to be an important mediator of chronicity in PTSD [17]. In clinical settings, PTSD has a comorbidity of up to 80% with at least one additional psychiatric diagnosis [18] which means that PTSD together with other psychological distress seems to be much more common than "pure" PTSD [17, 19]. Aside from psychiatric symptoms, PTSD patients often also report a wide variety of somatic complaints [20-22]. The focus in trauma related studies, however, has often primarily been on the presence of symptoms of PTSD, while other symptomatology or psychological distress related to trauma experiences is less systematically studied [4].

In conclusion, due to the heterogeneity of predictors and the complex relationship between experienced trauma and development of trauma-related symptoms and PTSD, further prospective longitudinal studies with a focus on more proximal mechanisms or processes have been called for. Also, studies focusing on comorbid symptomatology together with PTSD-specific symptoms and links to predictors for discrete samples exposed to trauma have been shown to need further research [4, 8].

In the present study, the focus of investigation was on female and male crime victims all having experienced severe interpersonal trauma in a civilian sample eight months post crime.

Aims of the Study

The main purpose of the study was to investigate the prevalence of current suffering in regards to PTSD symptoms as well as other symptoms of psychopathology among crime victims eight months after a violent crime. In addition, we wanted to explore how the association between self-reported current distress is related to risk factors such as a) peritraumatic emotions ("primary" and "secondary"), and social support from family and friends, b) sociodemographic factors, and c) background factors like previous mental health problems, childhood adversity and previous experi-

enced trauma. Finally, as a complement to the univariate analyses, we wished to explore risk factors in aggregated form.

METHODS

Participants

The sample consisted of 41 individuals, of which 14 (34%) were females, recruited through the police (see Table **1**). The victims were all at least 18 years old, with a range between 18 and 66. The exclusion criteria for participation in the study were: known brain injury, psychotic state, drug and/or alcohol abuse and known criminal behavior, and domestic violence. Violent crime was defined as intentional grievous bodily harm, threats thereof, and/or severe violation of another's integrity, for instance, of a sexual or offensive nature. The specific crimes included were robbery or armed robbery (n = 12; 29%), physical assault (n = 24; 58.5%), and rape (n = 5; 12.2%). Of the total group, five participants (12%) were of non-Swedish ethnicity.

Drop-outs

Four of the 45 approached victims declined participation, leaving a total number of 41 participants. Although efforts were made to encourage these four to participate, the endeavor was unsuccessful. Six of the remaining 41 participants failed to return their questionnaires despite repeated prompts. No systematic characteristics could be found in these six drop-outs.

The socio-demographic characteristics of the participants in the study are shown in Table **1**.

Mean age was 34.6 years old (sd 13.1) for the total group; 33.6 years old (sd 12.8) for males and 36.6 (sd 13.9) for females. Significant gender differences existed where the female participants had received or applied for treatment for mental health problems more frequently before the crime than the male participants ($\chi^2 = 10.85$; df = 1; p < .01). There were also more reports of adverse or problematic childhood in the female group ($\chi^2 = 7.78$; df = 1; p < .05). Fifty percent of the females and 33% of the males had been exposed to a similar traumatic event prior to the target stressor; the difference, however, was not significant. Neither were differences in perceived social support from friends and family significant between gender (93 % and 85% for females and males, respectively). None of the participants reported any additional trauma, comparable to target stressor, between crime and the interview but there was still a considerable variability in the lives of the participants; from stable life situations to life situations with continued stressors starting before the crime.

Procedure

This cross-sectional study is one part in a larger longitudinal study of violent crime in municipalities in northern Sweden. The participants were recruited consecutively and selected by the police authority according their classification system for crime severity. Participants were interviewed at eight months post-crime and asked to retrospectively report their pre-, post- and peritraumatic life situation and suffering. They were also asked to fill out questionnaires. Informed consent was obtained at interview and a contract was signed

Table 1.   Socio-demographic and other Background Characteristics of 41 Swedish Crime Victims

		Total (n = 41)	Female (n = 14)	Male (n = 27)
Age mean (SD)		34.6 (13.11)	36.6 (13.9)	33.6 (12.8)
Marital status	Frequency of Singles[1]	20 (48.8 %)	8 (57.1 %)	12 (44.4 %)
Education	Secondary school or lower	34 (83 %)	12 (85.7 %)	22 (81.5 %)
Occupational status[5]	Unemployed or employed < 50 %	10 (24.4 %)	2 (14.3 %)	8 (29.6 %)
Good social network		36 (88 %)	13 (92.9 %)	23 (85.2 %)
Prior trauma	Positive answers[2]	15 (36.6 %)	7 (50 %)	9 (33.3 %)
Previous mental health problems	Positive answers[3]	15 (36.6 %)	10 (71.4 %)	5 (18.5 %)
Adverse childhood	Negative appraisal[4]	12 (29.3 %)	8 (57.1 %)	4 (14.8 %)
Perpetrator was acquaintance/known[6]		6 (14.6 %)	2 (14.3 %)	4 (14.8 %)

[1]Includes divorced and widowed; with or without children living at home.
[2]Number of "yes" answers to the question "Have you ever experienced anything similar before?"
[3]Number of "yes" replies to the question "Have you ever received mental health treatment/applied for treatment for mental health problems?"
[4]Number of cases coded as Adverse/problematic childhood based on the semi-structured interview (as opposed to "normal/OK" and "very good")
[5]Employment/occupation at the time of the crime. Includes unemployed, disability pension, sick or disabled. Students and full-time retired included in the category employment > 50%.
[6]Known = casual acquaintance, not intimate or close relationship.

by all participants. The study has been approved by the Regional Ethical Review Board in Umeå (D.no: 03-408 and 05-035M).

Instruments

Semi-structured Interview

The semi-structured interview started with an open-ended question about how the participants' life had developed since the crime, including presence of additional trauma in the time between crime and the interview. The interview covered retrospective and current reports by the victims for pre- peri- and post-trauma themes. The interviews were recorded on a digital medium as well as on paper. The responses were coded according to pre-determined criteria in a manual developed by the investigators.

Pre-trauma Themes

Pre-trauma themes included childhood experiences and family history, previous mental health, previous experienced trauma (worded in the interview as: "Have you ever experienced anything like this before, that is, violence directed at yourself, or witnessed severe violence?"), marital status, education, occupational status, and ethnicity.

Peritraumatic Themes

Peritraumatic themes included perceived fear, horror, and helplessness at the time of the trauma event (reflecting "primary" emotions) and intense negative emotional reactions shortly after or within the first few days after the crime (reflecting "secondary" emotions arising from subsequent cognitive appraisal) as well as available social network.

Post-traumatic Themes

Post-traumatic themes included such themes as current mental physical health and social life situation, additional post crime life stressors, and current emotions associated with the crime eight months ago.

Additional Life Stressors

Additional life stress between the crime and the time of the interview was assessed through an open-ended question where the participants were asked to describe how their lives had developed after the crime. Any additional trauma was recorded as present or not presents (i.e. "Yes" or "No").

Quality of Social Support

Participants were asked during the interview about their social support from available network. The responses were grouped into two crude categories: "Good/Adequate social network" or "poor/meager social network".

Childhood Adversity

The interviewer's assessment of childhood experiences was made on a 3-point ordinal scale (1 = Adverse/Problematic, 2 = Acceptable/Good, 3 = Very Good) but later dichotomized by pooling the scale points 2 and 3 (i.e., Adverse Childhood vs. Good or Very Good Childhood).

Peritraumatic Emotions

The assessment of participants' peritraumatic emotions were derived from two questions in the interview. The participants were asked to describe the experienced crime as carefully as possible, paying special attention to (apart from what actually happened): a) what they perceived, b) their bodily sensations, c) what they felt (i.e., their emotions), and also d) whether there were parts of the event they had trouble

remembering. From this description of the actual event, the assessments of a) *Fear* and b) *Helplessness during the Crime* were obtained. The respondents were also asked to describe their immediate emotional reactions shortly or within a few days after the crime. From this question the assessment of c) *Reactions and Emotions after the Crime* was derived. The interviewer's assessment of peritraumatic reactions was done on a 3-point ordinal scale (1 = None/Low, 2 = Moderate, 3 = Intense) for perceived (a) fear and (b) helplessness during the actual crime, and (b) negative emotional reactions shortly or within a day after the crime. While performing Student's t-test, the 3-point scale was dichotomized into a 2-point scale for the univariate analyses, using a cut point of 1.5. The following distribution was obtained: high fear and/or helplessness at the time of crime (scale point 2 and 3) vs. low fear and/or helplessness (scale point 1). Since no participant whatsoever experienced lack of negative reactions shortly after the crime, the skewed distribution in this variable was dealt with by dichotomizing as follows: "moderate negative reactions" (scale point 2) and "intense immediate negative reactions" (scale point 3), i.e., a cut point of 2.5. Interrater reliability estimates for the peritraumatic reactions were computed on a subsample of 10 participants and four judges. ETA (η^2) was calculated using SPSS crosstabs, and three separate computations of explained variance were obtained [23]. These η^2 were: Fear = 0.152, Helplessness = 0.214 and Negative Emotional Reaction = 0.194, meaning that 84.8% of the variance in Fear during the crime, 78.6 in helplessness during crime and 80.6 in intense negative reaction were independent of judges.

Self-assessed Mental and Physical Health

The semi-structured interview also included a self-report assessment of mental and physical health using a 100 millimeter Visual Analog Scale (VAS) ranging from 1 = extremely low (i.e. poor) to 10 = extremely high (i.e. good). The self-ratings of mental and physical health were made retrospectively for the time *before the crime, at the time of the crime* as well as *eight months post crime*.

Symptom Checklist – 90 (SCL-90)

The Symptom Checklist [24] is an internationally well-known instrument consisting of 90 items for the assessment of a wide array of general psychiatric symptoms in 9 primary subscales: Somatization, Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Aggression (Hostility), Phobic Anxiety, Paranoid Ideation, Psychoticism and the global subscale Global Severity Index (GSI). The mean score of all symptom items in the different subscales over the last seven days, on a scale ranging from "not at all" (= 0) to "extremely" (= 5), constitutes the subject's symptom score. A Swedish version of SCL-90 with satisfactory psychometrics has been validated and standardized [25]. Cut-off values have also been suggested for the separate scales on group level, i.e., non gender-separated [26].

Harvard Trauma Questionnaire (HTQ)

The Harvard Trauma Questionnaire [27] is a 30-item questionnaire consisting of 16 PTSD items corresponding to the three core symptoms in PTSD (Intrusion, Avoidance, and Arousal) in DSM-III-R [28], and 14 PTSD-related symptoms

added by Mollica and colleagues as typical symptoms in the Indo-Chinese refugee group. The instrument has been found reliable and valid and has been used in different studies such as on refugees [29, 30], crime victims [31, 32] and traumatic loss in elders [33]. The mean score of all symptom items (4-point Likert scale 1 = not at all to 4 = very much) makes up the subject's total score as experienced through the past seven days. In the Indo-Chinese refugee group, the cut-off limit for a PTSD diagnosis was a mean score of 2.5. In a later study of former Vietnamese political prisoners, the cut-off limit was determined as 1.17 for a PTSD diagnosis [34]. Another method of establishing PTSD diagnoses based on the HTQ was suggested in a later study by Mollica and colleagues: a rating of 3 or more for at least one of the questions on intrusion, 3 about avoidance/numbing, and 2 about the arousal symptoms, provided that the A criterion was fulfilled, brought about a PTSD diagnosis [35]. In this study the algorithm suggested above was used to determine caseness, while the symptom rating was mainly used as a continuous variable covering the range of PTSD symptoms, with the possibility of correlating these measures to risk factors [5]. The alpha values for this study were .95 for the total scale and .91 for the 16 PTSD items (HTQ_{16}); and for the subscales Intrusion .68, Avoidance .83 and Arousal .82. In the present study, only the 16 PTSD items were used since they correspond more directly with the PTSD criteria in DSM-IV [1] and had a near perfect correlation with the total 30-item questionnaire (.97).

Statistical Methods

The distribution of the data was translated through means, standard deviations and percentages. Student's t–tests were used to compare group means, and chi-square tests were used for non-parametric data. Comparisons between Swedish normative data for SCL-90 and the target group were performed using the WinPepi, version 9.2 software. The multivariate method Partial Least Squares (PLS) in latent structures was used to integrate the information contained in the relation between the variables in the univariate calculations, while simultaneously maximizing the correlation between these variables and symptom scores. The univariate modeling of data was performed using SPSS version 14.0, and the SIMCA software version 8.0 was used for the multivariate modeling.

PLS – Partial Least Squares in Latent Structures

This multivariate method [36, 37] represents an important development in clinical psychology, which often contains variables that cannot guarantee independence and/or too many variables in relation to the subjects, implying risks for spurious results (Type I and Type II errors). PLS is a regression extension of PCA, aimed at creating a model for prediction of one data set (Y) from another (X). As in PCA, the manifest variables are transformed into a minimum number of significant orthogonal components. This is done independently for each of the two sets, and the correlation between these data is simultaneously maximized. This is the regression part of the PLS method. The relative contribution from each manifest variable to the PLS model is expressed in a Variable Importance in the Projection (VIP) value. A VIP value larger than 1.0 shows that the variable contributes

more than average to the significant relationship, whereas variables with VIP values below 0.8 make only a minor contribution to the model. One way to validate a PLS model is cross-validation. Cross-validation of each component provides a measure of how well the manifest X variables can predict the Y variables when new cases are added, i.e., the goodness of prediction (Q2 value) of the model. PLS is now also included in SPSS version 16.0.

RESULTS

Univariate Analysis of General Psychiatric Symptoms and Trauma-Specific Symptoms

Table **2** shows the means and standard deviations of the different subscales in the SCL-90 for the total group, female and male participants, respectively.

Females in this study showed more pronounced symptoms than males in seven of nine subscales, including the global severity index, GSI. Age was significantly negatively correlated with the subscales Obsessive-Compulsive (r = -.376, p = .029) and Interpersonal Sensitivity (r = -.342, p = .048). A similar age-symptom correlation was also found in the Swedish normative group [25]. The symptom levels of the target group was compared to a Swedish normal population [25], in general, both females and males in the target group showed significantly higher levels of symptoms eight months post crime on several subscales including GSI.

The means and standard deviations for the trauma specific symptoms (HTQ) are presented in Table **3**.

The mean score of the 16 PTSD items for the entire group was 1.57 (SD 0.53). Significant gender differences emerged, where females reported significantly more symptoms than males in the three subscales intrusion, avoidance

and arousal. Especially the subscale of arousal was elevated for females. When controlling for trauma type (i.e. excluding the Rape cases from the analyses) the significant gender differences in symptom outcome remained.

When scrutinizing the data more in detail only two of 32 participants consistently rated *one* on the four degree scale, i.e., no symptoms at all. Applying the algorithm suggested by Mollica *et al.* [35] to HTQ three participants (9.4%), two female and one male, were identified as fulfilling the criteria for PTSD. An additional three participants, two females and one male, were identified as sub-clinical cases (i.e., lacking only one item from one criterion). When the subclinical cases were added the proportion of PTSD increased to 18.7%.

Self-rated Mental Health using a Visual Analog Scale (VAS)

In Table **4** the participants' ratings of their mental health using a Visual Analog Scale (VAS) is presented. One male participant was excluded (dropped out) due to inability to rate mental health using the VAS.

The table shows no significant difference in mental health between females and males *before* the crime, while the females' mental health eight months *post* crime was significantly lower compared to the males'.

A paired-samples t-test showed a significant difference between mental health before the crime and the actual mental health level for the total group (t(-3.33) = .002, p < .05) and for female participants (t(-3.15) = .008 p < .05). Thus mental health was not recovered to the level reported before the crime. While this was significant for females, it was only a tendency for males. As with the other symptom outcomes

Table 2. Means and Standard Deviations in the Different SLC-90 Subscales, Including Global Severity Index (GSI), for Female and Male Participants as well as Data for Swedish Reference Group

	Group Mean (n = 34)	SD	Female Mean (n = 13)	SD	Male Mean (n = 21)	SD	t[1]		Female Ref Mean (n = 707)	SD	t[2]		Male Ref Mean (n = 309)	SD	t[3]	
Somatization	0.70	(0.53)	0.87	(0.56)	0.60	(0.52)	1.43	ns	0.49	(0.48)	2.82	**	0.35	(0.38)	2.16	*
Obsessive-compulsive	0.79	(0.64)	1.12	(0.76)	0.59	(0.46)	2.56	*	0.65	(0.61)	2.74	**	0.50	(0.53)	0.76	ns
Interpersonal sensitivity	0.74	(0.67)	1.09	(0.82)	0.52	(0.46)	2.26	*	0.55	(0.57)	2.36	*	0.33	(0.42)	1.99	*
Depression	0.90	(0.82)	1.29	(0.96)	0.66	(0.63)	2.32	*	0.72	(0.74)	2.74	**	0.40	(0.49)	2.31	*
Anxiety	0.66	(0.63)	1,00	(0.77)	0.45	(0.42)	2.67	*	0.56	(0.54)	2.89	**	0.33	(0.39)	1.36	ns
Aggression	0.50	(0.55)	0.78	(0.55)	0.33	(0.48)	2.46	*	0.39	(0.50)	2.78	*	0.26	(0.37)	0.82	ns
Phobic anxiety	0.68	(0.79)	1.10	(0.87)	0.42	(0.62)	2.67	*	0.16	(0.40)	3.89	**	0.08	(0.21)	2.50	*
Paranoid ideation	0.68	(0.71)	1.08	(0.78)	0.43	(0.55)	2.62	*	0.41	(0.54)	3.08	*	0.32	(0.45)	1.07	ns
Psychoticism	0.31	(0.58)	0.55	(0.73)	0.16	(0.27)	2.22	ns	0.23	(0.37)	1.58	ns	0.14	(0.27)	0.33	ns
GSI	0.71	(0.57)	1.05	(0.69)	0.50	(0.38)	2.98	**	0.49	(0.44)	2.92	*	0.32	(0.32)	2.46	*

*** = p < .0005 ** = p < .001 * = p < .05 † = p > .01 ns = not significant.
[1] Independent samples t-test for differences between female and male SCL-90 scores.
[2] Independent samples t-tests for differences between female crime victims and Swedish female reference group (Fridell, *et al*., 2000 [25]).
[3] Independent samples t-tests for differences between male crime victims and Swedish male reference group (ibid).

Table 3. **Means and Standard Deviations for the Total HTQ-scores (HTQ$_{16}$) and Scores for the three Subscales for all the Participants (Group), and Females and Males, Respectively**

	Group Mean (n = 32)	SD	Female Mean (n = 12)	SD	Male Mean (n = 20)	SD	t[1]	
HTQ16	1.57	(0.53)	1.98	(0.51)	1.33	(0.37)	4.08	***
Intrusion	1.56	(0.50)	1.87	(0.40)	1.37	(0.47)	3.03	**
Avoidance	1.48	(0.54)	1.83	(0.62)	1.27	(0.37)	3.19	**
Arousal	1.72	(0.68)	2.21	(0.69)	1.39	(0.44)	4.10	***

*** = p < .0005 ** = p < .001 * = p < .05 † = p > .01 ns = not significant.
[1]Independent samples t-test for differences between female and male HTQ scores.

Table 4. **Mean Scores and Standard Deviations for Self-rated Mental Health (VAS) before and Eight Months after the Crime (VAS$_{before}$ and VAS$_{current}$, Respectively) (n = 40)**

		Group Mean (n = 40[3])	SD	Female Mean (n = 14)	SD	Male Mean (n = 26)	SD	t[1]	
VAS$_{before}$	VAS 1-10[2]	8.03	(2.29)	7.57	(2.62)	8.27	(2.10)	-2.91	*ns*
VAS$_{current}$	VAS 1-10[2]	6.33	(2.67)	4.79	(2.60)	7.15	(2.36)	-.91	**

*** = p < .0005 ** = p < .001 * = p < .05 † = p > .01 ns = not significant.
[1]Independent samples t-test for differences between female and male VAS scores.
[2]The VAS ranges from 1 to 10 with ten as the highest rating of well-being and one as the lowest.
[3]One male participant was unable to assess mental health using the VAS.

the gender difference remained for the self-rated mental health as well after removing the Rape cases from the analysis.

Association between Mental Health and Background/Socio-demographic Factors

Using the background and socio-demographic factors as grouping variables, the association between such factors and various symptoms was investigated using the SCL-90, HTQ and VAS$_{current}$. The results are presented in Table **5**.

Table **5** shows that there are associations between general psychiatric and trauma-specific symptoms and *Previous Mental Health Problems, Prior Trauma, Adverse Childhood, and Less than 50% Employment* (i.e., part-time work or unemployment). Significant associations were obtained for *all* subscales of SCL-90 with *Previous Mental Health Problems*. *Adverse Childhood* also showed significant associations with the SCL-90 subscales Depression, Anxiety and Phobic Anxiety. Due to small samples, gender-specific comparisons were not calculated. Due to restriction of range, *Social support* was not included in the univariate analysis; only 5 of the 41 were assessed as having "poor/meager social support".

Peritraumatic Reactions

Peritraumatic reactions and emotions during and immediately after the crime, related to general symptoms and PTSD-specific symptoms, were also investigated. For some participants, an estimate of the peritraumatic reactions was impossible due to ambiguous narratives. These cases were excluded from the analysis. The results are presented in Table **6**.

Intense negative reactions shortly after the crime were associated with *all* general and trauma-specific symptoms, as well as self-rated mental health (VAS). *Fear during crime* was only associated with somatization and *Helplessness during crime* was associated with four general symptoms but not with trauma-specific symptoms.

Multivariate Analyses

Seven risk factors identified in the univariate analyses (i.e., Prior Trauma, Adverse Childhood, Previous Mental Health Problems, Less than 50% Employment, and the three Peritraumatic factors) were used in a multivariate modeling of data, hypothesizing that aggregating them would result in improved levels of prediction. *Age, Education,* and *Marital status* as well as *Social support* were also added, although it was proved later that they contributed very little to the models. Using the PLS model, where all the variables were simultaneously related to the criterion, might then outweigh the apparently larger impact of trauma severity.

A PLS model relating socio-demographic, pretrauma and peritraumatic reactions (X) to HTQ$_{16}$ and GSI symptoms, respectively (Y), was performed for the total group to find the variable pattern-predicting level of symptoms. One significant component was obtained, where 30% of the variance in X explained 46% of the variance (r^2) in Y (HTQ$_{16}$), with a

Table 5. **Background and Socio-demographic Factors Related to Mental Health Outcomes as Described by SCL-90[2] (GSI), HTQ and Self-rated Mental Health (VAS$_{current}$). Means and Standard Deviations (in Parenthesis) Reported for Each Variable[3]**

Previous Mental Health Problems	Yes	No	t[1]	
	(n = 13)	*(n = 21)*		
GSI	1.17 (0.68)	0.43 (0.30)	4.31	***
	(n = 11)	*(n = 21)*		
HTQ$_{16}$	1.93 (0.57)	1.36 (0.38)	3.34	***
HTQ$_{Intrusion}$	1.86 (0.43)	1.47 (0.47)	2.77	**
HTQ$_{Avoidance}$	1.83 (0.63)	1.34 (0.43)	2.91	**
HTQ$_{Arousal}$	2.18 (0.71)	1.46 (0.51)	3.23	***
	(n = 14)	*(n = 26)*		
VAS$_{current}$	4.50 (2.59)	7.31 (2.18)	-3.62	***
Prior trauma	Yes	No		
	(n = 12)	*(n = 22)*		
GSI	0.89 (0.45)	0.58 (0.62)	1.48	*ns*
Interpersonal sensitivity	1.0 (0.64)	0.49 (0.48)	2.56	**
	(n = 12)	*(n = 22)*		
HTQ$_{16}$	1.83 (0.42)	1.47 (0.71)	1.92	*ns*
HTQ$_{Intrusion}$	1.77 (0.52)	1.48 (0.47)	1.60	*ns*
HTQ$_{Avoidance}$	1.72 (0.42)	1.42 (0.61)	1.53	*ns*
HTQ$_{Arousal}$	2.01 (0.56)	1.58 (0.71)	1.82	*ns*
	(n = 14)	*(n = 26)*		
VAS$_{current}$	5.36 (2.30)	6.85 (2.75)	-1.72	*ns*
Adverse childhood	Yes	No		
	(n = 12)	*(n = 22)*		
GSI	1.03 (0.76)	0.53 (0.39)	-2.49	**
	(n = 11)	*(n = 21)*		
HTQ$_{16}$	1.86 (0.63)	1.46 (0.44)	-2.12	*
HTQ$_{Intrusion}$	1.72 (0.45)	1.51 (0.52)	-1.21	*ns*
HTQ$_{Avoidance}$	1.76 (0.70)	1.40 (0.43)	-1.84	*ns*
HTQ$_{Arousal}$	2.05 (0.76)	1.56 (0.58)	-2.07	*
	(n = 12)	*(n = 28)*		
VAS$_{current}$	5.08 (2.93)	6.86 (2.41)	-2.00	†
Employment	< 50 %	> 50 %		
	(n = 6)	*(n = 28)*		
GSI	0.73 (0.63)	0.61 (0.21)	.44	*ns*
Aggression (SCL-90)	0.59 (0.56)	0.11 (0.12)	3.96	***
	(n = 6)	*(n = 26)*		
HTQ$_{16}$	1.60 (0.57)	1.46 (0.27)	.56	ns
HTQ$_{Intrusion}$	1.66 (0.49)	1.53 (0.51)	-.55	ns
HTQ$_{Avoidance}$	1.54 (0.54)	1.24 (0.12)	2.38	*
HTQ$_{Arousal}$	1.74 (0.73)	1.63 (0.43)	.35	*ns*
	(n = 9)	*(n = 31)*		
VAS$_{current}$	6.52 (2.66)	5.67 (2.73)	.83	*ns*

Table 5. contd….

Previous Mental Health Problems	Yes	No	t^1	
Marital status (Single-living)	Yes	No		
	(n = 16)	*(n = 17)*		
GSI	0.69 (0.50)	0.70 (0.66)	-.75	*ns*
	(n = 16)	*(n = 17)*		
HTQ$_{16}$	1.64 (0.54)	1.56 (0.55)	.44	*ns*
HTQ$_{Intrusion}$	1.62 (0.50)	1.55 (0.51)	.39	*ns*
HTQ$_{Avoidance}$	1.56 (0.54)	1.49 (0.59)	.39	*ns*
HTQ$_{Arousal}$	1.82 (0.77)	1.65 (0.61)	.71	*ns*
	(n = 20)	*(n = 20)*		
VAS$_{current}$	6.05 (2.43)	6.60 (2.92)	-.64	*ns*
Education	low	high		
	(n = 28)	*(n = 6)*		
GSI	0.83 (1.13)	0.67 (0.45)	-.82	*ns*
	(n = 28)	*(n = 6)*		
HTQ$_{16}$	1.64 (0.83)	1.59 (0.48	-.65	*ns*
HTQ$_{Intrusion}$	1.66 (0.62)	1.57 (0.48)	-1.14	*ns*
HTQ$_{Avoidance}$	1.52 (0.95)	1.52 (0.46)	-.77	*ns*
HTQ$_{Arousal}$	1.76 (0.87)	1.72 (0.66)	-.14	*ns*
	(n = 34)	*(n = 6)*		
VAS$_{current}$	5.83 (2.99)	6.41 (2.60)	.48	*ns*

*** = p < .0005   ** = p < .001   * = p < .05   † = p > .01   ns = not significant.
[1]Independent samples t-test for differences in reported background and socio-demographic variables.
[2]Where a significant result for GSI was obtained only GSI is presented in the table; where not, individual significant subscales are presented in addition to GSI.
[3]Participants without completed questionnaires were excluded from the analysis.

Table 6. **Peritraumatic Factors (Fear and Helplessness *during* Crime and Intense Negative Emotional Reactions *after* Crime) for the whole Group Related to Mental Health Outcomes as Described by SCL-90[2] (GSI), HTQ and Self-rated Mental Health (VAS$_{current}$). Means and Standard Deviations (in Parenthesis) Reported for Each Variable[3]**

	High	Low	t^1	
Intense negative emotional reactions after crime	**(n = 19)**	**(n = 15)**		
GSI	0.99 (0.58)	0.36 (0.33)	3.66	**
	(n = 17)	(n = 15)		
HTQ$_{16}$	1.84 (0.56)	1.27 (0.27)	3.51	**
HTQ$_{Intrusion}$	1.84 (0.51)	1.25 (0.26)	3.97	***
HTQ$_{Avoidance}$	1.73 (0.62)	1.20 (0.26)	3.08	*
HTQ$_{Arousal}$	1.98 (0.73)	1.41 (0.48)	2.57	*
	(n = 23)	(n = 17)		
VAS$_{current}$	5.48 (2.52)	7.47 (2.50)	-2.47	*

Table 6. contd….

	High	**Low**	**t[1]**	
Intense negative emotional reactions after crime	**(n = 19)**	**(n = 15)**		
Fear during crime	(n = 19)	(n = 15)		
GSI	0.82 (0.43)	0.57 (0.71)	1.26	*ns*
Somatization	0.88 (0.52)	0.48 (0.50)	2.25	*
	(n = 17)	(n = 15)		
HTQ_{16}	1.72 (0.44)	1.41 (0.58)	1.72	*ns*
$HTQ_{Intrusion}$	1.72 (0.49)	1.38 (0.47)	1.95	*ns*
$HTQ_{Avoidance}$	1.60 (0.45)	1.34 (0.62)	1.36	*ns*
$HTQ_{Arousal}$	1.87 (0.62)	1.53 (0.71)	1.47	*ns*
	(n = 24)	(n = 16)		
$VAS_{current}$	5.79 (2.82)	7.13 (2.27)	-1.57	*ns*
Helplessness during crime	(n = 23)	(n = 11)		
GSI	0.82 (0.62)	0.48 (0.39)	1.64	*ns*
Somatization	0.81 (0.59)	0.47 (0.34)	2.10	*
Obsessive-compulsive	0.98 (0.65)	0.40 (0.41)	2.64	*
Interpersonal sensitivity	0.90 (0.71)	0.40 (0.46)	2.10	*
Phobic anxiety	0.88 (0.85)	0.28 (0.45)	2.66	*
	(n = 21)	(n = 11)		
HTQ_{16}	1.69 (0.57)	1.35 (0.36)	1.76	*ns*
$HTQ_{Intrusion}$	1.65 (0.53)	1.38 (0.42)	1.44	*ns*
$HTQ_{Avoidance}$	1.60 (0.61)	1.24 (0.27)	1.82	*ns*
$HTQ_{Arousal}$	1.83 (0.72)	1.49 (0.54)	1.38	*ns*
	(n = 28)	(n = 12)		
$VAS_{current}$	6.36 (2.79)	6.25 (2.49)	.11	*ns*

*** = $p < .0005$ ** = $p < .001$ * = $p < .05$ † = $p > .01$ ns = not significant.
[1]Independent samples t-test for differences between High and Low ratings of intense negative reactions after crime, fear during crime and helplessness during crime, respectively.
[2]Where a significant result for GSI was obtained only GSI is presented in the table; where not, individual significant subscales are presented in addition to GSI.
[3]Participants without completed questionnaires were excluded from the analysis.

predictive value (Q_2) of 0.32. Alternately, the relation between X and Y can be presented as a correlation (in this case r = .68), which according to Cohen [38] is a large correlation.The variance in X pertains to the *reliability* of the variables in the study, while the variance in Y pertains to the *validity*. The corresponding multivariate model for the outcome variable GSI also revealed one significant component with a goodness of prediction value (Q_2) of 0.30, in which 30% of the variance in risk factors explained 48% in the outcome variable GSI. The results, with the variables most important for the prediction (VIP values > 0.8), are presented in Tables **7** and **8**.

Table **7** shows that the most important variables predicting trauma-specific symptoms according to HTQ_{16} are being female, intense negative reactions shortly after the crime, previous mental health problems, helplessness during the crime, adverse childhood and, in addition, and prior-trauma experiences. A similar pattern of variables was received for the prediction of general psychiatric symptoms (GSI), presented in Table **8**, where previous mental health problems, intense negative reactions shortly after the crime, being female, helplessness during the crime and adverse childhood had the greatest power in the prediction of outcome.

DISCUSSION

This study highlights the prevalence of current suffering and the role of peritraumatic emotions and other risk factors in the development of trauma-specific and other symptoms in a civilian group of victims of interpersonal crime eight months post crime.

Table 7. VIP-variables in a PLS Model of Factors Predicting the Outcome on HTQ. Cut-point for Inclusion is 0.8

Variable	VIP-value
	Group (n = 41)
Female	1.66
Intense negative emotional reactions after crime	1.50
Psychiatric history	1.44
Helplessness during crime	1.32
Adverse childhood	0.89
Prior trauma	0.82
Fear during crime	0.8

Table 8. VIP-variables in a PLS-model of Factors Predicting the Outcome on GSI

Variable	VIP-value
	Group (n = 41)
Psychiatric history	1.71
Intense negative emotional reactions after crime	1.48
Female	1.27
Adverse childhood	1.17
Helplessness during crime	1.14

The overall result showed that the victims, males and females, still suffered from various degrees of post-traumatic symptoms and other psychological distress eight months post crime. In general, female victims reported more symptoms than males (trauma-specific symptoms and especially arousal symptoms) as well as other symptoms of psychopathology, and also rated a lower level of general mental health (VAS score) than males. These gender differences confirm previous findings [4, 6, 39]. After having controlled for trauma severity or greater exposure to previous trauma, Frans *et al.* concluded that gender differences in PTSD seem *in part* to represent a generally greater vulnerability to emotional stress in females [6]. Also, when trauma type was adjusted for in this study, (i.e., rape was excluded from the analysis), gender differences in symptom outcome, i.e., HTQ, SCL-90 and current VAS rating of mental health, remained significant. The differences found in background factors (previous mental health problems and adverse childhood) also remained significant. The findings that gender seems to be a risk factor for traumatization is likely to be a complex phenomenon and needs further research to be understood. Although social support has been shown to be an important factor in the sequalae after trauma [3, 5] this result was not obtained in this study. Most likely this was due to limited variation in the social support variable (the majority did report good or adequate social network, 93 % and 85% for females and males, respectively). Repeat traumatization is also a likely factor

influencing post trauma distress but since none of the participants reported any new trauma in the time between the crime and the interview this was not included as a factor. However, ongoing life stress not regarded as traumatizing events could most likely contribute to the lack of recovery after trauma for some of the participants in the study.

Using the multivariate PLS method, the simultaneous assessment and aggregation of potential risk factors for current overall distress eight months post crime was investigated. Powerful predictions of trauma-related symptoms were received, and the strength of the goodness of prediction values (Q_2) was high for both trauma-specific and general symptoms, explaining about the same degree of variance. Sharing common risk factors, these findings highlight the etiological significance of a traumatic event in developing of a wide range of symptoms, aside from the core trauma-specific symptoms, and the importance of an assessment of general symptoms of psychopathology, aside from the core PTSD symptoms. The subjective estimates of the intensity of trauma-related emotions were significantly related to high vs. low levels of symptoms, where the retrospective accounts of peritraumatic emotional distress to the event (especially secondary emotions following cognitive appraisals after the traumatic event, but also helplessness) were significant predictors of the three core PTSD symptoms and the comorbid symptoms. At first sight, it was surprising that Fear at the time of the crime did not show a stronger association to PTSD symptoms, since fear for one's life has been shown to be an important risk factor for PTSD [8] as well as an important concept in behavioral theories of PTSD [40]. However, for some victims, the crime happened too quickly for intense emotions to be registered while others experienced a numbing response, with effects ranging from extreme to partial reduction in both emotion and awareness. The apparent lack of association between fear and general symptoms is also consistent with findings by Roemer *et al.* [9]. Studies have shown that it is the negative emotions occurring after subsequent cognitive appraisal that often have a link to the development of PTSD symptoms [11, 41]. The finding that helplessness and trauma-related symptoms are correlated is consistent with the significance of uncontrollability and unpredictability of a traumatic event [42]. In the DSM-III-R system [28], the trauma was defined more "objectively," while in DSM-IV, the impact is on the subjective, affective component of the trauma concept [1]. This is in line with Krystal's view [14] that the subjective interpretation of the traumatic event is what constitutes the trauma. Our findings with respect to the strong association between peritraumatic emotions and post-traumatic symptoms are in line with Krystal's formulation. The positive association between the number of experienced prior trauma and post-traumatic symptoms should be regarded, at best, as an approximation of the severity of traumatization. A mere count of traumatic events does not take in account the magnitude of the victim's emotional response. Apart from the peritraumatic emotions, a combination of predictors of psychopathology identified in previous studies were confirmed in the present study; such as being female, unemployed, previous mental health problems, childhood adversity and previous trauma [4, 6, 39]. When using the PLS-method it is important to remember that that it is the pattern of variables in aggregated form that explains the outcome, not the separate variables independently. For

example, in this study being female is a meaningful risk factor only when combined with the other significant variables (such as intense negative emotional reactions after the crime and psychiatric history).

In the multivariate analyses, previous trauma experiences was a risk factor that had greater importance for the development of trauma-specific symptoms than for general symptomatology, while in the univariate analysis, experience of previous trauma was associated only with interpersonal sensitivity and not with the core PTSD symptoms. This heterogeneity in results using different analysis methods seems to have some affinity to the result presented by Brewin *et al.* [4], who found that these predictors were risk factors that predict PTSD to varying extents or in some populations only.

In this study, a relatively small number of participants actually fulfilled all necessary criteria for a PTSD diagnosis, equivalent to three of 32 complete HTQ questionnaires (i.e., 9.4%). This can be compared with a prevalence of 22% in Danish studies by Elklit and Brink [31, 32]. However, the participants in the Danish studies were all recruited from an emergency ward so it can be assumed that they were more severely injured than those in the present study. Furthermore, six participants in this study failed to return their questionnaires, which could be a sign of a high degree of Avoidance in these six. Due to the small sample size, such a small dropout rate has great impact on the mean scores. In any case, it can be concluded that the prevalence of PTSD in this study is possibly underestimated.

The variables in this study were derived from measures using diverse techniques, e.g. interview derived categories (yes/no questions), and interviewer derived assessments (e.g. childhood adversity), and questionnaire variables. While the different techniques might give rise to methodological questions, the different measures offer a broader, more complex view of the participants. Given that there have been somewhat ambiguous research results concerning different methodology [4] it might be prudent to include a variety of assessment techniques.

Some limitations in the study need to be mentioned. First of all, there is the issue of small sample size and the fact that the design of our study was cross-sectional, precluding conclusions about causality. Secondly, our data were based on retrospective reports, eight months postcrime and therefore subjected to biases in recall. There is evidence that retrospective reports of trauma events may change over time and that the change may be associated either negatively or positively with symptom level. The reporting of Peritraumatic emotions could further be affected by forgetting or malingering [43-45]. Despite the problem with retrospective reports, the results in this study seem to be corroborated by other, prospective studies, e.g. Ehring *et al.* [15]. In the future, prospective studies measuring emotional reaction immediately after violent crime and predicting trauma-related symptoms later on might give us better understanding of the association between symptoms and peritraumatic reactions and information about different pre-trauma variables. On the other hand, asking about trauma intensity too soon after the event, when victims still feel numb or unable to appraise what has happened, may yield underestimates of trauma intensity [4]. Thirdly, we have not in a sufficient way assessed the pres-

ence of dissociation at the time of trauma. Assessing dissociation retrospectively is most likely difficult and is probably easier measured using prospective designs, e.g. Briere *et al.* [46, 47]. Finally, the self-reported continuous scores used for measuring trauma-related symptoms in this study actualizes the problem that the different ways of assessing trauma-related symptoms (e.g., interview vs. questionnaire) are not always equivalent, and that these methodological questions need to be given further attention.

In sum, provided that the results are replicated in a larger sample, our findings have potential clinical and research implications. First, assessing background factors and comorbid conditions apart from the core PTSD symptoms appears to be important. Consideration of a possible etiology of comorbid symptoms also appears to be important, since symptoms with different causes may require different treatment approaches. Secondly, assessing for peritraumatic emotions and their cognitive and associate scripts in the initial posttrauma period could be helpful in identifying victims who are at risk of developing trauma symptoms. Thirdly, a consideration of gender-related factors appears to be important, particularly those associated with a higher level of subjective distress among females. Lastly, consideration of the association between variables before, during and after the trauma appears to be necessary.

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