Routledge
Taylor & Francis Group

# The role of illness perceptions in the attachment-related process of affect regulation

Noa Vilchinsky[a]*, Rachel Dekel[b], Zvia Asher[a], Morton Leibowitz[c] and Morris Mosseri[c]

[a]*Department of Psychology, Bar-Ilan University, Ramat-Gan 52900, Israel;* [b]*School of Social Work, Bar-Ilan University, Ramat-Gan 52900, Israel;* [c]*Department of Cardiology, Meir Medical Center, Kfar Saba, Israel*

Based on the predictions of the attachment theory and the Common Sense Model of illness perceptions, the current study focused on the role played by illness perceptions in explaining the path linking attachment orientations to negative affect during recovery from cardiac illness. We predicted two putative mechanisms: (1) illness perceptions would mediate the direct association between attachment-related insecurity (especially attachment anxiety) and levels of distress at follow-up and (2) illness perceptions would interact with attachment orientations (attachment avoidance in particular) in explaining patients' distress. The sample consisted of 111 male patients admitted to the Cardiac Care Unit of the Meir Medical Center, located in the central region of Israel. Patients completed a measure of attachment orientations during hospitalization (baseline). One month later, patients' illness perceptions were measured. Patients' depression and anxiety symptoms were measured at baseline and at the six-month follow-up. The associations between attachment-related anxiety and anxiety symptoms at follow-up were fully mediated by illness perceptions. Attachment-related avoidance was found to interact with illness perceptions in the prediction of depressive symptoms at follow-up. The findings shed light on the possible dynamics among personality, cognitive appraisals, and affect regulation efforts when coping with illness.

Keywords: affect regulation; anxiety; attachment orientations; cardiac illness; depression; illness perceptions

## Introduction

The relationship between depression and coronary heart disease is well established (Poole, Dickens, & Steptoe, 2011). In addition, growing evidence points to the role played by anxiety following acute coronary syndrome (ACS) – which is defined as a myocardial infarction (MI) or new onset chest pain requiring hospitalization for stabilization – in predicting adverse outcomes. A recent meta-analysis concluded that anxiety following an MI is associated with a 36% increased risk of adverse cardiac outcomes (Roest, Martens, Denollet, & de Jonge, 2010). Therefore, an understanding of the mechanisms contributing to affect regulation and consequently to the health of cardiac patients may be crucial in our ability to help patients and even save lives.

---

*Corresponding author. Email: noa.vilchinsky@biu.ac.il

Further to Lazarus' and Folkman's (1984) well-known transactional model of stress and coping, Leventhal, Meyer, and Nerenz (1980) have suggested the Self-Regulatory Model (also known as the Common Sense Model [CSM]) which provides a useful framework for considering the mechanisms which regulate the emotions that arise in response to illness (Cameron & Leventhal, 2003; Leventhal, Brissette, & Leventhal, 2003). The CSM suggests that when an individual is confronted with an illness, he/she will attempt to assign meaning to it by forming perceptions about it. These illness perceptions are influenced by the patients' emotional states, and conversely, the patients' emotional states are colored to a great degree by their perceptions of their illness (Dempster et al., 2010).

The CSM predictions were verified in numerous studies. For example, a slower return to work and a greater degree of cardiac anxiety were predicted by perceptions of a more severe level of damage to the heart (Broadbent, Petrie, Ellis, Ying, & Gamble, 2004). Individuals who made changes in their post-diagnosis lifestyle behaviors often did so as a result of attributing their cardiac events to their poor health habits (French, James, Horne, & Weinman, 2005).

With regard to emotion regulation, Hagger and Orbell (2003), in a meta-analytic review of the CSM, found a correlation between negative illness perceptions and elevated distress levels among patients with diverse physical illnesses. Grace et al. (2005) found significant associations between illness perceptions and symptoms of depression in 661 ACS patients. Stafford, Berk, and Jackson (2009), using a prospective design, showed how negative illness beliefs, particularly those associated with the consequences of coronary artery disease (CAD), predicted higher levels of depression at three and nine months among 193 CAD patients.

Although the CSM predictions regarding individuals' current cognitive and affective appraisals are well established, the model is limited in its ability to explain the ethological roots of these appraisals, as well as the individual differences in applying them. This question, however, can be approached from the perspective of another theory of emotion regulation: the attachment theory.

Over the last two decades, attachment theory (Bowlby, 1969) has become one of the most important conceptual frameworks for understanding the process of affect regulation (Mikulincer, Shaver, & Pereg, 2003). Bowlby claimed that the quality of a person's early childhood interpersonal experiences could very well be responsible for his/her ability to regulate emotions over the course of his/her life. In accordance with this line of thought, the current longitudinal study assessed the contribution of attachment orientations to symptoms of depression and anxiety among patients coping with ACS. In keeping with Leventhal's CSM, we focused on the role played by illness perceptions in this process.

### Attachment orientation, illness perceptions, and emotion regulation

Attachment theory is predicated on the idea that infants seek proximity to their primary caregivers, especially during times of threat (Bowlby, 1969; Mikulincer & Shaver, 2007). Individuals who develop a sense of secure attachment during childhood will be able to invoke mental representations of these attachment figures even in their actual absence (Mikulincer & Shaver, 2007). Those individuals who do not develop this sense of security will, in times of stress, react with anxiety (i.e., "hyper-activation of the attachment system"), avoidance (i.e., "deactivation of the

attachment system''), or both (Mikulincer & Shaver, 2007). Thus, the way in which a person ''attaches'' is directly related to how he/she appraises events and regulates his/her emotions in response to them (Mikulincer & Shaver, 2007).

Though attachment theory has increasingly been applied to the understanding of disease and chronic illness (e.g., Maunder & Hunter, 2001, 2008), few studies have investigated the role illness perceptions may play in the attachment-related process of affect regulation. Meredith, Strong, and Feeney (2005) found that threat appraisal partially mediates the relationship between attachment anxiety (AANX) and depression among patients coping with chronic pain. Overall, the findings regarding anxious attachment consistently show that being securely attached is associated with appraisals which *reduce* the individual's distress, while being anxiously attached is associated with appraisals which *increase* his/her distress (Mikulincer & Shaver, 2007). Therefore, illness perceptions are hypothesized to mediate the association between attachment-related anxiety and distress.

For avoidant individuals, however, the findings are less consistent. The lack of consistency in the findings might be due to avoiders' subconscious tendency to keep emotions and cognitions separate. According to Mikulincer et al. (2003), deactivating strategies seem to weaken the associations between negative affect and cognitions. In one study, it was shown that highly avoidant people who had read an article about a car accident did not differ in terms of their attributions from people who also scored high on the avoidant dimension but had only read an article about using a hobby kit (Pereg, 2001). Mikulincer et al. (2003) concluded that deactivating strategies do not allow negative experience to be used in cognitive processing. The negative experience is ''blocked'' – depleted of its power to influence cognitions, thereby serving the goal of attachment-system deactivation (2003, p. 88). Pursuant to the ideas of Mikulincer et al. (2003), we examined whether this ''blockage'' between cognitions and affect might also explain the emotion regulation process of avoidant cardiac patients. Due to the avoiders' tendency to keep cognitions and emotions separate, we suspected that the higher an individual scored on the avoidant scale, the weaker the association between illness perceptions and distress would be. Therefore, another possibility to be considered beyond the proposed mediation model would be an interactive model which might explain the role illness perceptions play in the affect regulation process of avoidant persons.

### The current study

Based on the predictions of the attachment theory and Leventhal's CSM, we focused on the path linking attachment orientation to negative affect during recovery from a cardiac illness, with a particular focus on the role illness perceptions might play in explaining it. Therefore, the current study attempted to identify the mechanisms by which illness perceptions might account for the association between attachment orientations and psychological distress. We predicted two putative mechanisms: (1) illness perceptions would mediate the direct association between attachment-related insecurity (especially AANX) and levels of distress at follow-up and (2) illness perceptions would interact with attachment orientations (attachment avoidance [AAVO] in particular) in explaining patients' distress.

Finally, the current study amplifies former studies by being longitudinal in design. In the current study, we measured attachment orientation very soon after the

onset of first ACS. We measured illness perceptions one month after the event, in order to allow patients' perceptions to stabilize, and we predicted distress six months post-ACS.

## Method

### Patient population and design

The current study was part of a large-scale study investigating personal and dyadic adjustment to heart disease (e.g., Vilchinsky et al., 2010, 2011). The target population was defined as married or cohabitating Jewish men, with the diagnosis of first ACS who agreed to participate in the study. Israel comprises a majority (75.4%) of Jewish citizens; the remainder consists of Muslims and other minorities (Israel Central Bureau of Statistics, 2009). The rationale behind solely targeting men was that the average female cardiac patient is older and therefore more likely to be widowed and not have the social support provided by marriage (Lemos, Suls, Jenson, Lounsbury, & Gordon, 2003). These patients were admitted between March 2005 and July 2007 to the Cardiac Care Unit (CCU) of the Meir Medical Center, located in the central region of Israel. The individuals excluded from the study included women, non-Jews, patients with a history of a previous cardiac event, patients over 75 years of age, patients with a diagnosis other than ACS, and patients who had co-morbid conditions (e.g., psychiatric illness, neoplasia).

Of the 306 patients eligible for the study, 111 patients agreed to participate in the study (36%) and were asked to complete the study questionnaires three times: at baseline, i.e., during hospitalization; one month after hospitalization; and at follow-up, six months after hospitalization. Ten patients refused to continue with the study due to lack of time or interest (attrition rate = 9%). Of the remaining 101 patients, one patient died before completing the follow-up questionnaire.

At baseline, while hospitalized in the CCU, all of the patients who were eligible for the study were approached by the research team. Upon agreement, they were given the study's questionnaire. A research assistant was available to answer their questions and offer assistance. One month and six months later, patients were interviewed by telephone. The study was approved by the Meir Medical Center Review Board.

### Instruments

#### Depression and anxiety (measured at baseline and at the six-month follow up)

Patients' depression and anxiety symptoms were measured using the Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983). In the current study, each participant was asked to rate the degree to which he had suffered from each symptom during the previous month on a scale ranging from 1 (not at all) to 4 (very much). We used the Hebrew translation of the subscales of depression and anxiety symptoms (Gilbar & Ben-Zur, 2002), and scores were averaged so that higher scores represented higher levels of depression and anxiety. In the current study, the Cronbach's alphas at baseline were .73 and .74 for depression and anxiety symptoms, respectively, and at the six-month follow-up were .88 and .83 for depression and anxiety symptoms, respectively.

We applied paired *t*-tests to assess the changes in patients' depression and anxiety over time. These tests showed no significant differences in the levels of depression ($t(110) = -.93$; $p > .05$), or anxiety ($t(110) = -.28$; $p > .05$), over time (depression: $M = 1.32$, $SD = .38$; $M = 1.35$, $SD = .57$ for baseline and follow-up respectively; anxiety: $M = 1.53$, $SD = .49$; $M = 1.54$, $SD = .65$ for baseline and follow–up, respectively). As no differences were found between baseline and follow-up levels of both depression and anxiety, we predicted distress levels as measured at follow-up.

### *Attachment orientation (measured at baseline)*

Patients' attachment orientations were measured at baseline using the Experiences in Close Relationships Scale (ECR; Brennan, Clark, & Shaver, 1998). The ECR is a self-report scale measuring the dimensions of AANX and AAVO. Participants rated the extent to which each item of the questionnaire was descriptive of their feelings in close relationships on a 7-point scale, ranging from not at all (1) to very much (7). Due to time limitations, the current study used a shortened version of this scale, consisting of 24 items. The items chosen were those with the highest loadings, as reported by Brennan et al. (1998). Twelve items reflected AANX (e.g., "I worry about being abandoned") and 12 reflected AAVO (e.g., "I prefer not to show my partner how I feel deep down"). The ECR has been used extensively with Israeli populations (Mikulincer & Florian, 2000; Mikulincer & Shaver, 2007; Vilchinsky et al., 2010). Scores were computed for each of the subscales by averaging the responses on the relevant items ($M_{AANX} = 2.52$, $SD = .95$); ($M_{AAVO} = 2.85$, $SD = .91$). Cronbach's alphas were: .76 and .77 for anxiety and avoidance, respectively.

### *Illness perceptions (measured one-month post-hospitalization)*

We used the validated Hebrew version (Kesler, Kliper, Goner-Shilo, & Benyamini, 2009) of the Brief Illness Perception Questionnaire (Brief IPQ), a nine-item scale designed to rapidly assess the cognitive and emotional representations of illness. This instrument was developed by Broadbent, Petrie, Main, and Weinman (2006) to measure components of illness perceptions as identified by Leventhal's CSM (Leventhal et al., 1980; Leventhal, Benyamini, Brownlee, et al., 1997; Moss-Morris et al., 2002). The CSM of self-regulation assumes that when people are faced with an illness, they will actively work, both cognitively and emotionally, to understand, it. To do so, they will develop what is referred to as "cognitive illness representations," an umbrella term which includes: labeling their condition and its symptoms ("Identity"), looking at the illness' expected duration ("Timeline"), understanding how the illness will impact their daily lives and future ("Consequences"), estimating the likelihood that they can recover from or control the illness ("Cureability/controllability"), developing an overall comprehension of the illness ("Coherence"), and contemplating how this illness came about ("Cause"). The "Emotional representation" incorporates negative reactions such as fear, anger, and distress (Broadbent et al., 2006). These representations enable patients to process the health care advice they receive from medical professionals and may even determine the way they adjust to their illnesses (Stafford et al., 2009). The Brief IPQ showed good test–retest reliability and concurrent validity with relevant measures. The scale also demonstrated good predictive validity in patients recovering from an MI, with

individual items being related to mental and physical functioning at the three month follow-up, cardiac rehabilitation class attendance, and speed of return to work (Broadbent et al., 2006).

In the current study, we made two modifications to the questionnaire. First, we omitted the open question regarding the cause of illness because this aspect was not of interest to us at this point. Second, we used a 5-point scale as in the original IPQ-R (Moss-Morris et al., 2002), and not the 10-point scale offered for the Brief IPQ. We made this adjustment after conducting preliminary tests which showed that the participants found the 10-point scale more difficult to relate to than the shorter 5-point scale. Therefore, all items were rated on a 1–5 scale ranging from none (e.g., no consequences, no personal control over their condition) to very high levels (e.g., serious consequences, great personal control over their condition). Example items were: "How much do you experience symptoms from your illness?" (Identity); "How well do you feel you understand your illness?" (Coherence); "How much control do you feel you have over your illness?" (Control). The items were recoded and then averaged so that a higher score now represented a more positive illness perception ($M = 4.08$, $SD = .59$; Cronbach's alpha $= .68$).

### Socio-demographic and medical data

At hospitalization, patients were asked to complete a short demographic questionnaire including age, duration (in years) of relationship, number of children, years of education, and socioeconomic status (SES) as measured on a scale of 1 (very poor) to 5 (excellent). At follow-up, patients were asked about the occurrence of additional coronary events during the previous six-months (MI, angioplasty, Coronary Artery Bypass Graft, and Cerebrovascular Accident).

### Illness severity

At the time of the initial examination, the severity of the patient's illness was estimated by a senior cardiologist using two sets of criteria: an echocardiogram score, which assesses cardiac damage, and an angiogram score (status of obstructed arteries), which assesses the risk of future damage. Both scores were measured on a scale ranging from 1 (normal) to 5 (extremely severe).

### Data analysis plan

Multiple imputation analysis was applied in order to deal with the issue of missing data for the 111 participants who completed study questionnaires at hospitalization. According to Enders (2010), the multiple imputation technique uses a regression-based procedure to generate multiple copies of the data-set, each of which contains different estimates of the missing values. In the current analysis, we applied the SPSS .20 MI procedure, and 10 copies of the data-set were generated. Briefly, for the imputation of each scale's missing items we used the other scales relevant for the analysis as temporary auxiliary variables. Therefore, an iterative imputation process repeatedly filled in the item scores from one subset while using the scale scores from the remaining subsets as auxiliary variables. After completing the imputation process for each item subset, we computed a new set of composite scores from the filled-in

item responses and filled in the missing data for the following variables: follow-up levels of depression and anxiety, baseline attachment scores, illness perceptions as measured one month post-hospitalization, years of education and SES.

Due to the strong associations among the baseline and follow-up measures of depression and anxiety, baseline depression and anxiety items were also used as auxiliary variables when imputing the missing items of depression and anxiety at follow-up. After creating the complete data-sets, we estimated the models on each filled-in data-set and subsequently used Rubin's (1987) formulas to combine the parameter estimates and standards errors into a single set of results. As interactive effects were hypothesized, we followed Ender's advice to preserve interaction effects in the imputation model (Enders, 2010).

Preliminary correlation analyses after applying Bonferroni corrections showed that among the relevant demographic parameters (patients' age, patients' years of education, patients' perceived SES, and patients' illness severity as measured both by an echocardiogram score and an angiogram score), only patients' years of education and SES were found to correlate significantly with both depression and anxiety (Table 1). Therefore, only these two variables were included in the following analysis.

To examine the mediation effect of illness perceptions on the associations between attachment orientations and depression and anxiety symptoms, we applied a structural model analysis (software: Mplus-6; Muthén & Muthén, 1998–2010). In this analysis, we used the 10 imputed data-sets obtained after applying the SPSS multiple imputation procedure. In order to estimate the indirect effects, we applied the "model constraints" command (Muthén & Muthén, 1998–2010).

To assess the interaction between illness perceptions and attachment orientations, we applied two four-step hierarchical regressions (SPSS 20.0 software). With regard to the regression analyses, Step 1 of each regression consisted of patients' years of education and SES in order to control for them. Step 2 consisted of the two attachment orientations: AANX and AAVO. Step 3 consisted of the measure of illness perceptions (IP). The two-way interactions between each attachment orientation and illness perceptions were entered in Step 4, which consisted of the product of the standardized[1] scores of these measures (IP ×AANX; IP ×AAVO). To test the simple slopes of the interactions, we used the procedures outlined by

Table 1. Properties and Pearson's product moment correlations of the study's variables ($N = 111$).

| Variable | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1. AAVO | 1 | | | | | |
| 2. AANX | .31*** | 1 | | | | |
| 3. IP | −.15 | −.36*** | 1 | | | |
| 4. DEP | .36*** | .37*** | −.31** | 1 | | |
| 5. ANX | .17 | .32*** | −.40*** | .51*** | 1 | |
| 6. EDU | .07 | −.05 | .14 | −.24 | −.29* | 1 |
| 7. SES | .06 | −.12 | .21 | −.28* | −.21 | .29* |

Note: AAVO, attachment-related avoidance; AANX, attachment-related anxiety; IP, illness perceptions; DEP, depression at follow-up; ANX, anxiety at follow-up; EDU, patients' years of education; SES, socio-economic status. Attachment scales were measured at baseline, illness perceptions were measured one month post-hospitalization, and depression was measured at the six month follow-up.
*$p < .05$; **$p < .01$; ***$p < .001$.

Preacher, Curran, and Bauer (2006), developed specifically for two-way regression models.

### Characteristics of the sample

Patients ranged in age from 39 to 74 years ($M = 56.85$, $SD = 7.49$), were married on average for 27.61 years ($SD = 11.29$), and had an average of 2.93 children ($SD = 1.16$). The majority of participants ($n = 70$, 63.1%) said they had a good to very good SES, a third of the sample ($n = 40$, 36%) reported a moderate SES, and only one said he had a poor SES (.9%) ($M_{SES} = 3.75$, $SD = .70$). On average, patients reported on completing more than 12 years of formal education ($M = 13.92$, $SD = 3.30$).

As for the clinical makeup of the sample, the majority of patients experienced an MI ($n = 95$, 85.6%), and the rest ($n = 16$, 14.4%) were diagnosed with unstable angina. All of the patients had undergone an angioplasty while in the CCU. Their angiogram scores showed that the majority had a normal to moderate level of arterial obstruction ($n = 68$, 61.3%), while 38.7% ($n = 43$) had a severe to very severe level of obstruction ($M_{Angio} = 3.23$, $SD = .77$). In addition, 94 patients received an echocardiogram while in the CCU which showed that 94.7% had no severe damage to their hearts ($M_{Eco} = 1.91$, $SD = 1.01$). Finally, patients experienced relatively few repeat acute coronary events or readmissions six months after their first ACS: of the 101 patients for whom we had valid medical data at follow-up, one had died (1%), three had experienced an additional MI (3%), and 10 (9.8%) had gone through an additional PTCA (Percutaneous Transluminal Coronary Angioplasty).

### Correlation analysis

Bivariate correlation coefficients among the study's main variables are presented in Table 1. Table 1 shows that illness perceptions are negatively associated with attachment-related anxiety. The more anxiously attached one is the less positive his illness perceptions are. Attachment-related anxiety was associated with elevated levels of both depression and anxiety at follow-up, whereas attachment-related avoidance was found to be significantly correlated only with depression at follow-up. As predicted, the greater number of positive perceptions a person holds of his illness, the less depressed and anxious he feels six months after the ACS. These results indicate that, the requisite conditions for mediation analysis identified by Baron and Kenny (1986) were met only for attachment related-anxiety.

### The mediation effects of illness perceptions

The model for the mediation hypothesis with regard to anxiety symptoms at follow-up was found to fit the data in a satisfactory way, according to the following model-fit criteria: $\chi^2(1) = .63$, $p = .43$; comparative fit index (CFI) = 1.00; Root Mean Square Error of Approximation (RMSEA) = 0; Standardized Root Mean Square Residual (SRMR) = .016. Figure 1 presents the results of the structural analysis model.

As shown in Figure 1, no significant direct effect exists between AANX and anxiety symptoms; however, a significant *indirect* effect was found between AANX and anxiety symptoms through illness perceptions (Est. = .06, $SE = .03$, $p < .05$).
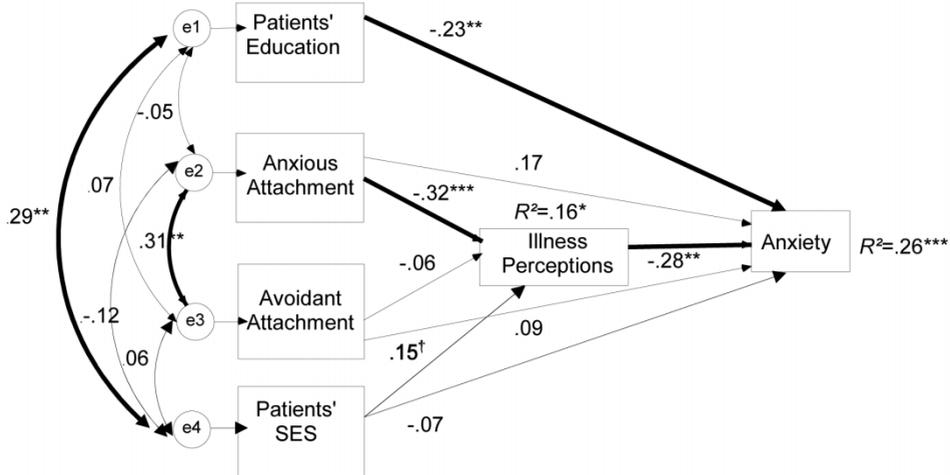
Figure 1. Structural analysis model of attachment orientations and illness perceptions on anxiety symptoms at follow-up, controlling for patients' education and SES.
Note: Attachment scales were measured at baseline, illness perceptions were measured one month post-hospitalization, and anxiety symptoms were measured at the six month follow-up. SES, socioeconomic status.
Significant paths are presented in bold lines.
$^{\dagger}p = .06$.
$*p < .05; **p < .01; ***p < .001$.

Therefore, the analysis yielded a significant full mediation of illness perceptions in the association between AANX and anxiety symptoms at follow-up, controlling for patients' education and SES. Results showed that higher levels of anxious attachment were associated with a tendency toward more negative illness perceptions, which in turn were associated with elevated anxiety. No significant direct or indirect effects were found for the associations between AAVO and anxiety symptoms.

The model for the mediation hypothesis with regard to depressive symptoms at follow-up was also found to fit the data in a satisfactory way, according to the following model-fit criteria: $\chi^2(1) = .63$, $p = .43$; CFI $= 1.00$; RMSEA $= .00$; SRMR $= .015$. However, the model revealed no significant mediation effects of illness perceptions for the association of either AAVO or AANX with depressive symptoms at follow-up. Figure 2 presents the results of this model.

It is important to note that one path had to be omitted from both models in order to avoid a just-identified model which does not allow for model testing (Harrington, 2009, p. 25). The path between patients' education and illness perceptions was omitted due to preliminary analyses proving it is insignificant in both models ($p = .17$).

## The interactions among attachment orientations and illness perceptions

Table 2 presents the standardized regression coefficients (βs), unstandardized *B*, and the standard errors for each effect from the last step of each regression analysis. The
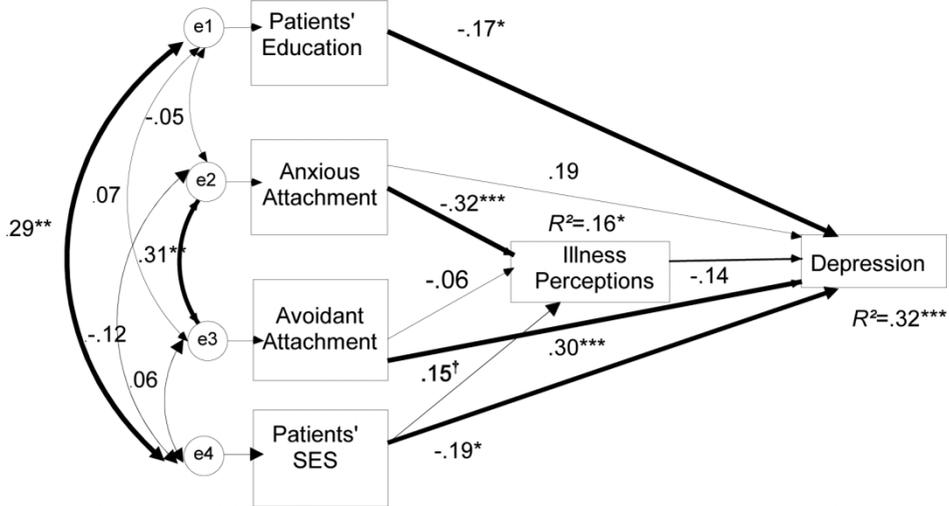
Figure 2. Structural analysis model of attachment orientations and illness perceptions on depressive symptoms at follow-up, controlling for patients' education and SES.
Note: Attachment scales were measured at baseline, illness perceptions were measured one month post-hospitalization, and depression symptoms were measured at the six month follow-up. SES, socioeconomic status. Significant paths are presented in bold lines.
$^{†}p = .06$.
$^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

interaction between attachment-related avoidance and illness perceptions came up as significant when predicting depressive symptoms. To test the simple slopes of this interaction, we used the procedure outlined by Preacher et al. (2006), and found that illness perceptions were negatively associated with patients' depressive symptoms at

Table 2. Regression analyses predicting anxiety and depression symptoms at follow-up from patients' attachment orientations and illness perceptions.

| Variables | Anxiety at follow-up | | | Depression at follow-up | | |
|---|---|---|---|---|---|---|
| | $B$ | $SE$ | $β$ | $B$ | $SE$ | $β$ |
| Patients' years of education | $-.04$ | .02 | $-.23^{*}$ | $-.04$ | .02 | $-.19^{*}$ |
| Patients' SES | $-.07$ | .08 | $-.08$ | $-.14$ | .08 | $-.17$ |
| Attachment-related avoidance (AAVO) | .05 | .06 | .08 | .19 | .06 | $.31^{**}$ |
| Attachment-related anxiety (AANX) | .11 | .06 | .18 | .11 | .05 | $.18^{*}$ |
| Illness perceptions (IP) | $-.16$ | .07 | $-.27^{**}$ | $-.06$ | .06 | .10 |
| AANX × IP | $-.06$ | .07 | .03 | .04 | .06 | .07 |
| AAVO × IP | .01 | .05 | $-.10$ | $-.10$ | .05 | $-.20†$ |
| | $R^2 = .28^{***}$ | | | $R^2 = .35^{***}$ | | |

Note: Attachment scales were measured at hospitalization, illness perceptions were measured one month post-hospitalization. SES, socioeconomic status. Presented are the results from the last step of each regression analysis.
$^{†}p = .053$
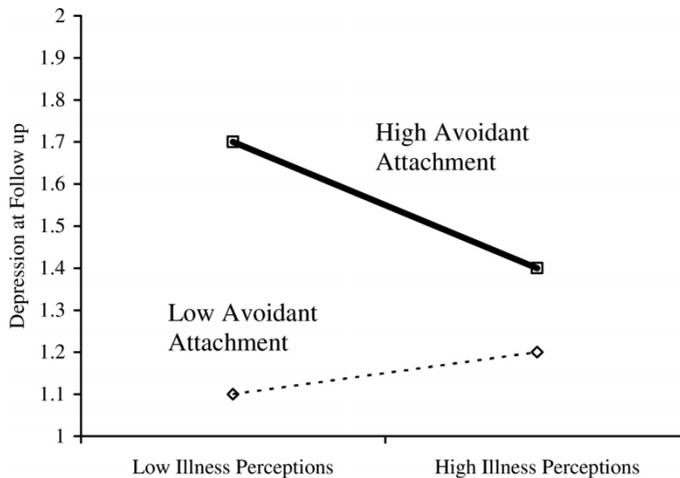$^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

Figure 3. Significant interaction of illness perceptions and attachment-related avoidance for depressive symptoms at follow-up.
Note: Attachment scales were measured at baseline, illness perceptions were measured one month post-hospitalization, and depressive symptoms were measured at the six month follow-up.

follow-up for patients high on attachment-related avoidance (1 *SD* above the mean), $b = -.16$, $t(103) = -2.04$, $p < .05$, but not for patients low on attachment-related avoidance (1 *SD* below the mean), $b = .04$, $t(103) = .50$, $p > .05$. Therefore, as can be seen in Figure 3, the higher the scores on the avoidant attachment scale, the greater the association between illness perceptions and depression, moving from no association to a negative one.

## Discussion

The current study unveiled possible cognitive patterns through which attachment insecurity is associated with negative emotion when coping with the sudden onset of a life-threatening illness. Our findings showed that among male cardiac patients, each attachment orientation loaned itself to a different cognitive-emotional dynamic. Attachment-related anxiety's association with anxiety was fully mediated by illness perceptions. This pattern was not detected for attachment-related avoidance, which in fact was found to *moderate* the association between illness perceptions and depression.

The former findings are in line with many others which consistently show an association between attachment-related anxiety (but not avoidance) and higher levels of symptom reporting, catastrophizing, and appraisals of less control over illness or pain (e.g., Ciechanowski, Katon, Russo, & Dwight-Johnson, 2002; Feeney & Ryan, 1994; Pramana, 1996). More specifically, Meredith et al. (2005) found that threat appraisal partially mediates the relationship between AANX and depression. Further to the findings of Meredith et al. (2005), we detected a full mediation of illness perceptions between attachment and anxiety. Therefore, our findings strengthen the theoretical models which suggest that early family relationships are

important in determining how an individual will see, evaluate and emotionally react to environmental threat cues.

Interestingly, illness perceptions were found to mediate the association between attachment-related anxiety (but not avoidance) and anxiety symptoms. Mikulincer and Florian (2004) claimed that anxious ambivalent persons often appraise situations in the bleakest possible terms and are unable to stop such negative thoughts and feelings from spiraling throughout the cognitive system. Therefore, one possible explanation for the current findings is that anxiously attached persons have acquired a sense of personal vulnerability so intense (Maunder & Hunter, 2001) that they almost automatically perceive the illness as a threat and therefore feel more anxious. Another possible explanation has to do with the tendency of anxiously attached people to bring attention to themselves by dramatizing their situations (Cassidy, 1994). According to Mikulincer and Shaver (2007), anxiously attached people have such an enormous need to receive the attention they did not receive as infants/children that as adults they overreact to their illnesses and generally behave in ways meant to insure they will get it now, from current attachment figures. Overly appraising their illnesses seems to serve anxiously attached patients by eliciting attention and care from the people in their lives; intensifying their feelings of distress produces the desired reaction in others. Although one tends to think of emotion "regulation" as a process by which one would rid him/herself of too much emotion, in the case of anxiously attached persons, regulation seems to mean just the opposite (Mikulincer & Shaver, 2007).

A different dynamic was found in the case of avoidant patients. The current findings showed that positive illness perceptions were strongly associated with the emotional makeup of patients high on attachment-related avoidance compared with patients low on attachment-related avoidance. Interestingly, the theory offered by Mikulincer and colleagues (Mikulincer et al., 2003) – that avoiders prevent negative emotions from affecting their cognitions – was not supported in the present study (at least not as far as cognitions affecting emotions). This discrepancy may be due to the fact that former studies focused on a distal stressor, one that did not bear personal consequences (i.e., reading an article about a car accident), whereas in the present study we focused on a real, concrete and much more insidious stressor. It seems that going through an actual life-threatening event such as an ACS makes it harder for avoiders to keep their cognitions and emotions separate. Indeed, it has already been shown that while avoidance strategies work well to reduce distress in situations that are not so severe, they are far less effective in situations that are highly threatening (Braun, Mikulincer, Rydall, Walsh, & Rodin, 2007; Mikulincer & Florian, 2001).

Moreover, our findings may imply that cognitive appraisals are much more prominent in determining the psychological manifestations of attachment-related avoiders than of the securely attached. Secure persons are reliant to a great extent on others' support in regulating their emotional state. Developing negative illness perceptions might even encourage the securely attached to reach out for *more* support, perhaps one reason we could not detect any association among their initial negative perceptions and their emotional state a few months later. Avoidant people, on the contrary, stress interpersonal distance and self-reliance and perceive support-seeking in times of need as risky and uncomfortable (Mikulincer & Shaver, 2007). This tendency toward self-reliance seems to leave them with only their internal resources, such as their cognitive appraisals, to rely on when regulating their distress.

Indeed, in a recent publication based on the same database, our lab found that neither avoiders' depression nor their anxiety at six months post-MI was influenced by their spouses' support (Vilchinsky et al., 2010).

In sum, going through a major life event such as an ACS was found to facilitate hyper-activating strategies while making deactivating strategies more difficult to act upon. In times of crisis, anxiously attached patients automatically generate more catastrophic attributions, which lead to heightened levels of anxiety but also increase their odds of gaining more attention and care from potential caregivers. Patients high on attachment-related avoidance, on the other hand, seem to find it more difficult than healthy avoiders to keep cognitions and emotions from colliding. This finding supports many previous findings showing that under intense stress, deactivating strategies are less effective in terms of emotion regulation (e.g., Braun et al., 2007). However, as the current findings showed that avoiders' negative illness perceptions were not an automatic product of their personality configurations, future studies would do well to identify the factors which shape avoidant patients' illness perceptions.

The limitations of this study should be noted. First, the 36% participation rate may have resulted in a nonrepresentative sample and may therefore limit the possibility of generalizing from these findings. The studied patients were Israeli Jewish married or cohabiting males; any generalization to female patients, single patients and patients from other cultures must also be done with caution. With regard to the main instrument used, namely the brief IPQ, we made a few changes in the original questionnaire; one should therefore be aware of these modifications when comparing our means and overall results with data coming from other studies applying this instrument. In addition, this specific instrument was deliberately chosen as a result of its brevity, in order to minimize patients' unwillingness to cooperate. However, a consequence of its being short is that it produced a single score consisting of many different kinds of perceptions (such as control, consequences, emotions and identity). It is therefore difficult to interpret the unique contribution made by each specific perception.

In the current study, our initial aim was to assess the way distress changed over time; however, no such change was detected. Therefore, we assessed the prospective contribution of attachment and illness perceptions to the follow-up levels of patients' distress, without controlling for baseline levels of distress. Although our hypothesis has a strong theoretical basis, and we applied a longitudinal design, our conclusions regarding the sequence of events should be viewed with caution; after all, the relationship between attachment, illness perceptions, and affect may run along different trajectories. For example, Feeney and Ryan (1994) concluded that the link between anxious attachment and symptom reporting is partially mediated by negative emotionality. Alternatively, Pereg (2001) claimed that attachment style moderated the link between negative affect and cognitions. Despite the current study's inability to pinpoint the exact cause and effect of cognition and affect, it contributes important information by revealing the different patterns created by the associations among attachment orientations, illness perceptions, and distress.

The knowledge obtained from this study may be used to help future patients navigate their way around such distress. Whereas changing personality disposition is thought to require fairly intensive interventions (Feeney, 2000), modifying maladaptive perceptions was found to be both feasible and fruitful (e.g., Petrie, Cameron,

Ellis, Buick, & Weinman, 2002). We believe that therapeutic work with anxiously attached clients should be directed at helping them accurately assess their illness and teaching them to employ a less anxiety-promoting way to gain social support. As for avoidant clients, therapeutic work ought to target the enhancement of their positive illness perceptions, because these individuals seem to heavily depend on their cognitive resources when regulating their distress.

## Acknowledgements

## Note

1. Standardized rather than centered scores were used due to the difficulty in pooling regression statistics out of multiple imputation data-sets when centered scores are used.

## References

Baron, R.M., & Kenny, D.A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173–1182. doi:10.1037/0022-3514.51.6.1173

Bowlby, J. (1969). *Attachment*. New York, NY: Basic Books.

Braun, M., Mikulincer, M., Rydall, A., Walsh, A., & Rodin, G. (2007). Hidden morbidity in cancer: Spouse caregivers. *Journal of Clinical Oncology*, *25*, 4829–4834. doi:10.1200/JCO.2006.10.0909

Brennan, K.A., Clark, C.L., & Shaver, P.R. (1998). Self-report measurement of adult attachment: An integrative overview. In J.A. Simpson & W.S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 46–76). New York, NY: Guilford Press.

Broadbent, E., Petrie, K.J., Ellis, C.J., Ying, J., & Gamble, G. (2004). A picture of health — Myocardial infarction patients' drawings of their hearts and subsequent disability: A longitudinal study. *Journal of Psychosomatic Research*, *57*, 583–587.

Broadbent, E., Petrie, K.J., Main, J., & Weinman, J. (2006). The brief illness perception questionnaire. *Journal of Psychosomatic Research*, *60*, 631–637. doi:10.1016/j.jpsychores.2005.10.020

Cameron, L.D., & Leventhal, H. (Eds.) (2003). *The self-regulation of health and illness behavior*. London: Routledge.

Cassidy, J. (1994). Emotion regulation: Influences of attachment relationships. In N. Fox (Ed.), *Biological and behavioral foundations of emotion regulation. Monographs of the Society for Research in Child Development*, 59, 228–249. URL: http://www.jstor.org/stable/1166148

Ciechanowski, P.S., Katon, W.J., Russo, J.E., & Dwight-Johnson, M.M. (2002). Association of attachment style to lifetime medically unexplained symptoms in patients with hepatitis C. *Psychosomatics*, *43*, 206–212. doi:10.1176/appi.psy.43.3.206

Dempster, M., McCorry, N.K., Brennan, E., Donnelly, M., Murray, L.J., & Johnston, B.T. (2010). Do changes in illness perception predict changes in psychological distress among esophageal cancer survivors? *Journal of Health Psychology*, *16*, 500–509. doi:10.1177/1359105310386633

Derogatis, L.R., & Melisaratos, N. (1983). The Brief Symptom Inventory: An introductory report. *Psychological Medicine*, *13*, 595–605. doi:10.1017/S0033291700048017

Enders, C.K. (2010). *Applied missing data analysis*. New York, NY: Guilford.

Feeney, J.A. (2000). Implications of attachment style for patterns of health and illness. *Child: Care, Health and Development*, *26*, 277–288. doi:10.1046/j.1365-2214.2000.00146.x

Feeney, J.A., & Ryan, S.M. (1994). Attachment style and affect regulation: Relationships with health behavior and family experiences of illness in a student sample. *Health Psychology*, 13, 334–345. doi:10.1037/0278-6133.13.4.334

French, D.P., James, D., Horne, R., & Weinman, J. (2005). Casual beliefs and behavior change post-myocardial infarction: How are they related? *British Journal of Health Psychology*, 10, 167–182. doi:10.1016/j.jpsychores.2008.11.006

Gilbar, O., & Ben-Zur, H. (2002). Adult Israeli community norms for the Brief Symptom Inventory (BSI). *International Journal of Stress Management*, 9, 1–10. doi:1072-5245/02/0100-0001/0

Grace, S.L., Krepostman, S., Brooks, D., Arthur, H., Scholey, P., Suskin, N., . . . Stewart, D.E. (2005). Illness perception among cardiac patients: Relation to depressive symptomatology and sex. *Journal of Psychosomatic Research*, 59, 153–160. doi:10.1016/j.jpsychores.2005.05.005

Hagger, M.S., & Orbell, S. (2003). A meta-analytic review of the common-sense model of illness representations. *Psychology & Health*, 18, 141–184. doi:10.1080/088704403100081321

Harrington, D. (2009). *Confirmatory factor analysis*. Oxford: Oxford University Press.

Huntsinger, E.T., & Luecken, L.J. (2004). Attachment relationships and health behavior: The mediational role of self-esteem. *Psychology & Health*, 19, 515–526. doi:10.1080/0887044042000196728

Israel Central Bureau of Statistics. (2009). Selected data from the New Israel Statistical Abstract No. 60 – 2009 Retrieved January 19, 2010 from http://www.cbs.gov.il/reader/newhodaot/hodaa_template.html?hodaa=200911294

Kesler, A., Kliper, E., Goner-Shilo, D., & Benyamini, Y. (2009). Illness perceptions and quality of life amongst women with pseudotumor cerebri. *European Journal of Neurology*, 16, 931–936. doi:10.1111/j.1468-1331.2009.02625.x

Kline, R.B. (2005). *Principals and practice of structural equation modeling*. New York, NY: Guilford.

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

Lemos, K., Suls, J., Jenson, M., Lounsbury, P., & Gordon, E.E.I. (2003). How do female and male cardiac patients and their spouses share responsibilities after discharge from the hospital? *Annals of Behavioral Medicine*, 25, 8–15. doi:10.1207/S15324796ABM2501_02

Leventhal, H., Benyamini, Y., Brownlee, S., Diefenbach, M., Leventhal, E.A., Patrick-Miller, L., & Robitaille, C. (1997). Illness representations: Theoretical foundations. In K.J. Petrie & J.A. Weinman (Eds.), *Perceptions of health and illness* (pp. 19–45). Amsterdam: Harwood Academic.

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

Leventhal, H., Meyer, D., & Nerenz, D.R. (1980). The common sense representation of illness danger. In S. Rachman (Ed.), *Contributions to medical psychology*. New York, NY: Pergamon.

Maunder, R.G., & Hunter, J.J. (2001). Attachment and psychosomatic medicine: Developmental contributions to stress and disease. *Psychosomatic Medicine*, 63, 556–567. doi:0033-3174/01/6304-0556

Maunder, R.G., & Hunter, J.J. (2008). Attachment relationships as determinants of physical health. *Journal of the American Academy of Psychoanalysis and Dynamic Psychiatry*, 36, 11–32. doi:10.1521/jaap.2008.36.1.11

Meredith, P.J., Strong, J., & Feeney, J.A. (2005). Evidence of a relationship between adult attachment variables and appraisals of chronic pain. *Pain Research & Management*, 10, 191–200.

Mikulincer, M., & Florian, V. (2000). Exploring individual differences in reactions to mortality salience: Does attachment style regulate terror management mechanisms? *Journal of Personality and Social Psychology*, 79, 260–273. doi:10.1177/0146167295214011

Mikulincer, M., & Florian, V. (2001). Attachment style and affect regulation implications for coping with stress and mental health. In G. Fletcher & M. Clark (Eds.), *Blackwell handbook of social psychology: Interpersonal processes* (pp. 537–557). Oxford: Blackwell.

Mikulincer, M., & Florian, F. (2004). Attachment style and affect regulation: Implications for coping with stress and mental health. In M.B. Brewer & M. Hewstone (Eds.), *Applied social psychology* (pp. 28–49). Malden, MA: Blackwell.

Mikulincer, M., & Shaver, P.R. (2007). *Attachment in adulthood: Structure, dynamics and change.* New York, NY: Springer.

Mikulincer, M., Shaver, P.R., & Pereg, D. (2003). Attachment theory and affect regulation: The dynamics, development, and cognitive consequences of attachment-related strategies. *Motivation and Emotion*, *27*, 77–102. doi:0146-7239/03/0600-0077/0

Moss-Morris, R., Weinman, J., Petrie, K., Horne, R., Cameron, L.D., & Buick, D. (2002). The revised illness perception questionnaire (IPQ-R). *Psychology & Health*, *17*, 1–16. doi:10.1080/08870440290001494

Muthén, L.K., & Muthén, B.O. (1998–2010). *Mplus user's guide* (6th ed). Los Angeles, CA: Muthén n.

Pereg, D. (2001). *Mood and cognition: The moderating role of attachment style* (Unpublished doctoral dissertation). Bar-Ilan University, Israel.

Petrie, K.J., Cameron, L.D., Ellis, C.J., Buick, D., & Weinman, J. (2002). Changing illness perception after myocardial infarction: An early intervention randomized controlled trial. *Psychosomatic Medicine*, *64*, 580–586. doi:0033-3174/02/6404-0580

Poole, L., Dickens, C., & Steptoe, A. (2011). The puzzle of depression and acute coronary syndrome: Reviewing the role of acute inflammation. *Journal of Psychosomatic Research*, *71*, 61–68. doi:10.1016/j.jpsychores.2010.12.009

Pramana, W. (1996). *The utility of theories of parenting, attachment, stress, and stigma in predicting adjustment to illness* (Unpublished PhD dissertation). University of Queensland, Brisbane, Australia.

Preacher, K.J., Curran, P.J., & Bauer, D.J. (2006). Computational tools for probing interactions in multiple linear regression, multilevel modeling, and latent curve analysis. *Journal of Educational and Behavioral Statistics*, *31*, 437–448. doi:10.3102/10769986031004437

Roest, A.M., Martens, E.J., Denollet, J., & de Jonge, P. (2010). Prognostic of anxiety post myocardial infarction with mortality and new cardiac events: A meta-analysis. *Psychosomatic Medicine*, *72*, 563–569. doi:10.1097/PSY.0b013e3181dbff97

Rubin, D.B. (1987). *Multiple imputation for nonresponse in surveys.* Hoboken, NJ: Wiley.

Stafford, L., Berk, M., & Jackson, H.J. (2009). Are illness perceptions about coronary artery disease predictive of depression and quality of life outcomes? *Journal of Psychosomatic Research*, *66*, 211–220. doi:10.1016/j.jpsychores.2008.09.005

Vilchinsky, N., Dekel, R., Leibowitz, M., Reges, O., Khaskia, A., & Mosseri, M. (2011). Dynamics of support perceptions among couples coping with cardiac illness: The effect on recovery outcomes. *Health Psychology*, *30*, 411–419. doi:10.1037/a0023453

Vilchinsky, N., Haze-Filderman, L., Leibowitz, M., Reges, O., Khaskia, A., & Mosseri, M. (2010). Spousal support and cardiac patients' distress: The moderating role of attachment orientation. *Journal of Family Psychology*, *24*, 508–512. doi:10.1037/a0020009