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# Cardiac-Disease-Induced Posttraumatic Stress Symptoms (CDI-PTSS) Among Cardiac Patients' Partners: A Longitudinal Study

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***Objective:*** Cardiac-disease-induced posttraumatic stress symptoms (CDI-PTSS) have been detected among a substantial number of cardiac patients. Even though patients' caregiving partners are also susceptible to CDI-PTSS, the research on cardiac partners' CDI-PTSS is scarce. Based on the ecological model of trauma and recovery, we investigated levels of partners' CDI-PTSS over time, and factors that potentially contribute to it. ***Method:*** During patients' hospitalizations, partners ($N$ = 143) provided data regarding demographic variables and peritraumatic emotional distress (depression and anxiety). Four months later, partners' CDI-PTSS, their emotional distress, fear of patients' illness progression, and perceived social support were assessed. Eight months posthospitalization, partners filled out questionnaires tapping CDI-PTSS. Hypotheses were tested using structural equation modeling (SEM). ***Results:*** A mild level of CDI-PTSS was detected among partners, 4 and 8 months after patients' cardiac event. Partners' distress as measured during patients' hospitalization, and their fear of patients' illness progression, contributed to the manifestation of CDI-PTSS over time. ***Conclusions:*** The findings shed light on potential risk factors for partners' CDI-PTSS. Interventions to ameliorate partners' distress and fear of illness progression should be designed toward reducing the development of CDI-PTSS among partners.

*Keywords:* ACE, fear of illness progression, PTSD, PTSS, partners

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Cardiovascular disease (CVD) comprises the main cause of death and disability worldwide (World Health Organization [WHO], 2022). The umbrella term *cardiovascular disease* includes any condition that affects the blood vessels or heart. Insufficient blood supply to the heart results in myocardial ischemia, potentially leading to an acute coronary event (ACE; i.e., myocardial infarction [MI] or unstable angina), which can lead to disability and death (Centers for Disease Control and Prevention [CDC], 2022). Another type of ACE is cardiac arrest, an emergency in which unexpected circulatory arrest occurs within one hour of symptom onset. Cardiac arrest usually leads within minutes to sudden cardiac death and therefore requires that the individual be immediately resuscitated (American Heart Association, 2022).

The perceived nature of CVD—the event's unexpectedness, the imminent probability of death, the patient's feelings of helplessness (Edmondson, 2014)—may give rise to intense negative emotional reactions such as depression and anxiety (Shao et al., 2020; Tully et al., 2016). It may even lead to the development of cardiac-disease-induced posttraumatic stress symptoms (CDI-PTSS). In some cases, these symptoms can even grow severe enough to warrant a diagnosis of cardiac-disease-induced posttraumatic stress disorder (CDI-PTSD; Vilchinsky et al., 2017).

Awareness of the fact that patients are not the only ones who need to cope with such turmoil is one of the areas that has been most neglected in the psycho-cardiology literature (Vilchinsky, 2017). In the specific context of cardiac disease, partners (whether spouses or romantic cohabitants) are the family members most

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vulnerable to the consequences of the illness, as the onset of cardiac disease typically occurs in late adulthood, when the principal caregiver is usually the partner (Randall et al., 2009). Taking care of an ill family member is known to have negative effects on the psychological well-being of the caregiving partner, who often experiences emotional distress, burden, and stress (Revenson et al., 2016; Vilchinsky et al., 2015). Moreover, evidence that these caregiving partners might develop conditions as severe as PTSS is beginning to accumulate (Fait et al., 2017).

A few studies have examined the existence of CDI-PTSD or CDI-PTSS among partners of patients coping with cardiac illnesses, but only in the specific context of heart transplantation. Bunzel et al. (2005) found that 23% to 25% ($n$ = 6) of patients' partners (all women) met the criteria for CDI-PTSD, whereas none of the patients did. According to Brouwers et al. (2015, partners of patients who underwent cardiac transplantation showed a higher CDI-PTSD prevalence at the six-month follow-up (14%) than did patients (9%). To the best of our knowledge, only one study to date, conducted by the authors of the current study, assessed the incidence of CDI-PTSD among partners of patients who experienced an ACE. In that study, we detected that 13% of our cardiac patients screened positive for CDI-PTSD, but as many as 25% of their partners met the same screening criteria (Fait et al., 2017). The WHO (2022) reported that approximately 18 million individuals died from CVD in 2019, representing one third of all global deaths. In addition, according to the CDC (2022) in the United States, every year as many as 805,000 Americans have a heart attack. There may, as such, be quite a few patients' partners with CDI-PTSD symptomatology who are undiagnosed and untreated (Vilchinsky, 2017).

Moreover, CDI-PTSS among patients has been found to be associated with many negative outcomes, such as psychopathology and reduced quality of life; low adherence to health-promoting behaviors; rehospitalizations, recurrent MACE (major adverse coronary event), and ACM (all-cause mortality; see reviews by Jacquet-Smailovic et al., 2021; Vilchinsky et al., 2017). Although patients' partners with CDI-PTSS may therefore be at risk for negative outcomes as well, no study to date has explored their CDI-PTSS levels over time nor the possible contributing factors to their CDI-PTSS. Thus, our aims in the current study were to assess the levels of CDI-PTSS over time among partners of patients who experienced an ACE as well as to examine the contribution of putative psychological risk factors to their CDI-PTSS. We based our assumptions on Harvey's (1996) ecological model of trauma and recovery, as well as on previous findings from studies on patients' CDI-PTSS.

## Applying Harvey's Ecological Model to the Context of Partners' CDI-PTSS

Studies of populations exposed to different kinds of traumas suggest that individuals differ considerably in their vulnerability to symptom development and stability (Harvey, 2007). This variability has been found to be related to individuals' pre- and peritraumatic features, to the characteristics of the traumatizing event, to individuals' perceptions of the traumatic event, and to qualities of the environment at large (Harvey, 2007). From an empirical point of view, two meta-analyses (Brewin et al., 2000; Ozer et al., 2003), showing that trauma severity, peritraumatic dissociation, perceived life threat, and perceived support were the strongest predictors of PTSS, seem to corroborate this model's assumptions. Thus, as suggested by Harvey in her ecological model of trauma and recovery (Harvey, 1996), any observation of the development of PTSS must take into consideration the event, the person, and the environment (Harvey, 1996).

Harvey's model, to the best of our knowledge, has never been applied in the context of health psychology. However, its assumptions are in line with the ecological and bio-psycho-social models of coping with illness that guide the field (Friedman & Hampson, 2021; Revenson & Gurung, 2018). Accordingly, in the current study we focused on the cardiac event characteristics, individual coping capacities, and social–environmental characteristics as putative contributing factors to CDI-PTSS among partners of patients with a new-onset ACE, as follows.

## The Cardiac Event Characteristics

Cardiac events, and especially ACEs, have the potential to be experienced as traumatizing. On average, 4%–16% of cardiac patients experience a level of CDI-PTSS that meets the criteria for a CDI-PTSD diagnosis, with a trend toward recovery over time (Vilchinsky et al., 2017). Moreover, the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed. [*DSM–5*]; American Psychiatric Association [APA], 2013, p. 271) states that individuals are susceptible to PTSS not only when they undergo an event but also when they witness "in person, the event(s) as it occurred to others" or when they learn "that the traumatic event occurred to a close family member or close friend." In the context of cardiac disease, a patient's partner is likely to have witnessed the cardiac event (Cornelius et al., 2020), making this kind of traumatic event different from events where the partner may not have been present, such as war, captivity, or sexual assault. Thus, being exposed to patients' ACE, in combination with serving as their primary caregiver, may very well make partners candidates for developing CDI-PTSS.

## Individual Characteristics

### *Peritraumatic Emotional Response*

Intense emotional responses to trauma-related cues are common in the aftermath of traumatic events, and an inability to attenuate them seems to serve as a risk factor for the development of PTSS (Bardeen et al., 2013; Brunet et al., 2001). This finding is also evident in the field of cardiac-induced trauma. In our literature review (Vilchinsky et al., 2017), we detected that the most consistent risk factor found for CDI-PTSS among cardiac patients was psychological functioning, whether it was conceptualized as premorbid distress, distress during the event, or premorbid personality difficulties. The same trend of findings was also detected in a more recent literature review on MI patients (Jacquet-Smailovic et al., 2021). Evidence regarding cardiac patients' partners' individual capacities for coping with the emotional turmoil of the cardiac event is scarce. Yet it is reasonable to suggest that, as in the case of patients, partners' anxious and depressive feelings immediately after experiencing their loved ones' coronary cardiac event may be an important contributing factor to CDI-PTSS. As high levels of

triple comorbidity are often detected among depression, anxiety and PTSS (Ginzburg et al., 2010), in the current study we assessed the possible contribution of partners' peritraumatic anxiety and depressive feelings as measured immediately after the event and during convalescence, to the unique manifestation of CDI-PTSS over time, either directly, or via their fears of illness progression, as follows.

### *Illness Perceptions*

According to the well-established theory of stress and coping (Lazarus & Folkman, 1984; Leventhal et al., 2003), a major coping determinant is people's perceptions and beliefs regarding their illness. Recent models of traumatic stress suggest that the perceived loss of control that individuals experience during traumatic events might lead to a fear of future such occurrences, as well as to a sense of helplessness, eventuating in traumatic stress symptoms (Dekel et al., 2019). Thus, a potential risk factor for illness-related PTSS is the level of perceiving the patient's illness as continuous and threatening, a phenomenon that is also described as fear of illness progression (FoP; Mellon et al., 2007; Simard et al., 2013). Recent findings from the field of cancer show that partners' PTSS is associated with their perception of the illness's threat to the patients' life, such that partners who hold a perception of higher threat to the patient also experience more severe PTSS (Posluszny et al., 2015). In our earlier study, we detected that FoP was indeed a substantial contributor to patients' CDI-PTSS (Fait et al., 2018); however, this putative risk factor has never been assessed in the context of cardiac patients' partners. It is very likely that partners in long, committed relationships, who are both emotionally and economically dependent on their ill partners, would be very anxious that the cardiac event might reoccur and have substantial ramifications for the patients as well as for themselves (Vilchinsky & Dekel, 2018). Thus, in the current study we investigated the contribution of partners' FoP to their subsequent CDI-PTSS.

## Environmental Characteristics

It has long been established that humans are critically dependent on group living and affiliative and attachment ties for survival (Taylor, 2007). Accordingly, the support that individuals receive from their social environment—namely, family, friends, colleagues, organizations, and community—has a profound impact on their psychological health, physical health, health-promoting behaviors, and on the ability to deal with adversities and challenges (Brazeau & Lewis, 2021). In the context of trauma, social support has been well-documented as a salutary factor in the etiology of PTSS (Fredette et al., 2016).

Social support availability has also been associated with low risk for CDI-PTSS among cardiac patients (e.g., Marke & Bennett, 2013). Furthermore, low or lack of social support provided to partners of patients undergoing heart transplantation has been found to be a risk factor for developing CDI-PTSS (Stukas et al., 1999). Thus, in the current study we investigated the contribution of partners' perceived support from multiple social agents to their subsequent CDI-PTSS.

## The Current Study

The main goal of the current study was to investigate the path of CDI-PTSS development over time, as well as the factors that putatively contribute to it, among a sample of cardiac patients' partners. Guided by Harvey's ecological model of psychological trauma and recovery, we assessed the contribution of partners' distress during patients' hospitalization to their early-onset CDI-PTSS (measured at 4 months on average posthospitalization), and the contribution of this early-onset CDI-PTSS, as well as partners' fear of patients' illness progression, and partners' perceived social support to partners' chronic CDI-PTSS over time (measured at 8 months on average posthospitalization). Accordingly, we hypothesized that:

1. A positive association would be found between partners' peritraumatic reactions (depression and anxiety) and subsequent CDI-PTSS levels, either directly or via subsequent levels of depression and anxiety.

2. Fear of patients' illness progression would mediate the association between peritraumatic reactions (depression and anxiety) and subsequent CDI-PTSS levels.

3. A negative association would be found between partners' perceived social support and their subsequent CDI-PTSS levels.

As partners' PTSS has to date rarely been investigated, we also assessed CDI-PTSS correlations with demographic and clinical variables. Figure S1 in the online supplemental materials presents the study's conceptual model and timeline.

## Method

### Participants and Procedure

The sample consisted of patients hospitalized in the Intensive Cardiac Care Unit (ICCU) of Sheba Medical Center at Tel Hashomer Hospital, the largest medical center in Israel. The target population was defined as patients diagnosed with an ACE who were in a significant intimate relationship. To focus on patients who experienced an acute cardiac event, our exclusion criteria for patients included a cardiac diagnosis other than an ACE; elective hospitalization; patients' cognitive, physical (e.g., being in pain or coping with severe fatigue), or language difficulties that precluded participation in the study; patients who were admitted to the ICCU for elective coronary artery bypass graft without experiencing an ACE; patients over the age of 85; patients who died during hospitalization; tourists; and patients under guardianship. Exclusion criteria for partners included cognitive, physical (e.g., being in pain or coping with severe fatigue), or language difficulties which precluded participation.

Eligible patients were approached by the research team during their hospitalization in the ICCU. Upon patients' agreement, the research team also approached the patients' partners. Couples consisting of two partners who (a) were eligible to participate and (b) agreed to participate, signed a consent form, and were asked to complete Time 1 questionnaires during hospitalization. On average, 4 months after discharge

we contacted all consenting participants (both patients and partners) by phone and arranged a follow-up meeting at their private residences to complete Time 2 questionnaires. On average, 8 months after hospital discharge, patients and partners were contacted to participate in a follow-up conversation over the phone to complete Time 3 questionnaires. Couples did not receive any reward for their participation. This study was approved by the Sheba-Tel Hashomer Medical Center Institutional Review Board.

During the study period (February 2015 through March 2018), 1,902 patients were hospitalized in the ICCU of Sheba-Tel Hashomer Medical Center. Of them, 461 (24.2%) met all inclusion criteria. In relation to these 461 eligible patients, there were 342 couples in which both patient and partner were eligible for the study. Of these, 156 couples agreed to participate and were recruited at Time 1. Most of these couples consisted of man–patient and woman-partner pairs; however, 13 couples (8.3%) consisted of woman-patient man-partner pairs. As such, we performed a series of *t* tests to evaluate differences in anxiety, as measured at Time 1, in accordance with each role (patient/partner). Women patients' anxiety levels ($M$ = 7.30, $SD$ = 5.73) were shown to be significantly higher than the anxiety levels of men patients ($M$ = 4.42, $SD$ = 4.10), $t$ (154) = 2.337, $p$ = .021. By contrast, the anxiety levels of women partners ($M$ = 5.00, $SD$ = 3.96) were found to be significantly lower than those of men partners ($M$ = 8.42, $SD$ = 5.32), $t$(154) = 2.261, $p$ = .025. As a result of the fact that there were too few women patients to unveil significant gender-by-role interactions, we did not include these 13 couples in further analysis. Of the remaining 143 couples comprising men-patients/women-partners, 106 couples completed full data at Time 2. Of them, 95 couples provided complete data at all measure timepoints, but 98 partners provided complete data at all timepoints (i.e., an additional three patients, though not their partners, withdrew at Time 3). Figure S2 in the online supplemental materials presents the flowchart of the recruitment process.

## Measures

As mentioned, the study consists of the following measurement points: during patients' hospitalization (Time 1), on average 4 months after discharge (Time 2), and on average 8 months after discharge (Time 3). At Time 1 partners' depression and anxiety were measured, and their demographic and clinical characteristics were recorded. At Time 2 we measured partners' CDI-PTSS, depression and anxiety, fear of patients' illness progression, and perceived social support. Finally, partners' CDI-PTSS was measured again at Time 3. The following questionnaires were applied.

### *Major Study Measures*

**CDI-PTSS.** CDI-PTSS was measured at Time 2 and 3 using the Hebrew version of the PTSD Scale - self-report for the *DSM–5* [PSS-SR5] (Foa et al., 2014). The PSS-SR5 is based on the Posttraumatic Stress Diagnostic Scale with added items to reflect the changes made to the PTSD diagnostic criteria in the *DSM–5* (APA, 2013). It consists of 20 items tapping the following PTSD symptoms: reexperiencing, avoidance, negative alterations in cognitions and mood, and arousal symptoms. These symptoms are measured on a scale ranging from 0 (*not at all*) to 4 (*six or more times a week*). Item scores are summed, so that a higher score indicates a more severe level of PTSS. In the current study, Cronbach's alpha for partners was .93 for Time 2 and .94 for Time 3.

Foa et al. (2016) provided the following cutoff points for the PSS-SR5: scores from 1 to 10 = mild cases, 11 to 20 = moderate cases, 21 to 35 = moderate to severe cases, and scores beyond 36 = severe cases. In addition, a score of 28 is used as a cutoff point for indicating a probable PTSD diagnosis (Foa et al., 2016). Finally, the PSS-SR5 also provides information on exposure to previous negative life events (part F). This part identifies 11 traumatic events and asks about the experience of one or more of them. For the purposes of the current study, events concerning cardiac history and family history of cardiac illness were added to the checklist, alongside an item referring to additional physical illnesses. One option on the checklist remained open in order to enable adding events that did not appear on the list. For each event mentioned, participants were asked to indicate their age during the event, subjective severity, threat to life, feelings of fear and helplessness, and whether the event had a meaningful impact on their life (emotionally or functionally). For our analysis we counted the number of traumatic events experienced by partners prior to patients' Time 1 hospitalization. In the current study, only the continuous measure of CDI-PTSS was factored into the model. However, data regarding exposure to previous negative life events, as well as the number of partners who reached the cutoff point for CDI-PTSD, are also presented to provide additional descriptive information about the sample.

**Depression and Anxiety.** Depression and anxiety were assessed at Time 1 and at Time 2, using the Hebrew version of the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). The HADS includes two subscales: depression and anxiety, each consisting of seven items. Participants were asked to rate the degree to which they experienced symptoms since the time of the patients' cardiac event, on a scale ranging from 0 (*not at all*) to 3 (*most of the time*). Raw scores were summed, so that a higher score indicated a more severe level of distress, with the following cutoff points: scores from 8 to 10 = mild cases, 11 to 15 = moderate cases, and 16 and above = severe cases (Snaith & Zigmond, 1994). Cronbach's alpha was .89 for the anxiety scale and .84 for the depression scale at Time 1, and it was .85 for the anxiety scale and .83 for the depression scale at Time 2.

**FoP.** FoP was measured at Time 2 using the Hebrew version (Fait et al., 2018) of the short form (a 12-item measure) of the Fear of Progression Questionnaire (Herschbach et al., 2005; Mehnert et al., 2006). The items were scored on a five-point Likert scale ranging from 1 (*never*) to 5 (*very often*), and higher values indicated higher levels of fear. In this study Cronbach's alpha was .88.

**Partners' Perceived Social Support.** Partners perceived social support was measured at Time 2 using the Cancer Perceived Agents of Social Support questionnaire (CPASS; Goldzweig et al., 2010), which was developed and validated in Hebrew. The CPASS consists of 12 items and evaluates different kinds of support (emotional, cognitive, and instrumental) given by different agents (partner, family, friends, and spiritual or religious beliefs). The questionnaire was originally developed in the context of coping with cancer; however, its items are generic and can be applied in different contexts. Example items are as follows: "To what extent do you feel you receive emotional support

from your partner/family/friends/belief-based sources?" and "To what extent do you feel you receive practical help from your partner/family/friends/belief-based sources?" Participants were asked to rate the degree to which they felt supported, on a scale ranging from 1 (*not at all*) to 5 (*very much*), and higher values indicated higher levels of support. In this study we focused only on three sources of support—namely, partner, family, and friends—as "spiritual or religious beliefs" might have been unduly influenced by participants' religious affiliation (i.e., secular vs. religious Israeli Jews). Cronbach's alpha was .81 for the Partner scale, .77 for the Family scale, and .84 for the Friends scale.

### *Demographic and Clinical Variables*

Partners' demographic and clinical characteristics were obtained at Time 1 and included age, years of current relationship, number of children, years of education, and income level (below the average income in Israel, equal to the average income, or above the average income), and premorbid psychiatric history (participants were asked to state whether they had coped or were still coping with the following: PTSD, major depressive disorder, anxiety disorder, bipolar disorder, schizophrenia, or other).

Following Neeland et al. (2012), patients' illness severity was assessed by a senior cardiologist based on two criteria measured at hospitalization: an echocardiogram (examines the structure and functioning of the heart) and an angiogram (examines obstructed artery status). The echocardiogram and angiogram were both measured on a scale ranging from 1 (*mild*) to 4 (*most severe*).

## Analysis

Following Cook (2021), missing data were handled by using full information maximum likelihood (FIML; Enders, 2010). A preliminary test of the missing values yielded $p = .770$; thus, we assumed these data were missing completely at random; Little, 1988). For the specific requirements of the current study, which focused on partners' CDI-PTSS, only partners who completed the initial CDI-PTSS assessment during Time 2 were included in the final analysis. Thus, the strategy for handling missing values was to base our sample only on those respondents who continued from Time 1 to Time 2 ($n = 106$). As according to the *DSM–5* (APA, 2013) CDI-PTSS emerges only as early as 1-month postevent and, therefore, could be traced only in the second study phase, excluding the 37 respondents who provided no information on CDI-PTSS was justified. We did include in the analysis the Time 3 dropouts (for whom Time 3 CDI-PTSS scores were not available), who comprised less than 10% of the Time 2 sample size (eight dropouts out of 106 respondents, 7.5%). It should be noted that independent variables from Time 1 were available for all respondents. No significant differences between the 37 partners who provided data at Time 1 only, and the 106 who also provided Time 2 data, were detected for any of the sociodemographic variables or for Time 1 anxiety and depression levels, except for income, $t(133) = 2.779$, $p = .06$). It was detected that dropouts were on average less affluent ($M = 2.417$, $SD = 1.052$) than completers ($M = 3.00$, $SD = 1.088$).

We used a paired samples $t$ test to assess the changes in CDI-PTSS over time. Second, we conducted Pearson correlation analyses in order to assess the associations between the study's different variables. For the primary analysis, we used structural equation modeling (SEM) to test the study hypotheses. We estimated the model by applying 8.3 Mplus software (Muthén & Muthén, 2018). We evaluated the goodness-of-fit of each model by using the comparative fit index (CFI), the Tucker–Lewis index (TLI), the chi-square values, the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). According to Hu and Bentler (1999), cutoff values for relative fit indices that are higher than .90 are recommended, and values higher than .95 are preferable. As chi-square tends to be sensitive to sample size and model complexity, the recommended approach is to divide the chi-square value by the model's degrees of freedom and compare the quotient to a chi-square distribution with one degree of freedom (in the current study any results $<2.70$ would be regarded as a good fit at $p > .1$). In addition, to minimize type I and type II errors under various conditions, one should use a combination of one of the above relative fit indices as the RMSEA (good models = $<.06$) or the SRMR (good models = $<.08$; Hu & Bentler, 1999).

Due to the high multicollinearity detected among depression, anxiety, and CDI-PTSS at Time 2, a formative factor with observed indicators (Brown, 2019; Diamantopoulos & Siguaw, 2006) was constructed to form a data-driven comprehensive CDI-PTSS factor at Time 2. We applied a nonzero variance, meaning that we included the measurement error based on the noncommon part of the item variance. To produce the measurement error, we calculated the internal consistency parameter and multiplied one minus this parameter by the overall variance. Thus, the remaining variance is the items' unshared variance which simulates the measurement error (Wang & Wang, 2019). We used this same technique for correcting all other indicator variances in the final model to include proxies for measurement errors. It is important to note that a formative factor can be formed only under the condition of predicting consequent factors. Therefore, we included the original Time 3 CDI-PTSS variable in the model and not an additional formative factor of Time 3 CDI-PTSS.

Sample size: Expecting a small/medium-level effect size, with a significance level of .05 for finding the effect, and five observed variables in the study, the minimum necessary sample size would have been 91 participants (Soper, 2013). This sample size would ensure a desired power of .8.

# Results

## Sample Characteristics

As mentioned above, only partners who completed the initial CDI-PTSS assessment during Time 2 ($N = 106$) were selected for the current study. The mean age of the selected sample was 57.48 years ($SD = 11.21$). All participants were married (88.7%) or cohabiting with an intimate partner. The average duration of relationships was 32.34 years ($SD = 14.13$), and participants had on average 3.25 children ($SD = 1.70$). Partners completed on average 14.09 years of education ($SD = 2.78$), and the majority (59.3%) reported that their income was equal to or above the average income in Israel that year. Most participants (89.3%) reported no premorbid psychiatric history. In addition, most of the sample had minimal to no traumatic history: 28.3% of the participants had

experienced more than one traumatic event, 36.8% had experienced one previous traumatic event, and 34.9% had not experienced a traumatic event at all. Finally, illness severity for most patients was mild to moderate according to both angiogram ($M$ = 2.19, $SD$ = 1.25; $n$ = 106) and echocardiogram ($M$ = 2.12, $SD$ = 1.12; $n$ = 106) scores. As data on partners' CDI-PTSS are scarce, we were also keen to observe specific characteristics of the current sample regarding CDI-PTSS manifestation. Based on the suggested cutoff points of the PSS-SR5 (Foa et al., 2016), we found that six partners at Time 2 (5.66%) and eight at Time 3 (8.42%) reached the required cutoff point for the identification of a probable CDI-PTSD diagnosis.

## Preliminary Analyses

The sum of partners' CDI-PTSS ranged from 0 to 78 and from 0 to 57 at Time 2 and Time 3, respectively. To assess the change in CDI-PTSS level over time, a paired samples $t$ test was used to compare CDI-PTSS scores between Time 2 and Time 3. The analysis showed that the mild level of CDI-PTSS experienced by participants at Time 2 had not changed significantly at Time 3 ($t$ = –.587, $p$ = .558). Means and standard deviations for the study's main variables are presented in Table S1 in the online supplemental materials.

Pearson correlations among partners' CDI-PTSS and the demographic variables can be seen in Supplemental Table 2. Of all the demographic variables assessed, only years of education correlated negatively with partners' CDI-PTSS as measured at Time 2 and Time 3, and income level correlated negatively with CDI-PTSS as measured at Time 3. Other background variables were not found to be correlated with levels of CDI-PTSS. No significant correlations were detected between partners' CDI-PTSS and number of previous traumatic events, nor with their premorbid psychiatric history (the latter was assessed using the Spearman correlation coefficient).

Table S3 in the online supplemental materials presents the Pearson correlations among the study's main variables. As can be seen, anxiety, but not depression, as measured during patients' hospitalization, was significantly correlated with higher levels of partners' CDI-PTSS, at both four and 8 months after hospitalization. In addition, anxiety, and depression, as measured at 4 months after hospitalization, were both significantly correlated with levels of CDI-PTSS at both four and 8 months after hospitalization. Finally, FoP, but not social support of any kind, was significantly correlated with levels of CDI-PTSS at both measurement times.

## Primary Analysis

Table S4 and Figure S3 in the online supplemental materials present the modeling results: Table S4 presents all the paths tested in the model and the correlations among the different factors; Figure S3 shows only the significant paths.

First, an assessment of the structural model showed good indices of fit: CFI = .974, TLI = .935, $\chi^2(11) = 20.21$, $p$ = .04, $\chi^2/df <$ 2.70, RMSEA = .059, SRMR = .05. Anxiety and depression at Time 1 were found to highly correlate with each other and highly correlate independently with their Time 2 measurements. Although in formative factors indicators are assumed to be independent, anxiety and depression remained correlated at Time 2, yet to a lesser extent. The Time 2 CDI-PTSS formative factor showed a similar response to the forming indicators (anxiety: $\beta$ =.35, $p < .001$; depression: $\beta$ = .31, $p < .05$). Time 3 CDI-PTSS was significantly associated with the formative Time 2 CDI-PTSS factor, as well as with FoP. In addition, we detected a significant positive path between peritraumatic anxiety (Time 1) and FoP.

As a mean of sensitivity check, we tested an expanded model in which a latent factor combined of education and income was included. We received satisfactory levels of goodness-of-fit for this model: CFI = .966, TLI = .930, RMSEA = .077, $\chi^2(22)$ = 35.94, $p$ = .03, SRMR=.066. It is important to note that these additional indicators did not show a significant effect on the CDI-PTSS measures, nor did they change the other coefficients.

## Discussion

In the current study, we investigated the trajectory of CDI-PTSS over time and the contribution of emotional distress, FoP, and social support to this trajectory, among a sample of partners of patients who underwent a recent acute coronary event. First, we observed the magnitude of the phenomenon in the current sample. Findings regarding the number of partners in this study who reached the required cutoff point for receiving a full CDI-PTSD diagnosis are comparable with findings detected in other contexts —for example, 7% of partners of police officers with PTSD also had PTSD (Meffert et al., 2014), and 10% (Dekel et al., 2016) and 6.5% to 8.4% of wives of veterans with PTSD also had PTSD (Solomon et al., 2021). When focusing on CDI-PTSD symptomatology, partners in the current study were found to experience, on average, a mild level of CDI-PTSS 4 months after patients' hospital discharge—a level that remained stable 8 months after patients' discharge. Considering the actual global number of cardiac patients every year, there may be reason to be concerned about the number of partners who will have to cope with CDI-PTSS.

As hypothesized, the analyses show that symptoms of anxiety and depression developing immediately after one's partner has undergone an ACE are associated with the emergence of CDI-PTSS 4 months later. The triple comorbidity of CDI-PTSS, depression, and anxiety (Ginzburg et al., 2010) contributed to the manifestation of chronic CDI-PTSS 8 months after the cardiac event. Indeed, it has already been recognized that intense negative emotional responses during or immediately after a traumatic event (peritraumatic emotions) are associated with higher rates of PTSS (Ozer et al., 2003). These findings have also been revealed in the context of illness, both for patients and their partners (Choi et al., 2018; Vilchinsky et al., 2017). From a clinical point of view, it is therefore important to screen partners for emotional distress and CDI-PTSS as early as during patients' hospitalization and over the course of the patients' rehabilitation process and to provide appropriate interventions once these symptoms have emerged. These interventions may prevent the early-onset CDI-PTSS among partners from stabilizing and becoming chronic.

Our findings also shed light on an underlying process through which anxiety consolidates into partners' chronic CDI-PTSS via the emergence of FoP. The association between FoP and PTSS has been studied mainly in the context of cancer, where it was detected that FoP was significantly correlated with PTSS among cancer survivors and their partners (Mellon et al., 2007; Simard et al., 2013). This line of research seems to be especially relevant in the case of

CDI-PTSS. According to Edmondson's (2014) enduring somatic threat model, in PTSD resulting from a life-threatening illness, symptoms are related to an ongoing threat. In the case of ACE, the threat is chronic and therefore anchored in fears and worries about the future, such as potential recurrence and even death (Green et al.,1997; Mundy & Baum, 2004). Indeed, FoP and CDI-PTSS have been found to be strongly associated among patients following an ACE (Fait et al., 2018). Our study is the first to demonstrate that the association between FoP and CDI-PTSS also exists among partners of cardiac patients.

Contrary to former findings showing that social support serves as a buffer for developing PTSS following trauma (e.g., Ozer et al., 2003), including a cardiac event (e.g., Marke & Bennett, 2013), in the current study the association found between social support and CDI-PTSS was not significant. It may be that as partners take on the role of providing support to patients, they find it difficult to be on the receiving end of and/or to benefit substantially from the support provided to them. This finding strengthens the importance of offering partners formal interventions, which might be more effective than the informal support available to them in buffering the emergence and stability of CDI-PTSS.

There are some limitations to the findings presented above. First, the 45% participation rate may limit the possibility of generalizing from these findings. It is important to note that during the first two days after experiencing an acute MI, it is very difficult to recruit patients—and even more so their partners—to participate in a study (Dagan & Hagedoorn, 2014; Quinn et al., 2010). Indeed, our former studies and other studies in the field of cardiac patients and their partners have reported similar response rates (e.g., Bouchard et al., 2021; Vilchinsky et al., 2015). Moreover, one of the dominant clusters of PTSS is the tendency to avoid reminders of the trauma (see *DSM–5*; APA, 2013). This tendency is a major obstacle in the recruitment of individuals coping with PTSS, as the study's questions are in and of themselves reminders of the traumatic event, and they can trigger avoidance. It is possible that those patients and partners who refused to participate in the study or who subsequently withdrew from it were the ones the study most wished to target. In addition, this study focused on women partners and therefore it is not possible to differentiate between the effect of gender and the effect of social role.

Despite its limitations, the current study is the first to provide findings on the trajectory of CDI-PTSS over time among partners of cardiac patients, a population which has been almost entirely neglected in the psycho-cardiology literature. Overall, the application of Harvey's ecological model to map potential contributors to partners' CDI-PTSS has revealed the key role played by partners' individual characteristics, such as peritraumatic emotional responses and illness perceptions, in the development of CDI-PTSS. Environmental characteristics, which in the current study were operationalized as social support, were found to be less salient than expected in buffering this development.

The current study focused only on partners' related characteristics. That said, in the context of coping with illness, it is well-established that coping is a dyadic process, involving reciprocal influences among partners' and patients' cognitions, emotions, and behaviors (Revenson et al., 2005). Thus, in future studies it would be worthwhile to investigate how patients' CDI-PTSS, as well as other characteristics, contribute to partners' CDI-PTSS over time.

In sum, to fully comprehend the experience of an acute coronary event, the psycho-cardiology literature must apply a more ecological perspective and relate not only to the experience of the identified patient but also to that of other family members. The next step would be to develop adequate and efficacious interventions for partners, either individual or dyadic, that might help the entire family overcome this medical crisis.

## References


American Heart Association. (2022). About cardiac arrest. Retrieved February 20, 2022, from https://www.heart.org/en/health-topics/cardiac-arrest/about-cardiac-arrest

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). American Psychiatric Publishing.

Bardeen, J. R., Kumpula, M. J., & Orcutt, H. K. (2013). Emotion regulation difficulties as a prospective predictor of posttraumatic stress symptoms following a mass shooting. *Journal of Anxiety Disorders*, *27*(2), 188–196. https://doi.org/10.1016/j.janxdis.2013.01.003

Bouchard, K., Gareau, A., McKee, K., Lalande, K., Greenman, P. S., & Tulloch, H. (2021). Dyadic patterns of mental health and quality of life change in partners and patients during three months of cardiac rehabilitation. *Journal of Family Psychology*. Advance online publication. https://doi.org/10.1037/fam0000898

Brazeau, H., & Lewis, N. A. (2021). Within-couple health behavior trajectories: The role of spousal support and strain. *Health Psychology*, *40*(2), 125–134. https://doi.org/10.1037/hea0001050

Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology*, *68*(5), 748–766. https://doi.org/10.1037/0022-006X.68.5.748

Brouwers, C., Denollet, J., Caliskan, K., de Jonge, N., Constantinescu, A., Young, Q., Kaan, A., & Pedersen, S. S. (2015). Psychological distress in patients with a left ventricular assist device and their partners: An exploratory study. *European Journal of Cardiovascular Nursing*, *14*(1), 53–62. https://doi.org/10.1177/1474515113517607

Brown, T. A. (2019). *Confirmatory factor analysis for applied research* (2nd ed.). Guilford Press.

Brunet, A., Weiss, D. S., Metzler, T. J., Best, S. R., Neylan, T. C., Rogers, C., Fagan, J., & Marmar, C. R. (2001). The Peritraumatic Distress Inventory: A proposed measure of PTSD criterion A2. *The American Journal of Psychiatry*, *158*(9), 1480–1485. https://doi.org/10.1176/appi.ajp.158.9.1480

Bunzel, B., Laederach-Hofmann, K., Wieselthaler, G. M., Roethy, W., & Drees, G. (2005). Posttraumatic stress disorder after implantation of a mechanical assist device followed by heart transplantation: Evaluation of patients and partners. *Transplantation Proceedings*, *37*(2), 1365–1368. https://doi.org/10.1016/j.transproceed.2004.12.248

Centers for Disease Control and Prevention. (2022). Heart disease. https://www.cdc.gov/heartdisease/coronary_ad.htm

Choi, K. W., Shaffer, K. M., Zale, E. L., Funes, C. J., Koenen, K. C., Tehan, T., Rosand, J., & Vranceanu, A.-M. (2018). Early risk and resiliency factors predict chronic posttraumatic stress disorder in caregivers of patients admitted to a neuroscience ICU. *Critical Care Medicine*, *46*(5), 713–719. https://doi.org/10.1097/CCM.0000000000002988

Cook, R. M. (2021). Addressing missing data in quantitative counseling research. *Counseling Outcome Research and Evaluation*, *12*(1), 43–53. https://doi.org/10.1080/21501378.2019.1711037

Cornelius, T., Vilchinsky, N., Fait, K., Matetzky, S., & Hod, H. (2020). Early exposure to cardiac treatment and distress among patients and

their partners. *Frontiers in Psychology*, *11*, 141. https://doi.org/10.3389/fpsyg.2020.00141

Dagan, M., & Hagedoorn, M. (2014). Response rates in studies of couples coping with cancer: A systematic review. *Health Psychology*, *33*(8), 845–852. https://doi.org/10.1037/hea0000013

Dekel, R., Levinstein, Y., Siegel, A., Fridkin, S., & Svetlitzky, V. (2016). Secondary traumatization of partners of war veterans: The role of boundary ambiguity. *Journal of Family Psychology*, *30*(1), 63–71. https://doi.org/10.1037/fam0000163

Dekel, R., Shaked, O. Z., Ben-Porat, A., & Itzhaky, H. (2019). Posttraumatic stress disorder upon admission to shelters among female victims of domestic violence: An ecological model of trauma. *Violence and Victims*, *34*(2), 329–345. https://doi.org/10.1891/0886-6708.VV-D-16-00200

Diamantopoulos, A., & Siguaw, J. A. (2006). Formative versus reflective indicators in organizational measure development: A comparison and empirical illustration. *British Journal of Management*, *17*(4), 263–282. https://doi.org/10.1111/j.1467-8551.2006.00500.x

Edmondson, D. (2014). An enduring somatic threat model of posttraumatic stress disorder due to acute life-threatening medical events. *Social and Personality Psychology Compass*, *8*(3), 118–134. https://doi.org/10.1111/spc3.12089

Enders, C. K. (2010). *Applied missing data analysis*. Guilford Press.

Fait, K., Vilchinsky, N., Dekel, R., Levi, N., Hod, H., & Matetzky, S. (2017). Cardiac disease-isduced post-traumatic stress Symptoms (CDI-PTSS) among patients' partners. *Stress and Health*, *33*(2), 169–176. https://doi.org/10.1002/smi.2686

Fait, K., Vilchinsky, N., Dekel, R., Levi, N., Hod, H., & Matetzky, S. (2018). Cardiac-disease-induced PTSD and Fear of illness progression: Capturing the unique nature of disease-related PTSD. *General Hospital Psychiatry*, *53*, 131–138. https://doi.org/10.1016/j.genhosppsych.2018.02.011

Foa, E. B., McLean, C. P., Zang, Y., Zhong, J., Powers, M. B., Kauffman, B. Y., Rauch, S., Porter, K., & Knowles, K. (2016). Psychometric properties of the Posttraumatic Diagnostic Scale for *DSM–5* (PDS-5) *Psychological Assessment*, *28*(10), 1166–1171. https://doi.org/10.1037/pas0000258

Foa, E. B., Nachasch, N., Hembree, E. A., & Olasov-Rothbaum, B. (2014). *Prolonged exposure therapy for PTSD: Emotional processing of traumatic experiences: Therapist guide*. Probook.

Fredette, C., El-Baalbaki, G., Palardy, V., Rizkallah, E., & Guay, S. (2016). Social support and cognitive–behavioral therapy for posttraumatic stress disorder: A systematic review. *Traumatology*, *22*(2), 131–144. https://doi.org/10.1037/trm0000070

Friedman, H. S., & Hampson, S. E. (2021). Personality and health: A lifespan perspective. In O. P. John & R. W. Robins (Eds.), *Handbook of personality: Theory and research* (pp. 773–790). Guilford Press.

Ginzburg, K., Ein-Dor, T., & Solomon, Z. (2010). Comorbidity of posttraumatic stress disorder, anxiety and depression: A 20-year longitudinal study of war veterans. *Journal of Affective Disorders*, *123*(1–3), 249–257. https://doi.org/10.1016/j.jad.2009.08.006

Goldzweig, G., Hasson-Ohayon, I., Meirovitz, A., Braun, M., Hubert, A., & Baider, L. (2010). Agents of support: Psychometric properties of the Cancer Perceived Agents of Social Support (CPASS) questionnaire. *Psycho-Oncology*, *19*(11), 1179–1186. https://doi.org/10.1002/pon.1668

Green, B., Epstein, S., Krupnick, J., & Rowland, J. (1997). Trauma and medical illness: Assessing trauma-related disorders in medical settings. In J. P. Wilson & T. M. Keane (Eds.), *Assessing psychological trauma and PTSD*(pp. 160–191). Guilford Press.

Harvey, M. R. (1996). An ecological view of psychological trauma and trauma recovery. *Journal of Traumatic Stress*, *9*(1), 3–23. https://doi.org/10.1002/jts.2490090103

Harvey, M. R. (2007). Towards an ecological understanding of resilience in trauma survivors: Implications for theory, research, and practice. *Journal of Aggression, Maltreatment & Trauma*, *14*(1–2), 9–32. https://doi.org/10.1300/J146v14n01_02

Herschbach, P., Berg, P., Dankert, A., Duran, G., Engst-Hastreiter, U., Waadt, S., Keller, M., Ukat, R., & Henrich, G. (2005). Fear of progression in chronic diseases: Psychometric properties of the Fear of Progression Questionnaire. *Journal of Psychosomatic Research*, *58*(6), 505–511. https://doi.org/10.1016/j.jpsychores.2005.02.007

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Jacquet-Smailovic, M., Tarquinio, C., Alla, F., Denis, I., Kirche, A., Tarquinio, C., & Brennstuhl, M. J. (2021). Posttraumatic stress disorder following myocardial infarction: A systematic review. *Journal of Traumatic Stress*, *34*(1), 190–199. https://doi.org/10.1002/jts.22591

Lazarus, R., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer.

Leventhal, H., Brissete, I., & Leventhal, E. A. (2003). The common sense model of self-regulation of health and illness. In D. Cameron & H. Leventhal (Eds.), *The self-regulation of health and illness behavior* (pp. 42–65). Routledge.

Little, R. J. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association*, *83*(404), 1198–1202. https://doi.org/10.1080/01621459.1988.10478722

Marke, V., & Bennett, P. (2013). Predicting post-traumatic stress disorder following first onset acute coronary syndrome: Testing a theoretical model. *British Journal of Clinical Psychology*, *52*(1), 70–81. https://doi.org/10.1111/bjc.12001

Meffert, S. M., Henn-Haase, C., Metzler, T. J., Qian, M., Best, S., Hirschfeld, A., McCaslin, S., Inslicht, S., Neylan, T. C., & Marmar, C. R. (2014). Prospective study of police officer spouse/partners: A new pathway to secondary trauma and relationship violence? *PLoS ONE*, *9*(7), e100663. https://doi.org/10.1371/journal.pone.0100663

Mehnert, A., Herschbach, P., Berg, P., Henrich, G., & Koch, U. (2006). Fear of progression in breast cancer patients–validation of the short form of the Fear of Progression Questionnaire (FoP-Q-SF). *Zeitschrift Für Psychosomatische Medizin Und Psychotherapie*, *52*(3), 274–288. https://doi.org/10.13109/zptm.2006.52.3.274

Mellon, S., Kershaw, T. S., Northouse, L. L., & Freeman-Gibb, L. (2007). A family-based model to predict fear of recurrence for cancer survivors and their caregivers. *Social and Behavioral Dimensions of Cancer*, *16*(3), 214–223. https://doi.org/10.1002/pon.1074

Mundy, E., & Baum, A. (2004). Medical disorders as a cause of psychological trauma and posttraumatic stress disorder. *Current Opinion in Psychiatry*, *17*(2), 123–127. https://doi.org/10.1097/00001504-200403000-00009

Muthén, L. K., & Muthén, B. O. (2018). *Mplus user's guide* (8th ed.). https://www.statmodel.com/download/usersguide/MplusUserGuideVer_8.pdf

Neeland, I. J., Patel, R. S., Eshtehardi, P., Dhawan, S., McDaniel, M. C., Rab, S. T., Vaccarino, V., Zafari, A. M., Samady, H., & Quyyumi, A. A. (2012). Coronary angiographic scoring systems: An evaluation of their equivalence and validity. *American Heart Journal*, *164*(4), 547–552. https://doi.org/10.1016/j.ahj.2012.07.007

Ozer, E. J., Best, S. R., Lipsey, T. L., & Weiss, D. S. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: A meta-analysis. *Psychological Bulletin*, *129*(1), 52–73. https://doi.org/10.1037/0033-2909.129.1.52

Posluszny, D. M., Dougall, A. L., Johnson, J. T., Argiris, A., Ferris, R. L., Baum, A., Bovbjerg, D. H., & Dew, M. A. (2015). Posttraumatic stress disorder symptoms in newly diagnosed patients with head and neck cancer and their partners. *Head & Neck*, *37*(9), 1282–1289. https://doi.org/10.1002/hed.23760

Quinn, C., Dunbar, S. B., Clark, P. C., & Strickland, O. L. (2010). Challenges and strategies of dyad research: Cardiovascular examples. *Applied Nursing Research*, *23*(2), e15–e20. https://doi.org/10.1016/j.apnr.2008.10.001

Randall, G., Molloy, G. J., & Steptoe, A. (2009). The impact of an acute cardiac event on the partners of patients: A systematic review. *Health Psychology Review*, *3*(1), 1–84. https://doi.org/10.1080/17437190902984919

Revenson, T. A., & Gurung, R. A. R. (Eds.). (2018). *Handbook of health psychology*. Routledge. https://doi.org/10.4324/9781315167534

Revenson, T. A., Griva, K., Luszczynska, A., Morrison, V., Panagopoulu, E., Vilchinsky, N., & Hagedoorn, M. (2016). *Caregiving in the illness context*. Palgrave Macmillan. https://doi.org/10.1057/9781137558985

Revenson, T. A., Kayser, K. E., & Bodenmann, G. E. (2005). *Couples coping with stress: Emerging perspectives on dyadic coping*. American Psychological Association. https://doi.org/10.1037/11031-000

Shao, M., Lin, X., Jiang, D., Tian, H., Xu, Y., Wang, L., Ji, F., Zhou, C., Song, X., & Zhuo, C. (2020). Depression and cardiovascular disease: Shared molecular mechanisms and clinical implications. *Psychiatry Research*, *285*, 112802. https://doi.org/10.1016/j.psychres.2020.112802

Simard, S., Thewes, B., Humphris, G., Dixon, M., Hayden, C., Mireskandari, S., & Ozakinci, G. (2013). Fear of cancer recurrence in adult cancer survivors: A systematic review of quantitative studies. *Journal of Cancer Survivorship: Research and Practice*, *7*(3), 300–322. https://doi.org/10.1007/s11764-013-0272-z

Snaith, R. P., & Zigmond, A. S. (1994). *HADS: Hospital Anxiety and Depression Scale*. NFER Nelson.

Solomon, Z., Horesh, D., & Ginzburg, K. (2021). Trajectories of PTSD and secondary traumatization: A longitudinal study. *Journal of Psychiatric Research*, *138*, 354–359. https://doi.org/10.1016/j.jpsychires.2021.03.027

Soper, D. S. (2013). Statistical power calculator. Retrieved November 5, 2018, from http://www.danielsoper.com/statcalc

Stukas, A. A., Jr., Dew, M. A., Switzer, G. E., DiMartini, A., Kormos, R. L., & Griffith, B. P. (1999). PTSD in heart transplant recipients and their primary family caregivers. *Psychosomatics*, *40*(3), 212–221. https://doi.org/10.1016/S0033-3182(99)71237-5

Taylor, S. E. (2007). Social support. In H. S. Friedman & R. C. Silver (Eds.), *Foundations of health psychology* (pp. 145–171). Oxford University Press.

Tully, P. J., Harrison, N. J., Cheung, P., & Cosh, S. (2016). Anxiety and cardiovascular disease risk: A review. *Current Cardiology Reports*, *18*(12), 120. https://doi.org/10.1007/s11886-016-0800-3

Vilchinsky, N. (2017). Unrecognized, undiagnosed, and untreated: Cardiac-disease-induced PTSD among patients' partners. *Frontiers in Psychology*, *8*, 1265. https://doi.org/10.3389/fpsyg.2017.01265

Vilchinsky, N., & Dekel, R. (2018). Cardiac disease-induced PTSD: The need for a dyadic perspective. In A. Bertoni, S. Donato, & S. Molgora (Eds.), *When "we" are stressed: A dyadic approach to coping with stressful events* (pp. 109–124). Nova Science Publishers.

Vilchinsky, N., Dekel, R., Revenson, T. A., Liberman, G., & Mosseri, M. (2015). Caregivers' burden and depressive symptoms: The moderational role of attachment orientations. *Health Psychology*, *34*(3), 262–269. https://doi.org/10.1037/hea0000121

Vilchinsky, N., Ginzburg, K., Fait, K., & Foa, E. B. (2017). Cardiac-disease-induced PTSD (CDI-PTSD): A systematic review. *Clinical Psychology Review*, *55*, 92–106. https://doi.org/10.1016/j.cpr.2017.04.009

Wang, J., & Wang, X. (2019). *Structural equation modeling: Applications using Mplus*. Wiley. https://doi.org/10.1002/9781119422730

World Health Organization. (2022). Cardiovascular diseases (CVDs). Retrieved February 20, 2022, from https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)

Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica*, *67*(6), 361–370. https://doi.org/10.1111/j.1600-0447.1983.tb09716.x

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