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Family cohesion and posttraumatic intrusion and avoidance among war veterans: a 20-year longitudinal study

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Abstract
Background The bi-directional relationships between combat-induced posttraumatic symptoms and family relations are yet to be understood. The present study assesses the longitudinal interrelationship of posttraumatic intrusion and avoidance and family cohesion among 208 Israeli combat veterans from the 1982 Lebanon War.
Methods Two groups of veterans were assessed with self-report questionnaires 1, 3 and 20 years after the war: a combat stress reaction (CSR) group and a matched non-CSR control group.
Results Latent Trajectories Modeling showed that veterans of the CSR group reported higher intrusion and avoidance than non-CSR veterans at all three points of time. With time, there was a decline in these symptoms in both groups, but the decline was more salient among the CSR group. The latter also reported lower levels of family cohesion. Furthermore, an incline in family cohesion levels was found in both groups over the years. Most importantly, Autoregressive Cross-Lagged Modeling among CSR and non-CSR veterans revealed that CSR veterans' posttraumatic symptoms in 1983 predicted lower family cohesion in 1985, and lower family cohesion, in turn, predicted posttraumatic symptoms in 2002.
Conclusions The findings suggest that psychological breakdown on the battlefield is a marker for future family cohesion difficulties. Our results lend further support for the bi-directional mutual effects of posttraumatic symptoms and family cohesion over time.

Keywords Posttraumatic symptoms · CSR · Family cohesion · War · Longitudinal study

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Introduction

The family is not a static, but rather a dynamic system that is characterized by both stability and life-span changes over time [1]. Changes in the family system are likely to occur when one of the family members undergoes a traumatic event that results in severe emotional injury. In such cases, an emotional crisis experienced by a family member often brings about a major threat to the family's structure, functioning, and satisfaction (e.g., [2]). Over the years, theoretical models and empirical studies pointed to the negative effects of traumatic stress on family relations (e.g., [3]). The present study examines the long-term changes in the family cohesion of Israeli combat veterans and its bi-directional relationships with the course of posttraumatic intrusion and avoidance symptoms experienced by these veterans.

It is now well established that the experiences of war may cause emotional distress. Some reactions to war can

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be acute, and occur on the battlefield or in the immediate aftermath of combat. The most common of these is acute combat stress reaction (CSR). CSR is characterized by polymorphic and labile symptoms such as paralyzing fear of death, emotional and physical numbness and severe detachment. Previous studies have shown that in some instances, this initial acute reaction may crystallize into a more chronic, long-lasting condition, most notably post-traumatic stress disorder (PTSD) [4]. According to the DSM-IV-TR [5], PTSD is characterized by re-experiencing the traumatic event, avoidance of stimuli associated with the trauma and numbing of general responsiveness, and symptoms of hyperarousal. A previous prospective study conducted by our group among Israeli veterans has found that veterans with CSR were 6.6 times more likely to endorse PTSD at all four measurements [6].

To date, there is conflicting empirical evidence regarding the course of combat-induced posttraumatic symptoms. While most prospective (e.g., [7]) and retrospective (e.g., [8]) studies among war veterans point to a gradual decrease in the number of posttraumatic symptoms, some studies (e.g., [9]) have shown elevated rates and valance of post-traumatic symptoms followed by a stabilization of symptoms in the first years after the war. Other studies, however, observed a fluctuating course with symptoms increasing and decreasing over time (e.g., [10]). Moreover, while many studies pointed to a decrease in posttraumatic symptoms over the years, it seems that not all symptoms decrease in a unified way. It has been postulated that the response to war experiences are not homogenous and the symptom composition and trajectories may be dependent upon the initial levels of PTSD symptoms [11].

One issue that has gained increasing attention in recent years is the well-being of family members living in the company of the traumatized survivor [12, 13]. Both case studies and empirical studies have consistently documented the deleterious effects of trauma and posttraumatic symptoms on traumatized veterans' family members and marital relationships (e.g., [14]). Findings relating to familial and marital relations among traumatized survivors may be examined from several perspectives. On the level of family structure, findings revealed high divorce rates among PTSD veterans [15]. On the level of family functioning, studies have reported outbursts of rage and aggression [16], difficulties in intimacy and marital communication [17], and difficulties in sexual functioning [18]. On the level of subjective experience, trauma victims reported lower marital satisfaction [19] and expressed their wishes and intentions to end their marriage more than non-traumatized veterans [20].

Empirical studies have mainly focused on survivors' marital relations, while family cohesion has received only negligible empirical attention [21]. Most studies reported negative associations between family cohesion and PTSD among war veterans [22]. A recent study among Operation Desert Storm veterans found that for both male and female veterans, higher combat exposure was associated with more PTSD symptoms, which in turn were associated with lower family cohesion [3]. To the best of our knowledge, only one study had previously examined the association between CSR and family cohesion [23]. That study reported that the families of Israeli traumatized veterans who had antecedent CSR and subsequently suffered from PTSD were characterized by low levels of cohesion as compared to veterans with antecedent CSR but without PTSD. Still, little is known on the long-term relations between CSR and family cohesion. Since posttraumatic intrusion and avoidance symptoms may have a fluctuating course, we aim to trace changes in family cohesion over the years as a function of the trajectory of war-induced psychopathology.

The literature review points to the tendency of researchers to imply that combat trauma, and specifically PTSD, affects family relations (e.g., [24]). However, it is important to note that several studies point to the role of a pre-existing dysfunctional family of origin in the development of subsequent PTSD among war veterans both directly (e.g., [25]) and indirectly [26]. Furthermore, there is the possibility that pre-deployment stress and disrupted family relations might predict current family discord [27, 28].

Theoretical models have suggested that the associations between posttraumatic symptoms and family relations are bi-directional [29, 30]. The Couple Adaptation to Traumatic Stress model (CATS; [31]) provides a theoretical systemic description of the bi-directional nature of the interactions between veterans' and family members' reactions to trauma. These interactions are also affected by one's level of functioning, predisposing factors, resources and the couple's baseline functioning. While the outcomes of this hypothesized systemic process are sometimes adaptive and promote recovery, at other times they can be maladaptive and influence the chronicity of victims' PTSD and other family members' psychopathology.

Unfortunately, bi-directional theoretical models have not been subjected to systematic and rigorous scientific investigation. As a result, empirical evidence for the mutual effects between family relations and PTSD are very limited. Benotsch and his colleagues [32] examined the relations between PTSD and family cohesion in a short-term (14 months) longitudinal design among Gulf War veterans. They have found that family cohesion at the first measurement predicted PTSD at the second measurement. However, PTSD at the first measurement also predicted family cohesion, thus revealing a longitudinal bi-directional relationship. Evans et al. [33] examined the associations

between PTSD symptoms and family functioning among veterans who were admitted to a treatment program. Their short-term longitudinal study followed veterans both at the completion of the program and at a 6-month follow-up. That study revealed that family functioning predicted PTSD symptoms, but not vice versa. These results are consistent with other studies showing that family functioning may promote recovery from psychological disorders among adults [34], and may be complementary to the body of research suggesting that combat-induced psychopathology affects family relations (e.g., [2]).

The existing literature stresses the need for long-term prospective studies that can shed light on the mutual effects of posttraumatic symptoms and family relations, and possibly contribute to understanding of the causal relationship between these variables. Furthermore, as Dekel and Monson [2] suggested, there is a dire need for studies to employ a developmental perspective examining the implication of trauma over the family life-cycle. The present study aims to fill these gaps by longitudinally following Israeli War veterans over a 20-year period. Given the theoretical perspective on the mutual effects of posttraumatic symptoms and family relations ([24], this study addresses three main questions: (1) what are the trajectories of posttraumatic intrusion and avoidance symptoms and family cohesion over 20 years? (2) Do these trajectories differ between the CSR and non-CSR groups? (3) Do posttraumatic intrusion and avoidance contribute to family cohesion; does family cohesion contribute to posttraumatic intrusion and avoidance; or rather—do both mutually contribute to one another, over 20 years?

Method

Participants

This study sample includes 208 male veterans, comprising two groups: The CSR group ($n = 128$) were Israeli veterans who fought in the 1982 Lebanon War and have been identified by military mental health personnel during the war as CSR casualties. Criteria for inclusion in this group were: (1) participation in front-line battles during the war, (2) a referral for psychiatric intervention by the soldier's battalion surgeon during the war, (3) a diagnosis of CSR on the battlefield by trained and experienced clinicians, (4) no indication in the clinician's report of serious physical injury and/or other psychiatric disorders. The research staff determined eligibility by using records of clinicians' diagnoses made on the battlefield.

The non-CSR group ($n = 80$) consisted of veterans who have participated in combat in the same units as the CSR group, but were not identified as suffering from CSR. Non-CSR veterans were matched with the CSR group for age, education, military rank, and assignment. While it is difficult to control for the subjective stressfulness of any combat experience, the sampling procedure used here was chosen in order to increases the chances that veterans in both groups have been exposed to a similar amount and type of objective stress, as the veterans in both groups served in the same units and fought on the same battlefields. All the veterans in the CSR and non-CSR groups underwent stringent physical and psychiatric screening before commencing their military service and no indication of diagnosable premorbid posttraumatic symptomatology was recorded in their medical files.

Posttraumatic symptoms and family cohesion were assessed at 3 points of time: 1 (Year 1, 1983), 3 (Year 3, 1985), and 20 (Year 20, 2002) years after the 1982 Lebanon War. The data in this study are based on the responses of veterans who participated in all three assessments. The CSR group included 128 participants, representing 60 % of those who responded at times 1 and 2. The non-CSR group includes 80 participants representing 69 % of those who responded at times 1 and 2.

The socio-demographic characteristics of the study sample, 20 years after the war, indicated that veterans from the CSR and Non-CSR groups did not significantly differ in age, family status, education, military rank and assignment. It is important to note that only a small number of veterans in our study reported being divorced in 2002 (CSR group = 3 (2.4 %) and control group = 5 (6.4 %). The two groups significantly differed in their income levels ($\chi^2(3) = 19.56$, $p < 0.001$) and fathers' country of birth ($\chi^2(3) = 10.12$, $p < 0.01$). Among the non-CSR group, we have found higher rates of participants with higher than average income as compared to CSR veterans. Among the CSR veterans, more participants reported that their fathers' country of birth was Asia/Africa as compared to non-CSR veterans, where the majority reported that their fathers' country of birth was Europe/America.

Although high attrition is a common and well-recognized problem in prospective studies, it may raise concerns regarding selective attrition of the sample. However, data retrieved from official military records and data gathered at Year 1 revealed that veterans who participated at all three points in time did not significantly differ in socio-demographic and military background, pre-military adjustment, intelligence, or mental and somatic health 1 year after the war, from those who declined to participate at Years 3 or 20.

Procedure

One and three years following their participation in the 1982 Lebanon War, participants were asked to report to the headquarters of the Israel Defense Forces (IDF) Medical Corps to take part in this study. Participants filled out a

battery of questionnaires in small groups. Twenty years after the war, data were collected at the veterans' homes. Participants' informed consent was obtained and they were informed that the data would remain confidential and would in no way influence their status in military or civilian life. Approval was obtained by both IDF and Tel Aviv University Human Subject Committees.

Measures

Impact of Event Scale (IES)

The IES [35] is a widely used measure in trauma studies that purports to assess the emotional sequelae of extreme stress. For the purposes of the present study, the IES was translated into Hebrew by three highly experienced bilingual psychologists and adapted for war experiences [36]. Based on a factor analysis, two factor scores were calculated, representing the intrusion and avoidance scales. The scale consists of 15 items, 7 of which measure intrusive symptoms (intrusive thoughts, nightmares, intrusive feelings and imagery), and 8 of which tap avoidance symptoms (numbing of responsiveness, avoidance of feelings, situations, ideas). Although the avoidance symptoms include both avoidance tendencies and emotional numbing, we adopted Horowitz's [37] formulation, where both symptoms are grouped together and called "avoidance". The respondent is asked to indicate on a 4-point scale ranging from "not at all" (=1) to "very often" (=4) how frequently he/she has experienced each reaction during the previous week. Following Horowitz's procedure [37], we have computed sum scores for intrusion and avoidance items by assigning the following weights to each item: 0 (not at all), and 1, 3, 5 (rarely, sometimes and often, respectively) for the 3° of positive endorsement. Horowitz [38] has identified thresholds for low, medium, and high symptom levels corresponding to levels of clinical concern using the IES total score: low, <8.5; medium, 8.6–19.0; and high, ≥19). However, this categorization is not indicative of any specific clinical diagnoses, and these cutoff points are quite arbitrary. High test–retest reliability and sound psychometric validity were found for the IES in previous measurements [39]. In this study, Cronbach Alpha coefficients were high for both avoidance (0.82–0.89) and intrusion (0.85–0.95) scores across the three waves of measurement.

Family Environment Scale (FES)

The FES [40] is comprised of ten subscales that assess three major domains in family relations: interpersonal relations, personal growth and family structure maintenance. In this study, we have used only one subscale tapping family cohesion (e.g., [41]). Family cohesion refers to the level of family members' commitment to help and support each other. It was assessed via a series of 9 statements that the participants were asked to rate with regard to their families. This widely used questionnaire was found to have adequate psychometric properties and an internal consistency of 0.61–0.76 [42]. In the present study, family cohesion Cronbach Alpha coefficients ranged between 0.71 and 0.75, across the three waves of measurement.

Results

Posttraumatic intrusion and avoidance symptoms and family cohesion trajectories of change over time

To examine changes in IES avoidance and intrusive symptoms over time, we conducted a series of Latent Trajectories Modeling (LTM; see [43]). Two latent factors were estimated: one to define the initial levels of the avoidance and intrusion symptoms (i.e., intercept), and one to explore whether the trajectory of change in avoidance and intrusive symptoms was constant over time (i.e., linear; time was coded as 0, 2 and 19) or took any other shape (by assessing which type of trajectory fits most to our observed data). Also, we assessed whether the LTMs were different for CSRs and controls by using a multi-group Structural Equation Models (SEM) procedure. We estimated the appropriateness of the model using EQS 6.1 SEM software [44]. The models' fit was assessed by the comparative fit index (CFI), Bentler–Bonett non-normed fit index (NNFI) and the root-mean-square error of approximation (RMSEA). A model is judged as reasonably fitting the data when CFI and NNFI are higher than 0.95 and the RMSEA is lower than 0.05 (see [35]). It is judged as fairly fitting the data when CFI and NNFI are higher than 0.90 and the RMSEA is lower than 0.10. In the current study, we used list-wise deletion (i.e., complete data) because the data was not MCAR (Missing Completely At Random), Little $\chi^2(67) = 87.73$, $p = 0.046$, and hence, more advanced methods as multiple imputation might bias the results. Fit indicates are presented in Table 1.

The LTMs revealed that CSRs' intrusion level in 1983 was 19.78, and that their avoidance level in 1983 was 11.38. Controls' intrusion level in that year was 8.03, and their avoidance level was 6.12. Multi-group analysis revealed that CSRs had higher levels of avoidance in 1983 compared with controls, $\Delta\chi^2(1) = 36.32$, $p < 0.001$ (because controls' LTM with respect to intrusive symptoms poorly fitted the data, we did not conduct a comparison of the initial levels of the intrusive cluster).

The analyses also revealed that the severity of the intrusive symptoms decreased over time for both CSRs and controls. On average, CSRs' intrusion level has linearly

Table 1 Fit indicates of the LTM and ARCL models among CSRs and controls

	χ^2	CFI	NNFI	RMSEA
LTM IES intrusive (CSR)	15.96**	1	1	0
LTM IES intrusive (control)	16.37**	0.93	0.80	0.16
LTM IES avoidance (CSR)	0.01	1	1	0
LTM IES avoidance (control)	3.49	1	1	0
LTM cohesion (CSR)	1.41	1	1	0
LTM cohesion (control)	0.11	1	1	0
ARCL (CSR)	85.93**	0.96	0.93	0.06
ARCL (control)	86.48	0.90	0.79	0.10

**$p < 0.01$

and annually decreased by 0.53 points since 1983, $t(127) = -8.84$, $p < 0.0001$. Controls' intrusion level, however, decreased in a non-linear fashion, as indicated by the poor fit of the model (see Table 1). Controls' level of intrusive symptoms dropped by 41.41 % from 1983 to 1985, and then continued decreasing at a slower pace until 2002. The trajectory of avoidance symptoms was somewhat different. CSRs' avoidance has linearly and annually decreased by 0.35 points since 1983, $t(127) = -9.73$, $p < 0.0001$, whereas controls' avoidance decreased by 0.15 points since 1983, $t(127) = -4.62$, $p < 0.0001$. Multi-group analysis revealed that CSRs showed greater decrease in their avoidance level over time than controls, $\Delta\chi^2(1) = 13.37$, $p < 0.001$ (see Fig. 1).

To examine changes in family cohesion over time, we conducted another LTM, which revealed that CSRs' family cohesion level in 1983 was 5.89, whereas controls' family cohesion level in that year was 6.74. Multi-group analysis revealed that controls showed a higher level of family cohesion in 1983 compared with CSRs, $\Delta\chi^2(1) = 13.31$, $p < 0.001$. Also, the LTM revealed that CSRs' family cohesion annually increased by 0.03 points since 1983, $t(127) = 2.86$, $p < 0.01$. while controls' family cohesion remained constant over time, $t(127) = 1.41$, $p = 0.16$. Multi-group analysis, however, has revealed that these group differences were not significant, $\Delta\chi^2(1) = 0.78$, $p = 0.38$ (see Fig. 2).

Relationships between posttraumatic intrusion and avoidance symptoms and family cohesion over the years

In this section, we examined the interrelations between the study variables. Specifically, we examined Pearson correlations between posttraumatic intrusion and avoidance and family cohesion as measured in 1983, 1985 and 2002. Results revealed significant positive relations between intrusion and avoidance ($r = 0.23$–0.75). In addition, as seen in Table 2, at all times of measurement, both intrusion and avoidance were negatively associated with family cohesion ($r = -0.15$ to -0.27): the more intrusion and/or

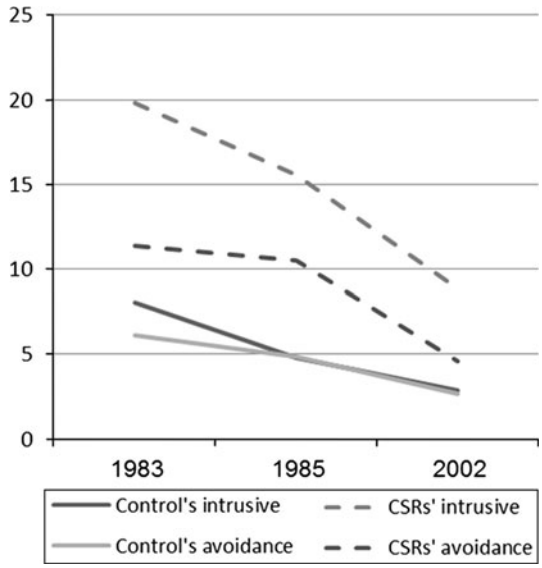

Fig. 1 CSR and control group's intrusion and avoidance trajectories across three times of measurement

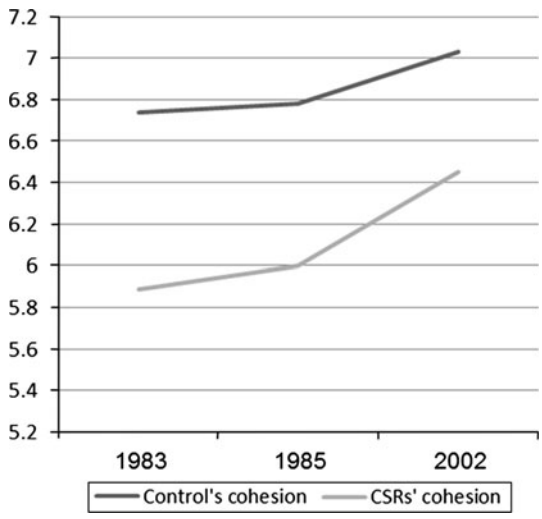

Fig. 2 CSR and control group's family cohesion trajectories across three times of measurement

Table 2 Pearson correlation coefficients among posttraumatic intrusion, avoidance and family cohesion across three times of measurement

	1	2	3	4	5	6	7	8	9
1. Intrusion 83	–								
2. Avoidance 83	0.63***	–							
3. Intrusion 85	0.77***	0.58***	–						
4. Avoidance 85	0.61***	0.66***	0.77***	–					
5. Intrusion 02	0.42***	0.28**	0.40***	0.34***	–				
6. Avoidance 02	0.32***	0.37***	0.31***	0.40***	0.69***	–			
7. Cohesion 83	−0.22**	−0.18**	−0.16*	−0.18***	−0.13	−0.16**	–		
8. Cohesion 85	−0.22**	−0.22**	−0.28***	−0.27**	−0.15*	−0.08	0.41***	–	
9. Cohesion 02	−0.19**	−0.19*	−0.20***	−0.17*	−0.32***	−0.26***	0.38***	0.36***	–
Mean	14.50	9.02	10.73	7.95	6.17	3.73	6.28	6.18	6.68
SD	11.52	7.87	11.10	7.96	9.34	5.98	2.04	2.10	1.95

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

avoidance symptoms the veterans endorsed in 1983 and 1985, the less family cohesion they reported ($r = -0.13$ to -0.29) in 1985 and 2002, respectively.

Exploring the bi-directional associations between posttraumatic intrusion and avoidance symptoms and between family cohesion dimensions over time

To examine the bi-directional association between IES avoidance and intrusion symptoms and between family cohesion measures from 1983, through 1985 to 2002, we employed Autoregressive Cross-Lagged modeling strategy (ARCL; e.g., [37]) that allowed us to examine whether earlier measures of IES predicted later measures of family cohesion, controlling for earlier measures of family cohesion, and whether earlier measures of family cohesion predict later measures of IES, controlling for earlier measures of IES. Because IES consists of avoidance and intrusion clusters, we used latent variables in SEM environment to represent the IES underlying phenomenon. Also, we assessed whether the ARCL was different for CSRs and controls by using a multi-group SEM procedure.

Figure 3 presents the bi-directional relations between CSRs' IES and family cohesion over time. The analysis revealed that the higher the CSRs' IES level in 1983, the lower was their family cohesion in 1985 [$b = -0.43$, $\beta = -0.22$, $t(127) = -2.28$, $p < 0.05$]; High levels of IES in 1985 were also related to lower levels of family cohesion in 2002 [$b = -0.40$, $\beta = -0.24$, $t(127) = -2.64$, $p < 0.01$].

CSRs' family cohesion in 1983 did not significantly predict their IES level in 1985 [bs < 0.10, βs < 0.16, $t(127) < 1.75$, ps > 0.08]; yet, the analysis revealed that the higher CSRs' family cohesion in 1985, the lower their IES level was in 2002 [$b = -0.12$, $\beta = -0.26$, $t(127) = -2.43$, $p < 0.05$].

Controls' ARCL model showed poor fit to the observed data; LM and Wald tests did not reveal any paths that may be added or omitted to improve the model's fit; and hence, we did not examine the controls' ARCL model any further.

Discussion

The present study traces the longitudinal course of posttraumatic intrusion and avoidance symptoms and family cohesion following combat. Across a 20-year period, CSR veterans reported higher intrusion and avoidance than non-CSR veterans. With time, there was a decline in these symptoms in both groups, but it was steeper among the CSR group. The CSR veterans also reported lower levels of family cohesion then the non-CSR veterans, but with no differences in their trajectories over time. Most importantly, in a bi-directional model CSR veterans' posttraumatic symptoms in 1983 predicted lower levels of family cohesion in 1985, and in turn posttraumatic symptoms in 1985 predicted family cohesion in 2002. In addition, family cohesion in 1985 predicted posttraumatic symptoms in 2002.

Our findings show that CSR is associated with higher levels of posttraumatic intrusion and avoidance symptoms. Thus, we suggest that CSR might be a predictor for emotional distress, even many years after the war. This finding is consistent with previous findings (e.g., [45]). According to Creamer et al. [46], intrusion and avoidance may be seen as mechanisms for processing trauma-related information. The authors claim that intrusion is first employed in order to activate a memory mechanism associated with the trauma, and avoidance is later employed in order to cope

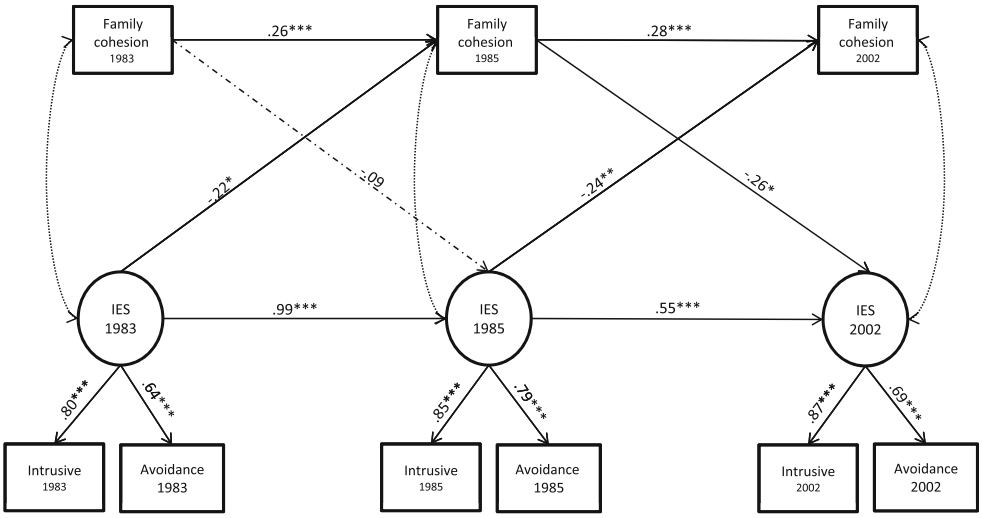

Fig. 3 Bi-directional model of the associations between intrusion, avoidance, and family cohesion across three times of measurement

with the intrusive thoughts. However, an effective processing of the trauma may only occur when intrusion and avoidance are not excessively high [47]. It seems that in the CSR group the levels of intrusion and avoidance remained somewhat elevated throughout the years. These elevated symptoms may, in turn, decrease the effectiveness of the "working through" of trauma residues [48].

Another explanation for these results may stem from the cognitive model of PTSD, developed by Ehlers and Clark [49]. They proposed that pathological responses to trauma arise when individuals process the traumatic information in a way that produces a sense of current threat, either an external threat to safety or an internal threat to the self and the future. The two major mechanisms that produce this effect involve negative appraisals of the trauma or its sequelae and the nature of the trauma memory itself. We suggest that the significant presence of intrusion symptoms among the CSR group can maintain current threat assessment, and subsequently lead to a strong sense of fear. For example, one's interpretation of traumatic flashbacks may be "I'm going crazy". It appears that a continuous state of intrusive symptoms may limit one's ability to recover since one's emotional response barely adds new information that could contradict the initial impressions and traumatic memories [50]. This continuous state intervenes and limits the processing and integration of traumatic memories in the normal sequence of human experiences.

The present study also found a decline over time in both intrusion and avoidance symptoms. This finding is in line with previous studies (e.g., [51]). The decline in intrusion and avoidance may be attributed to spontaneous recovery with the passage of time. In addition, although we did not employ a full clinical diagnosis of PTSD and assessment of treatment, the finding that intrusion and avoidance continue to change many years after the war challenges the notion that posttraumatic symptoms remain relatively constant after the first year [51]. At the same time, however, our findings indicate that the CSR group continued to manifest higher avoidance and intrusion levels than the non-CSR group at all three time points. This demonstrates the complex nature of the PTSD course. While the initial trauma leaves a long-lasting and enduring mark, symptom severity may nonetheless fluctuate and show different trajectories among clinical and non-clinical populations [11]. Symptom trajectory may also be related to external life events that occasionally increase stress levels in one's life and render one more vulnerable to posttraumatic symptoms [52].

Our finding that veterans in the CSR group endorsed more difficulties in family cohesion than non-CSR veterans is in line with studies showing that battle exposure and posttraumatic stress symptoms are associated with both family environment and satisfaction from family life (e.g., [3]). In addition, over the years, several studies have reported a higher prevalence of family problems [14] and non-effective patterns of communication and conflict resolution [15] among families of traumatized veterans. However, to the best of our knowledge, ours is the first prospective study to show the long-term effects of battle-induced acute stress reaction (CSR) on family life.

Previous studies have shown that CSR is not merely a transient stress reaction but rather one that may leave a harmful imprint on the veteran's self. Thus, the impact of CSR seems to be extensive, moving beyond the realm of psychiatric symptoms [53]. It is possible that over the years, CSR veterans continue to have difficulties trusting their capabilities as husbands and fathers, in part due to the shattering of their masculine identity during combat [52]. One possibility is that when family members witness the father's difficulties in regaining his former family role, they may react with resentment and destabilization of familial borders. This, in turn, might have an adverse effect on family cohesion [54].

In addition, it has been previously shown that traumatized veterans often show high levels of rage, aggressiveness, and violent behaviors towards their family [55]. They may also manifest avoidance tendencies and emotional numbing in response to their loved ones' reactions toward them [24]. When an attempt to get closer to the traumatized veteran is encountered with intolerance and disregard, family cohesion is likely to be hindered and the gaps between family members may deepen. Furthermore, family members may avoid contact with the veteran due to his unexpected rage. The family, in turn, may have difficulties understanding the veteran's symptoms. In the absence of a genuine understanding of the veteran's inner experience, family members may feel guilty for their approach attempts and further avoid the traumatized family member.

We also found that CSR veterans reported an increase in family cohesion over time. The initial low levels of family cohesion may reflect the family's reaction to feelings of alienation and estrangement expressed by the veteran [56]. However, it is possible that after several years the family gains a better understanding of posttraumatic reactions, learns how to adapt to the new situation, and gradually becomes more cohesive.

One of the unique contributions of this study is a focus on the longitudinal relations between posttraumatic intrusion and avoidance and family cohesion. Both intrusion and avoidance were associated with lower levels of family cohesion, both on a given year and across the years. These findings are in line with previous studies showing a link between posttraumatic symptoms and problems in family functioning [13]. Although researchers and clinicians have been reporting the adverse effects of posttraumatic symptoms on family functioning for many years, problems in functioning were not considered an integral part of the clinical picture of PTSD. Only with the introduction of the F criterion for the diagnosis of PTSD in DSM-IV [57], has the issue of family functioning received greater attention.

Most importantly, when examining a bi-directional model we have found that CSR veterans' posttraumatic symptoms in 1983 predicted lower levels of family cohesion in 1985, and posttraumatic symptoms in 1985, in turn, predicted family cohesion in 2002. Moreover, family cohesion in 1985 predicted posttraumatic symptoms in 2002. These results are in line with findings reported by other studies [32]. For example, Evans et al. [33] have examined the associations between PTSD symptoms and family functioning among veterans who were admitted to a treatment program. Their study revealed that family functioning predicted PTSD symptoms, but not vice versa, across a 6-month time period. Unfortunately, bi-directional theoretical models have not been subjected to systematic and rigorous scientific investigation. To the best of our knowledge, this is the first prospective study that follows the mutual effects between posttraumatic symptom and family environment, over a long time period.

The results of our study are also consistent with theoretical models, such as the Couple Adaptation to Traumatic Stress (CATS; [31]) model. This model provides a systemic description of the bi-directional interactions between veterans' and family members' reactions to trauma. The outcomes of this systemic process may be adaptive and promote posttraumatic recovery. Our study points to a reduction in posttraumatic symptoms over the years, and indicate that family cohesion may contribute to this reduction. Thus, this evidence is congruent with other studies showing that family relationships may promote recovery from mental disorders among adults [30].

A number of methodological issues should be noted. First, due to the attrition of participants between measurements, the sample may be somewhat selective. Although we have found no statistically significant differences between respondents and non-responders over the 20-year period, the power of the statistical tests is relatively low given our 60–69 % response rates. Second, the use of self-report measures, although very common in trauma studies, entails the risk of a reporting bias. Future studies should consider gathering data from multiple family members. In addition, in the 20 years of this study, more updated measures were published (such as the IES-R; [58]). However, to allow standardization and comparability across time we have used the same measures that were in use 20 years ago. Third, one should take into account that a possible floor effect may somewhat explain the lack of improvement in intrusion and avoidance symptoms among the control group. Fourth, the lack of pre-combat assessment of family functioning strongly limits our ability to infer causality. Lastly, our assessments did not cover the entire span of 20 years since the war. Therefore, we were unable to monitor changes in the course of intrusion and avoidance, as well as changes in family structure, between 1985 and 2002.

Despite these limitations, however, this study yielded several important findings. Our results shed light on the long-term interplay of posttraumatic intrusion and avoidance and problems in family cohesion. Furthermore, the findings of this study have important clinical implications. They reveal that veterans with CSR may be at increased risk for mental distress and various psychological difficulties in the future. Therefore, it is important to monitor these veterans over the years, and to identify and treat early reactions to combat-related trauma.

Treatment strategies are encouraged to assist family members in identifying and understanding symptoms such as nightmares and flashbacks, as well as in reducing the veteran's exposure to stimuli that remind him/her of the traumatic experience [59]. Hopefully, such interventions

will enhance the understanding of posttraumatic symptoms within the family and improve overall family cohesion. PTSD symptoms are often viciously persistent, and where the symptoms cannot be ameliorated, helping the families to live with them is an important aim that could ultimately make a big difference.

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