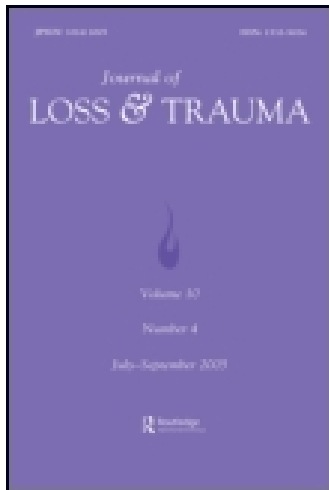


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Loneliness Trajectories: The Role of Posttraumatic Symptoms and Social Support

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Loneliness Trajectories: The Role of Posttraumatic Symptoms and Social Support

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This study prospectively examines the longitudinal course of loneliness, social support, and posttraumatic symptoms (PTS) among Israeli war veterans. Two groups of veterans with and without antecedent combat stress reaction (CSR) were assessed at three points of time during a 20-year period. Veterans with CSR reported higher levels of loneliness compared with veterans without CSR. Loneliness remained stable among veterans with CSR but decreased among veterans without CSR. Baseline level of social support predicted the trajectory of change in loneliness. Finally, higher levels of PTS and lower levels of social support were associated with more loneliness among veterans with CSR.

KEYWORDS *combat stress reaction, loneliness, longitudinal study, posttraumatic symptoms, social support*

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Loneliness has been implicated in both physical and mental health. For example, loneliness is associated with increased vascular disease (Hawkley, Burleson, Berntson, & Cacioppo, 2003), lowered immunity (Pressman et al., 2005), psychosomatic symptoms (Lynch, 1985), depression (Cacioppo, Hawkley, et al., 2006), anxiety (Johnson, LaVoie, Spenceri, & Mahoney-Wernli, 2001), and suicidal ideation (Stravynski & Boyer, 2001). Loneliness has also been specifically examined and documented in the context of psychic trauma. Studies have shown loneliness to be positively associated with posttraumatic symptoms (PTS) among various populations such as Holocaust survivors (e.g., Van Solinge & Van Imhoff, 2001), U.S. veterans (e.g., Macleod, 1994), and Israeli veterans (e.g., Solomon & Mikulincer, 2006; Solomon, Mikulincer, & Waysman, 1991). Less is known about the cause of loneliness and its implications for mental health. To the best of our knowledge, only three studies have previously explored long-term trajectories of loneliness (Benner, 2011; Doohan, Carrère, & Riggs, 2010; Patterson & Veenstra, 2010); however, none of these studies were in the field of traumatic stress. The current study aims to fill this gap in research by prospectively examining the longitudinal course of loneliness among Israeli war veterans from the 1982 Lebanon War. The study examines the relationship between loneliness, social support, and both acute and chronic reactions to combat stress in order to understand the long-term associations between them.

Loneliness is a universal experience, inherent in the human condition. It is considered an affective and cognitive reaction to a threat to social bonds (Rotenberg, 1999). Over the years, loneliness has been conceptualized in various ways. Weiss (1973), for example, categorized loneliness into (a) social-isolation loneliness, deriving from the absence of an engaging social network, and (b) emotional-isolation loneliness, stemming from the absence or loss of close attachment relationships. Russell's (1982) global or unidimensional approach assumes that there is a common loneliness experience, regardless of circumstance, and that loneliness takes on essentially the same form in different situations. Empirical evidence supports this contention, suggesting that individual differences in loneliness are adequately gauged by this conceptual and measurement approach (e.g., Cacioppo, Hughes, et al., 2006). Therefore, this is the approach adopted in the current study.

The war trauma clinical literature has documented the salience of loneliness experienced by combatants on the battlefield, at homecoming, and later on in life (e.g., Dasberg, 1976; Herman, 1992). On the battlefield, traumatized soldiers feel defenseless and exposed to the uncontrollable threat of death and feel abandoned and alone as if all of the threads connecting them to others have been severed (Dasberg, 1976). The disengagement from society is deepened following the soldier's return home from the war. During the homecoming period, veterans report feeling estrangement and disconnection from society. They feel that those around them do not understand

what they have experienced or are not interested in knowing about their harsh war experiences (e.g., Figley & Leventman, 1980).

Empirical studies also confirm the association between loneliness and both acute and chronic war-induced psychological trauma (e.g., Solomon, 1993). Soldiers who succumb to stress and suffer a psychic breakdown on the battlefield are diagnosed with combat stress reaction (CSR), a condition that severely undermines military functioning (Kormos, 1978). CSR is characterized by polymorphic manifestations, such as overwhelming anxiety or total psychological withdrawal (Bartemeier, 1946). The defining characteristic of CSR is that soldiers fail to function in the military role that they are expected to perform in battle (Kormos, 1978).

After the war ends, considerable rates of veterans exhibit posttraumatic stress disorder (PTSD). PTSD is a chronic anxiety reaction to war trauma that consists of three symptom clusters: reexperiencing the event (e.g., distressing dreams and flashbacks), avoidance and numbing (e.g., avoidance of trauma reminders and restricted range of affect), and hyperarousal (e.g., sleep disturbances and irritability) (American Psychiatric Association, 2000). PTSD is the most common chronic psychiatric disorder resulting from combat stress (e.g., Solomon & Mikulincer, 2006) and has been repeatedly associated with loneliness among various veteran populations (e.g., Macleod, 1994; Solomon & Dekel, 2008). In fact, the co-occurrence of loneliness and PTSD has also been consistently observed among the traumatized even many years after their traumatic exposure (Solomon & Dekel, 2008). Several possible explanations can account for the association between PTSD and loneliness. First, prolonged loneliness can serve as a vulnerability factor for PTSD. Second, PTSD may undermine social ties and activities and induce loneliness. Third, other factors such as fear of annihilation can cause both PTSD and loneliness. To understand the relationship between loneliness and posttraumatic reactions, longitudinal studies are needed.

PTSD symptoms tend to wax and wane with time, resulting in various trajectories including chronic, recurrent, delayed, recovered, and resilient (Bonanno et al., 2012; Dickstein, Suvak, Litz, & Adler, 2010; Solomon & Mikulincer, 2006). Similarly, loneliness also tends to fluctuate over time (Dykstra, Van Tilburg, & de Jong Gierveld, 2005; Perlman & Peplau, 1981). Since most studies to date are cross-sectional, it is unclear what the long-term relationships are between loneliness and trauma outcomes. Specifically, is loneliness a risk factor for CSR and PTSD? Is it the result of trauma-induced psychopathology, or are there other variables that affect both?

Various psychological variables have been known to serve as stress buffers, preventing or attenuating the adverse effects of war trauma. Social support has been one of the most commonly studied and validated stress buffers in the face of war trauma. Studies have highlighted its protective role in both preventing immediate psychological distress on the battlefield (e.g., Solomon, Mikulincer, & Hobfoll, 1986) and inhibiting the crystallization of

chronic PTSD in the wake of war (Solomon, Mikulincer, & Flum, 1989). Loneliness has also been associated with social support. Several studies have found loneliness to be negatively related to frequency of contact with others (e.g., Iecovich et al., 2004) and positively related to dissatisfaction with social networks and with level of social support (e.g., Tiikkainen & Heikkinen, 2005). Research supports the inverse relationship between the availability of social support and loneliness, both at a specific time point and over time (Cacioppo, Hawkley, et al., 2006). Hence, this study aims to increase our knowledge of the role of CSR, PTS, and social support in loneliness trajectories among war veterans.

Capitalizing on data from a 20-year prospective study of Israeli veterans, both with and without antecedent CSR, the present study provides a unique opportunity for investigating the long-term relationships of CSR, PTS, and social support with loneliness. First we will test the following two hypotheses: (a) Veterans with CSR will report higher rates of loneliness in the aftermath of the war as compared with veterans without CSR, and (b) loneliness trajectories differ between veterans with and without CSR. Since CSR is an identified marker for subsequent PTS (Solomon & Mikulincer, 2006), we expected that veterans with CSR would report an increase in loneliness over time. On the other hand, we expect that veterans without CSR will demonstrate decreases in loneliness, as it has been shown in other studies that most traumatized people initially respond with distress that eventually subsides (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995).

Regarding longitudinal trajectories, we test two further sets of hypotheses, the launch and snares hypotheses (e.g., Hussong, Curran, Moffitt, Caspi, & Carrig, 2004). These models have been investigated in relation to various phenomena (e.g., substance abuse; Hussong et al., 2004) but have not, to the best of our knowledge, been applied to PTS and loneliness. The launch hypothesis is based on the premise that the starting point of an individual serves as a catapult that defines the trajectory of a phenomenon (Kindermann & Skinner, 1992). As such, PTS that develops early on could launch the entire trajectory of loneliness in motion from a more vulnerable starting point. Our third hypothesis is that higher baseline levels of PTS in both groups will be associated with a greater increase in loneliness over the next 20 years and higher baseline levels of perceived social support will be associated with a greater decrease in loneliness over time.

The snares hypothesis (Hussong et al., 2004; Moffitt, 1993) argues that the course of a phenomenon is impacted by short-term factors or “snares” that arise over time. The current study investigates the snares hypothesis that loneliness trajectories are related to changing levels of PTS over time. Our fourth hypothesis, therefore, is that levels of PTS and perceived social support in both groups will continue to be positively associated (i.e., decreasing over time) and negatively associated (i.e., increasing over time), respectively, with loneliness at later points in time. The launch and the snares hypotheses

are not contradictory or mutually exclusive—they may be complementary—but they represent two different mechanisms by which PTS and perceived social support could affect loneliness trajectories.

METHOD

Participants

The current study is part of a larger longitudinal research project investigating the long-term impact of CSR (for details, see Solomon & Mikulincer, 2006). Previous studies on this sample have not examined loneliness trajectories. Two groups of male veterans participated in this study. The CSR participants were Israeli soldiers who fought in the 1982 Lebanon War and had been identified by military mental health personnel on the battlefield as psychiatric casualties suffering from CSR. Criteria for inclusion in this group were as follows: (a) participation in frontline battles during the war, (b) a referral for psychiatric intervention made by the soldier's battalion surgeon during the war, (c) a diagnosis of CSR made on the battlefield by clinicians trained and experienced in the diagnosis of combat-related reactions, and (d) 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 second group consisted of soldiers who had participated in combat in the same units as the CSR group but were not identified as having CSR. Veterans without CSR were matched with the CSR group for age, education, military rank, and military assignment. Although it is difficult to control for the subjective stressfulness of any combat experience, this sampling procedure was chosen to ensure that soldiers in both groups were exposed to a similar amount and type of objective stress. All of the soldiers in the CSR and non-CSR groups underwent stringent physical and psychiatric screening before commencing their military service, and no indication of diagnosable premorbid psychiatric disorders was recorded in their medical files.

Participants were assessed at three time points: 2 years (1984), 3 years (1985), and 20 years (2002) after the 1982 Lebanon War. The three-wave measurement data set includes 346 veterans with CSR (of whom 235 had missing data at one or two time points) and 264 veterans without CSR (of whom 193 had missing data at one or two time points). Little's missing completely at random test indicated that the data of the veterans with CSR were missing completely at random, $\chi^2(58) = 53.55$, $p = .64$, while the data of the veterans without CSR were not missing completely at random, $\chi^2(142) = 176.86$, $p = .03$.

Soldiers' ages in 1984 (first wave of measurement) ranged between 19 and 52 ($M = 29.40$, $SD = 5.95$, $Mdn = 29$). Of the participants, 19% had completed only eighth grade, 26.2% had been to high school without completing

it, 35.2% had completed only high school, and 19.5% had an academic degree. Veterans with CSR and veterans without CSR did not significantly differ in age, education, military rank, and assignment. The attrition rate may raise doubts about the unbiased nature of the sample. However, high attrition is a common and well-recognized problem in prospective studies. Furthermore, data retrieved from official military records and from the questionnaires filled out at Time 1 revealed that veterans who participated at all three points in time did not significantly differ from those who declined to participate at Times 2 or 3 in sociodemographic and military background, pre-military adjustment, intelligence, or mental and somatic health 2 years after the war.

Procedure

Two (T1) and 3 (T2) years following their participation in the 1982 Lebanon War, participants were asked to report to the headquarters of the surgeon general to take part in this study. Participants filled out a battery of questionnaires in small groups. Twenty years after the war (T3), data were collected at the veterans' homes. Participants' informed consent was obtained, and they were informed that the data would remain confidential and in no way influence their status in military or civilian life. Approval was obtained from both the Israel Defense Forces and Tel-Aviv University ethics committees.

Measures

The *Impact of Event Scale* (IES; Horowitz, Wilner, & Alvarez, 1979) 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 (Schwarzwald, Solomon, Weisenberg, & Mikulincer, 1987). The DSM-IV PTSD diagnosis includes three major symptom criteria: intrusion, avoidance, and hyperarousal (American Psychiatric Association, 2000). The original IES, which was available when the study commenced, assesses intrusion and avoidance but not hyperarousal. The scale consists of 15 items, seven of which measure intrusive symptoms (intrusive thoughts, nightmares, intrusive feelings, and imagery) and eight of which tap avoidance symptoms (numbing of responsiveness, avoidance of feelings, situations, and ideas). Combined, they provide a total subjective distress score. Although the avoidance symptoms include both avoidance tendencies and emotional numbing, we adopted Horowitz's (1976) formulation, in which both symptoms together are called avoidance. The respondent is asked to indicate on a 4-point scale ranging from 1 (not at all) to 4 (very often) how frequently he or she has experienced each reaction during the previous week. Cronbach's alpha coefficients were high for both avoidance (ranging from .82 to .89) and intrusion (from .85 to .95) across the three waves of measurement.

Feelings of loneliness were assessed via the revised *UCLA Loneliness Scale* (Russell, Peplau, & Cutrona, 1980). The scale consists of 20 items measuring general feelings of social isolation and dissatisfaction with one's social interactions. Ten items reflect satisfaction with social relationships and 10 reflect dissatisfaction. Participants were asked to indicate how often they experienced the feelings mentioned in the items on a 4-point Likert scale (1 = not at all, 4 = very often). The total score is the mean of all 20 items after having reversed the positively worded items. High scores reflect more feelings of loneliness. The scale possesses good psychometric properties in both the English (Russell et al., 1980) and the Hebrew (Solomon & Dekel, 2008) versions, the latter of which was used in the current study. In the present study, high internal consistency was found (Cronbach's alpha = .93).

The *Perceived Social Support Scale* was devised for the purposes of this study on the basis of Mueller's (1980) Social Network Interview. Participants were presented with seven questions regarding expressive and instrumental support that they received from their network's members. They were asked to indicate on a 4-point scale (1 = not at all, 4 = very much) to what extent they received support from their social network. The scale was previously found to possess good psychometric properties (Solomon, Mikulincer, & Habershaim, 1990). In the present study, the scale was found to have good reliability (Cronbach's alpha = .86).

Data Analysis

To test our hypotheses, we examined a series of latent trajectory models (LTs). LTs extend latent variable analyses within the structural equation modeling (SEM) framework to provide a flexible tool for testing hypotheses of change over time and prediction of such change (e.g., McArdle, 1988). These are superior to such traditional techniques as analysis of variance in two ways: (a) the ability to capture a trajectory of a change across multiple time points, not only between two time points at a time, and (b) the ability to predict this trajectory of change. In these analyses, we estimated LTs to examine the trajectory of change in sense of loneliness over time among veterans with CSR and veterans without CSR. The basic LT begins with the premise that a set of repeated measures are functionally related to the passage of time. The function relating repeated measures and time can be either linear or take on a variety of other forms. These kinds of models are known as *unconditional* LTs. To examine whether veterans with CSR and veterans without CSR differ in the extent of change in their sense of loneliness over time, we used the SEM multi-group technique.

If the unconditional models fit the data well, one can include other variables in order to predict the initial level of the phenomenon and its degree of change. These models are known as *conditional* LTs. Therefore, we tested the launch hypothesis (Hussong et al., 2004) through conditional LTs in which

IES score and level of social support in 1984 served as exogenous predictors of change over time in sense of loneliness among veterans with CSR and veterans without CSR—assessing long-term associations between both IES and social support and sense of loneliness. IES was assessed using a latent variable on which the intrusive and avoidance clusters were loaded.

Next, we tested the snares hypothesis (Hussong et al., 2004). The repeated measures of IES and social support were considered as time-varying covariates to examine their time-specific associations (short-term associations) to sense of loneliness among veterans with CSR and veterans without CSR (for more information, see Curran & Hussong, 2002; Curran, Muthén, & Harford, 1998).

To assess the appropriateness of the LTs, we used the EQS 6.1 structural equation models (SEM) software (Bentler & Wu, 1995). We estimated the model's fit by using the comparative fit index (CFI), the 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 the CFI and NNFI are larger than .95 and the RMSEA is lower than .05 (Bollen & Curran, 2006). Missing data were handled with case-wise maximum likelihood estimation using the Jamshidian-Bentler EM algorithm (Jamshidian & Bentler, 1999), followed by Yuan-Bentler (Yuan & Bentler, 2000) corrections for possible non-normality when running EQS models. Overall, we had data on 351 veterans with CSR (250 of whom had missing data on at least one of the variables on one of the occasions, a total of 32 missing patterns) and 268 veterans without CSR (199 of whom had missing data on at least one of the variables on one of the occasions, a total of 25 missing patterns).

RESULTS

Differences Between Veterans With CSR and Without CSR

To examine group differences in the main study measures (IES avoidance and intrusive scores, loneliness, and social support), we conducted a series of independent samples *t* tests that were adjusted by Bonferroni's method to account for the multiple comparisons. Means, standard deviations, test statistics, and effect sizes are presented in Table 1. As can be seen in Table 1, the analyses revealed that veterans with CSR reported significantly higher IES avoidance and intrusive symptoms and loneliness as compared with veterans without CSR. Conversely, veterans without CSR reported higher levels of social support than veterans with CSR.

Loneliness Trajectories in Veterans With CSR and Without CSR

In this section, we examine (a) the shape of the developmental trajectory of sense of loneliness that best fit the data and (b) whether there were

TABLE 1 Means, Standard Deviations, Test Statistics, and Effect Sizes for Examining Group Differences in the Main Study Measures.

	CSR group		Control group		<i>t</i>	Cohen's <i>d</i> ^a
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
IES intrusion T1	2.13	1.47	.74	.92	12.34**	1.75
IES avoidance T1	1.62	1.20	.67	.84	9.94**	1.41
IES intrusion T2	1.87	1.42	.60	.86	10.85**	1.54
IES avoidance T2	1.42	1.16	.70	.87	6.88**	.98
IES intrusion T3	1.21	1.33	.35	.82	8.09**	1.15
IES avoidance T3	.79	1.03	.36	.74	4.89**	.70
Loneliness T1	2.21	.57	1.81	.52	4.84**	.69
Loneliness T2	2.21	.63	1.78	.50	5.42**	.77
Loneliness T3	2.15	.67	1.70	.58	4.92**	.70
Social support T1	2.71	.75	3.16	.73	-3.95**	.56
Social support T2	2.81	.79	3.15	.75	-3.06*	.43
Social support T3	2.74	.77	3.32	.61	-5.99**	.85

^a0.2–0.5 = weak effect, 0.5–0.8 = moderate effect, 0.8 and above = strong effect.

* $p < .01$; ** $p < .001$ (after adjusting the significance level by Bonferroni's method).

differences in the developmental trajectory of sense of loneliness between veterans with CSR and veterans without CSR.

To examine changes in sense of loneliness, we estimated unconditional LTs for the repeated measures of sense of loneliness reported in 1984 (T1), 1985 (T2), and 2002 (T3). Two latent factors were estimated: one to define the initial level (intercept) of the developmental trajectory of sense of loneliness (with all factor loadings fixed to 1.0) and one to define the linear slope of the trajectory (with factor loadings set to 0, 1, and 18 to define an annual metric of time).

The unconditional LT for veterans with CSR showed an adequate fit to the observed data, $\chi^2(3) = 13.95$, $p < .05$, CFI = .96, NNFI = .94, RMSEA = .07. The analysis revealed that the CSR group's sense of loneliness at T1 was 36.85 ($SD = 10.66$) and that it remained constant over time ($b = -.01$, $t = -.39$, $p = .70$): At T2 it was 36.15 ($SD = 12.34$), and at T3 it was 36.73 ($SD = 12.77$). The unconditional LT for veterans without CSR also showed an adequate fit to the observed data, $\chi^2(3) = 11.06$, $p < .05$, CFI = .96, NNFI = .94, RMSEA = .06. The analysis revealed that the non-CSR group's sense of loneliness at T1 was 30.69 ($SD = 9.77$) and that it significantly decreased by .05 annually to a level of 29.80 at T3 ($SD = 10.01$, $t = -2.05$, $p < .05$); the non-CSR group's level of loneliness at T2 was 30.05 ($SD = 9.66$).

To examine whether veterans with CSR and veterans without CSR differ in the initial level and rate of change of sense of loneliness over time, we conducted multi-group unconditional LTs. To this end, we compared a default model that allowed effects to vary across groups with two constrained models that imposed equality of the intercept

(initial level) and slope (rate of change) factors. The analyses revealed that whereas veterans with CSR had a higher sense of loneliness at T1 than veterans without CSR ($\Delta\chi^2 = 52.48$, $df = 1$, $p < .0001$), the groups did not differ in the rate of change in their sense of loneliness ($\Delta\chi^2 = .45$, $df = 1$, $p = .50$).

Test of the Launch Hypothesis

We next estimated conditional LTs that examined the hypothesis that IES at T1 predicts a greater sense of loneliness for that year and an incline in sense of loneliness over time. Also, we examined whether the degree of perceived social support at T1 predicts a lower sense of loneliness for that year and a decline in sense of loneliness over time. In other words, we tested whether the magnitude of intercepts and slopes underlying sense of loneliness varied as a function of IES and perceived social support at T1. To this end, a latent variable of IES at T1 and the measure of perceived social support at T1 were included as exogenous predictors of the intercept and slope factors defining the trajectories of sense of loneliness over time. The models are presented in Figure 1.

The CSR group's launch LTs showed an adequate fit to the observed data, $\chi^2(8) = 19.76$, $p < .05$, CFI = 1, NNFI = 1, RMSEA = .02. The analysis revealed that the higher the IES score and the lower the perceived social support at T1, the higher the CSR group's initial level of sense of loneliness ($b = 2.82$, $\beta = .34$, $t = 4.16$, $p < .001$, and $b = -9.28$, $\beta = -.69$, $t = -11.59$, $p < .0001$, respectively). Also, perceived social support ($b = .34$, $\beta = .36$, $t = 3.72$, $p < .001$) but not IES ($b = .02$, $\beta = .04$, $t = .41$, $p = .68$) had long-term effects on the rate of change in sense of loneliness among veterans with CSR: The higher the perceived social support at T1, the smaller the decline in sense of loneliness over time among veterans with CSR.

The non-CSR group's launch LTs also showed an adequate fit to the observed data, $\chi^2(8) = 9.25$, $p = .32$, CFI = 1, NNFI = 1, RMSEA = 0. The analysis revealed an equivalent pattern of results: The higher the IES score and the lower the perceived social support at T1, the higher the non-CSR group's initial level of sense of loneliness ($b = 2.71$, $\beta = .24$, $t = 2.66$, $p < .01$, and $b = -8.62$, $\beta = -.75$, $t = -7.84$, $p < .001$, respectively). Also, perceived social support ($b = .27$, $\beta = .37$, $t = 2.94$, $p < .01$) but not IES ($b = -.06$, $\beta = -.08$, $t = -.69$, $p = .49$) had long-term effects on the rate of change in sense of loneliness among veterans without CSR. High perceived social support at T1 predicted a smaller decline in the non-CSR group's sense of loneliness over time as compared with the rate of decline for those with an average level of perceived social support. The multi-group analyses affirmed that the pattern of results for CSR and non-CSR veterans was not significantly different, $\Delta\chi^2s < .83$, $dfs = 1$, $ps > .36$.

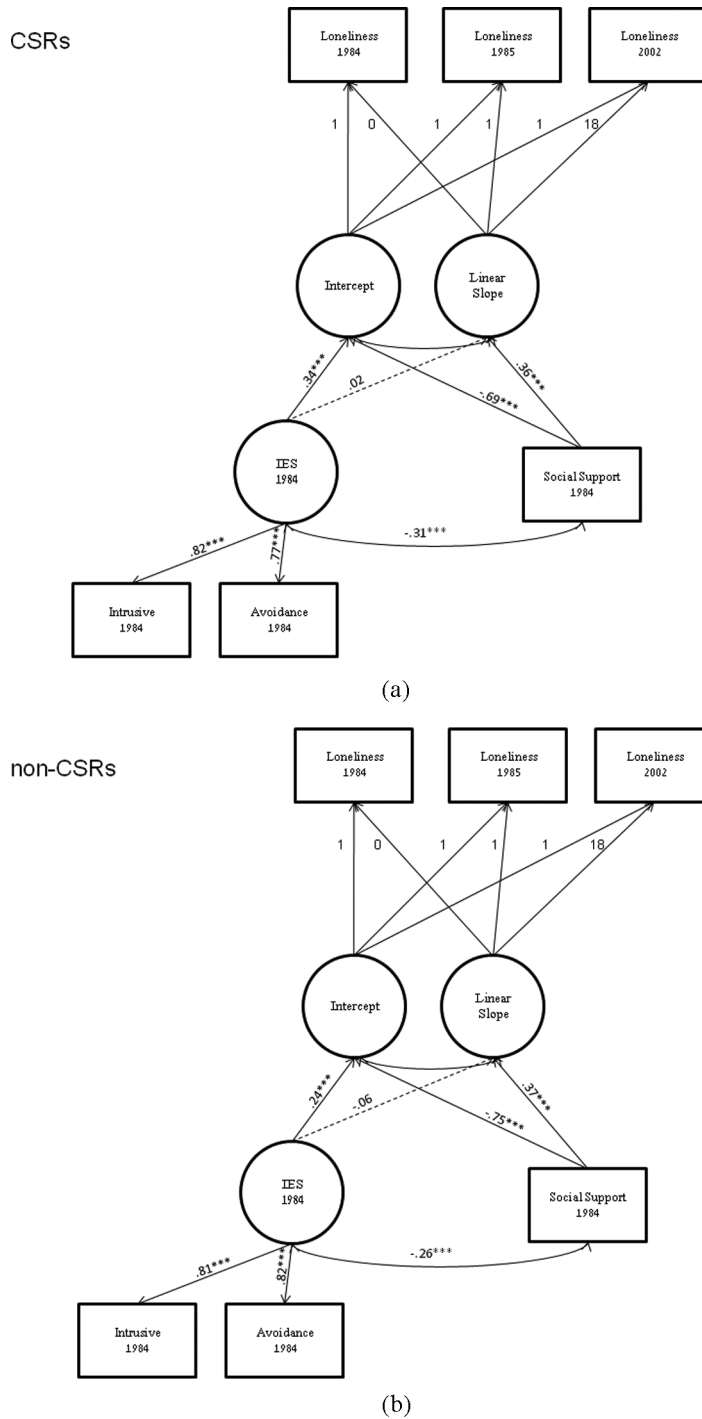


FIGURE 1 The CSR (top panel) and non-CSR (bottom panel) groups' conditional LTs, used to examine the hypothesis that IES at T1 predicts a greater sense of loneliness in that year and an increase in sense of loneliness over time. The analysis also examined whether the degree of perceived social support at T1 predicts a lower sense of loneliness in that year and a decrease in sense of loneliness over time.

Test of the Snares Hypothesis

Next, we examined the extent to which IES and perceived social support account for time-specific change in sense of loneliness among veterans with CSR and veterans without CSR. To this end, we estimated a time-varying covariate model in which indicators of IES and perceived social support at T1, T2, and T3 served as predictors of within-time individual variability in sense of loneliness (see Hussong et al., 2004, for more information). This strategy evaluates whether higher levels of IES uniquely predict a time-specific elevation or “shock” in sense of loneliness above and beyond what is expected based on the individual-specific underlying trajectory of this measure (Curran & Bollen, 2001) and whether perceived social support uniquely predicts a time-specific decline (a short-term “protection”) in sense of loneliness. In other words, significant prediction of time-specific measures of loneliness indicates that IES maintains a higher level of sense of loneliness than would be expected for that individual given his overall pattern of these measures and that perceived social support maintains a lower level of sense of loneliness. The models are presented in Figure 2.

The snares LT for veterans with CSR showed an adequate fit to the observed data, $\chi^2(42) = 104.32$, $p < .05$, CFI = .99, NNFI = .99, RMSEA = .03. The analysis revealed that the higher the IES score at a given time, the higher the sense of loneliness for veterans with CSR in that time ($b = 2.85$, $\beta = .35$, $t = 4.91$, $p < .001$ at T1; $b = 2.65$, $\beta = .29$, $t = 4.64$, $p < .001$ at T2; and $b = 3.89$, $\beta = .37$, $t = 7.91$, $p < .001$ at T3). Also, the higher the perceived social support at any given time, the lower the sense of loneliness among veterans with CSR at that time ($b = -9.44$, $\beta = -.68$, $t = -14.33$, $p < .0001$ at T1; $b = -9.17$, $\beta = -.63$, $t = -14.19$, $p < .0001$ at T2; and $b = -11.42$, $\beta = -.70$, $t = -17.79$, $p < .0001$ at T3).

Non-CSR veterans' snares LT also showed an adequate fit to the observed data, $\chi^2(42) = 106.39$, $p < .05$, CFI = 1, NNFI = 1, RMSEA = .02. The analysis revealed a different pattern of results: The higher the IES score at T1 ($b = 2.75$, $\beta = .22$, $t = 3.26$, $p < .01$), but not at T2 ($b = 1.56$, $\beta = .11$, $t = 1.44$, $p = .15$) or T3 ($b = 1.71$, $\beta = .12$, $t = 1.73$, $p = .09$), the higher non-CSR veterans' sense of loneliness at that time. Perceived social support, however, predicted sense of loneliness at all time points: The higher the perceived social support at a given time, the lower the sense of loneliness among veterans without CSR at that time ($b = -8.79$, $\beta = -.70$, $t = -10.74$, $p < .0001$ at T1; $b = -9.06$, $\beta = -.73$, $t = -10.91$, $p < .0001$ at T2; and $b = -11.74$, $\beta = -.71$, $t = -11.79$, $p < .0001$ at T3).

Multi-group analyses revealed that the short-term effects of perceived social support on sense of loneliness did not differ significantly between veterans with CSR and veterans without CSR ($\Delta\chi^2_s < .51$, $dfs = 1$, $ps > .48$).

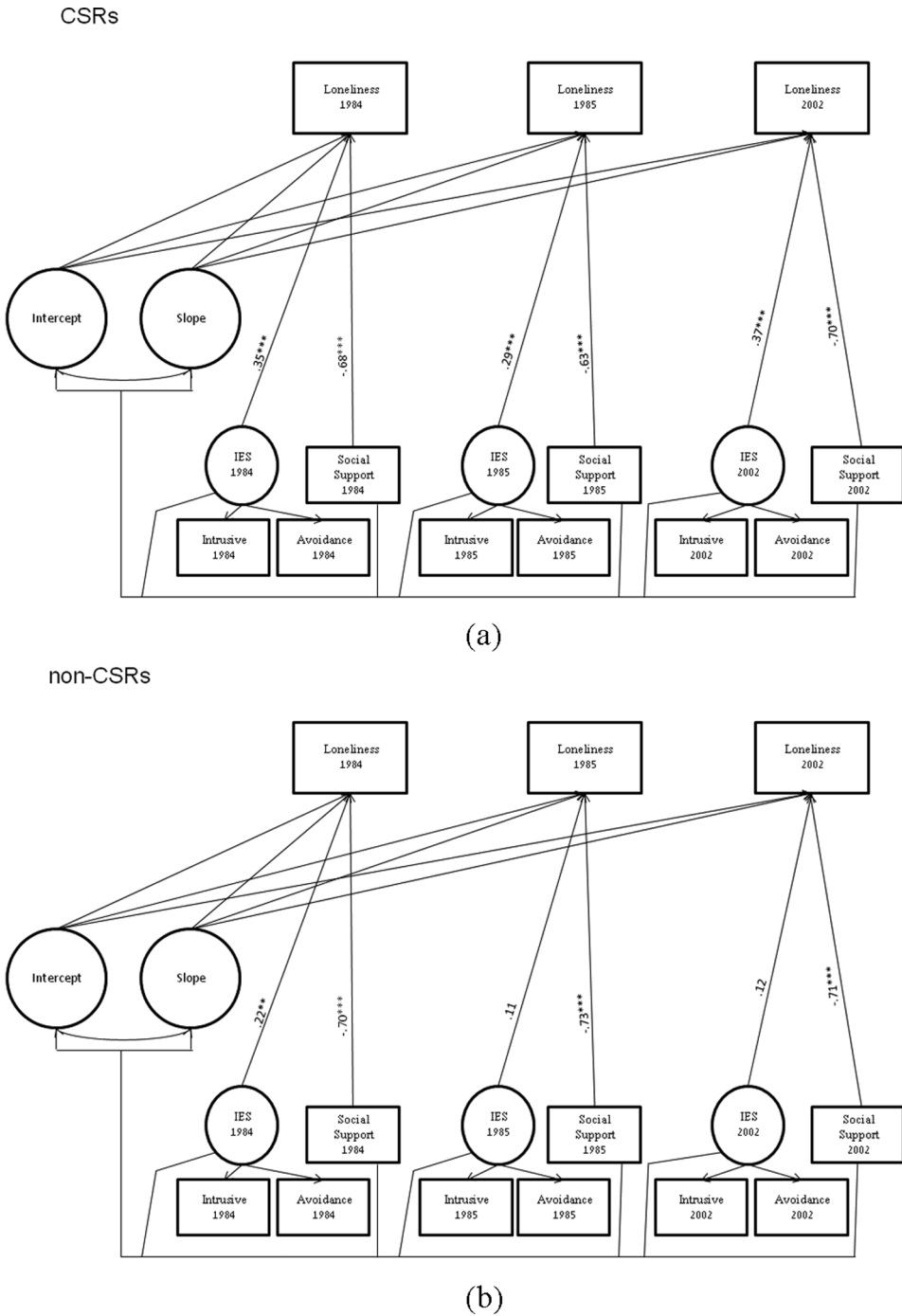


FIGURE 2 The CSR (top panel) and non-CSR (bottom panel) groups' time-varying covariate models, used to examine the extent to which IES and perceived social support account for time-specific change in sense of loneliness among veterans with and without CSR.

The only significant difference in the short-term effects of IES on sense of loneliness was at T3 ($\Delta\chi^2 = 4.83$, $df = 1$, $p < .05$). The groups did not differ significantly in the links between IES and loneliness at T1 or T2 ($\Delta\chi^2$ s < 1.47 , $dfs = 1$, $ps > .23$).

DISCUSSION

The analyses revealed several important findings casting light on the trajectory of loneliness over 20 years. First, as hypothesized, veterans with antecedent CSR reported higher levels of loneliness in the relatively short aftermath of the traumatic event as compared with veterans without CSR. Second, although the final analysis did not show a significant difference between study groups in the rate of change in loneliness over time, close scrutiny of each of the two groups separately revealed that while loneliness remained stable over time among the veterans with CSR, it decreased among veterans without CSR. These results are only partly in accordance with our hypothesis. Third, the launch hypothesis was only partly supported by the findings, as the baseline severity of PTS was cross-sectionally, but not longitudinally, positively associated with loneliness. However, in line with our hypothesis, the baseline level of perceived social support was negatively associated with loneliness both in the cross-sectional and longitudinal analyses. Finally, while the snares hypothesis (i.e., cross-sectional, time-specific associations with loneliness) regarding perceived social support was supported among both study groups, the snares hypothesis regarding IES scores was fully supported only among veterans with CSR.

The CSR veterans' increased vulnerability to loneliness was highlighted by two separate findings. First, CSR veterans reported increased loneliness in the first assessment compared to non-CSR veterans. Second, loneliness remained stable among veterans with CSR during all points in time, while it decreased among veterans without CSR. These findings are in accordance with previous studies showing a positive relationship between loneliness and CSR in veterans (e.g., Dasberg, 1976). They are also in line with clinical observations of Vietnam veterans (Figley & Leventman, 1980) and case studies of Israeli combat veterans. One of these case studies, for example, vividly described the experience of loneliness following the Lebanon War: "[After Lebanon] my desire for company really dwindled. I have none. I feel that everyone is disconnected from me... I have no desire for anything. I want to be alone" (Solomon, 1993, p. 118).

The stability and continuous presence of loneliness may be explained by what Laub and Auerhahn (1989) termed "failed empathy." Accordingly, the veteran's feelings of physical and psychological desertion and disengagement from potential social support may develop into enduring mistrust towards other people, which may lead to a negative self-perception that hinders

interpersonal relationships. The stability and continuous presence of loneliness may also be understood in light of what Lifton (1968) called “death imprint.” This phenomenon relates to circumstances in which individuals witness the death of others, following which indelible imprints are left upon their consciousness. This imprint becomes intrusive and the survivors feel immersed in death, even in the midst of life. It may be that a similar imprint exists in the case of loneliness, wherein a powerful sense of being alone is imprinted on the battlefield (e.g., Dasberg, 1976) and continues to affect the traumatized veteran long after the war is over. Among these veterans, loneliness thus becomes an existential experience, which feeds on itself and endures independently from any outside experiences that occur after battles have ceased.

This stability of loneliness may also be understood in light of Shaw’s (1987) conceptualization, according to which CSR occurs when soldiers can no longer sustain the illusion of immortality that often protects them during combat. This irrational thought, that they are impervious to bullets and exploding shells, is regarded by Shaw as a narcissistic defense that enables soldiers to function during wartime by keeping their biological vulnerability out of awareness. When this basic illusion is shattered by psychological breakdown on the battlefield (i.e., CSR), one is overwhelmed by feelings of helplessness and isolation. The traumatized soldier may then feel exposed and vulnerable, struggling alone against forces much stronger than him or her. This brutal awakening is bound to have long-term consequences, since the cherished illusion is also the basis for one’s feelings of comfort, safety, and well-being.

Although baseline levels of PTS (i.e., IES scores) did not predict the future trajectory of loneliness, they did have cross-sectional, time-specific effects, as a positive correlation was found between PTS and loneliness at any given time point among the CSR group. For veterans without CSR, this was true only in the relatively short aftermath of the war. The finding that PTS failed to predict the long-term trajectory of loneliness may be attributed to the highly labile nature of PTS. Longitudinal studies have often shown waxing and waning of PTS across time (e.g., Solomon & Mikulincer, 2006), and the initial level of symptoms may dramatically change over the years. Therefore, the level of PTS at T1, only 2 years after the war, may have not been a stable and potent predictor of future emotional difficulties. Still, our finding regarding a positive association between PTS and loneliness at a given time point does suggest a connection between PTS and loneliness. More specifically, although we used the general IES score in this study, as opposed to its constituent subscales, it should be remembered that this total score comprises two groups of PTS: intrusion and avoidance.

The connection between veterans’ avoidance and their sense of loneliness is reasonable. Avoidance is a commonly observed response to traumatic experiences, as one attempts to distance oneself from any reminder of the

trauma. Among other things, one may exert great efforts in order to avoid social interactions and other people who may not be able to understand one's distress (Figley & Leventman, 1980). This avoidance is often accompanied by feelings of shame about the veteran's breakdown in combat and subsequent dysfunction (Herman, 1992; Solomon, 1993). These attempts to avoid others, if deemed successful, may leave one isolated and directly foster feelings of loneliness. Intrusive symptoms, which constitute the second component of the general IES score, may also explain CSR-related loneliness. War recollections may crop up at odd moments, including in the midst of social interactions, as described by a veteran who was plagued by intrusive war memories: "When I'm talking to people . . . or when they're talking, I somehow tune out, even though I'm looking straight at them And when they ask me a question, I can't answer because I have no idea what they've been saying" (Solomon, 1993, p. 119). Dissociative interactions of this nature disconnect veterans from their social surroundings, thus contributing to an increased sense of loneliness.

In this study, social support was the only variable to predict loneliness in both the short and long term. This is in line with previous studies, which have found social support to be a particularly important resource following combat, buffering the association between traumatic war stress and various adverse psychological implications (e.g., King, King, Fairbank, Keane, & Adams, 1998). The high predictive strength of social support vis-à-vis loneliness is to be expected, however, as these two variables may be seen as opposing mirror images. This may be particularly true in light of the way in which social support was assessed in the present study, as we specifically tapped one's perceptions of one's social network. The subjective nature of this variable possibly makes it confounded, at least in part, with loneliness, as those who perceive their social network as less supportive inherently feel lonelier. Finally, the important role of social support across time may be viewed in light of Hobfoll's (1989) conservation of resources (COR) theory. The theory's basic assumption is that people strive to retain, protect, and build resources and that what is threatening to them is the potential or actual loss of these resources. Following a traumatic event, resource loss is often fast, extensive, and deep. One example of a loss spiral is the one created by the traumatic experience of combat (Hobfoll, 1998). During war, soldiers may find themselves alone and defenseless when exposed to the uncontrollable threat of death. This experience can worsen in the face of the death of their comrades—their closest social support network. During war, many things are at stake: the soldier's self-esteem, sense of control, physical health, faith in others, and social support. Our findings indicate that veterans who reported high levels of social support in the short aftermath of combat experienced less loneliness. In line with COR theory, this finding may be taken to support the long-term value of social resources following trauma.

Limitations and Suggestions for Future Studies

This study has several limitations. The use of self-report measures, although common in trauma studies, may be prone to reporting bias. The relatively long intervals between study assessments, particularly the interval between T2 and T3, hinder the examination of possible fluctuations in PTS, loneliness, and social support. Finally, the employment of the IES may be seen as another limitation, as this instrument does not tap PTSD diagnoses but rather assesses symptoms of intrusion and avoidance in general. Also, for statistical reasons, we conducted all analyses using the global IES score, rather than the two separate subscale scores. This resulted in a rather general evaluation of PTS.

Additional prospective, longitudinal studies are needed in order to gain a deeper understanding of the long-term trajectories of loneliness following combat. Future studies are encouraged to employ more and frequent waves of measurement, in order to more accurately monitor fluctuations in loneliness over time.

Despite the limitations, the findings of this study have important theoretical and practical implications. First, this is, to the best of our knowledge, the first study to examine the long-term associations between PTS and loneliness among veterans. Our findings suggest that loneliness is not limited to the actual experience of combat but rather continues to hinder the lives of traumatized veterans many years after the war. This finding should be taken into account by mental health practitioners as they attempt to alleviate the suffering of traumatized populations at various stages after the traumatic event. Also, our findings highlight the important role of social support as a long-term buffer against loneliness. Thus, therapeutic interventions aiming to bolster social support may prove to be particularly helpful in the aftermath of combat trauma.

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