

## **On the Self-Regulation of a Health Threat: Cognitions, Coping, and Emotions Among Women Undergoing Treatment for Infertility**

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*The Self-regulation Model (SRM) proposed by Leventhal and colleagues (H. Leventhal, Meyer, & Nerenz, 1980) argues that cognitive representations of a health threat guide coping with the threat, which in turn affects physical and emotional outcomes. The current study tested these hypothesized relationships between cognitive perceptions of infertility, ways of coping with infertility and its treatment, and emotional outcomes, in a sample of 310 women undergoing treatment for infertility. The data provided evidence for direct and indirect relationships between cognitions and emotions and underscored the importance of examining illness cognitions and attending to both positive and negative emotions in research and therapy.*

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**KEY WORDS:** Self-regulation, illness cognitions, illness representation, coping, infertility.

### **INTRODUCTION**

The biopsychosocial approach to health and illness has led both researchers and clinicians to note that even within similar levels of objective health status there are often vast differences in adjustment among patients. Research has shown that people's subjective perceptions of their health status contribute to the interpersonal variation in both physical and emotional outcomes, beyond the contribution of more objective indicators. Independent effects on outcomes were found for subjective perceptions of global health (Benyamini & Idler, 1999; Idler & Benyamini, 1997) as well as for those of specific health threats (Petrie & Weinman, 1997). The Self-regulation Model (SRM), developed by Leventhal and his colleagues (Leventhal, Meyer, & Nerenz, 1980), proposes a framework for the relationship between the way people organize their understanding of their health status and various outcomes.

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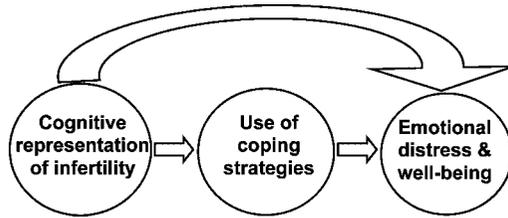
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One of the main tenets of this theory is that people form cognitive representations of the health threat that guide their choice of coping procedures, which in turn affect the outcomes. The main objective of the current study was to investigate to what extent cognitive representations of a health threat can serve to regulate emotional outcomes directly and indirectly, through the use of coping strategies, among women undergoing infertility treatment.

When confronted with a health threat, we are usually exposed to a lot of information from diverse sources ranging from our own bodily sensations to information from physicians and medical tests, advice and reactions of other people, and even reports in the media. The processing of this information is embedded in the personal and social context within which we live. The results of this information processing, according to the SRM, are cognitive representations of the health threat and related emotional representations. Five sets of attributes of the cognitive representation were identified (Leventhal, Nerenz, & Steele, 1984): (1) the *identity* of the disease – its label and symptoms; (2) its perceived *causes*; (3) the *timeline* of the disease (for example, is it acute, episodic, or chronic); (4) its *consequences* – how serious is this health threat and what is its impact on various domains of life (somatic, personal, social, economic); and, (5) the degree of *controllability* or *curability* – to what extent can one's own actions or the medical treatment affect the course of the illness (this attribute was identified by Lau & Hartman, 1983). These attributes are distinct yet not necessarily independent, according to the theoretical model and to empirical findings of patterns such as high-perceived consequences coupled with a stronger illness identity, lower controllability and a longer timeline (Heijmans, 1999). Together, these attributes form the person's theory of their illness, which helps them further interpret their experience and decide how to act. This model has also been labeled "the Common Sense Model of Illness," because it models people's common-sense thinking when confronted with a disease or a health threat. Researchers have also referred to cognitive representations of illness simply as illness representations, or as illness cognitions, lay beliefs or folk beliefs of health and illness, or illness perceptions. We will use the term cognitive representations of illness, or in short *illness representations*, and refer to *illness cognitions* to denote its components (listed above).

Forming an illness representation is the first stage according to the SRM. It serves as the foundation for the second stage: the development and execution of response plans for coping with the health problem and with the emotions it creates. The underlying assumption is that these coping plans are carried out in order to achieve certain outcomes, so that the third stage of people's common sense thinking is their appraisal of the outcomes. The SRM posits parallel processing of separate though closely interrelated cognitive and emotional branches, where each branch includes a path from representation to coping to outcomes/outcome appraisal and the paths are interconnected at each stage. In practice, most research has considered this path without separating it into two branches, for several reasons. First, emotional representations are more difficult to study and to discern from emotional outcomes. Second, the distinction is also unclear at the stage of coping because the same strategy can serve to cope with the problem and with the emotions that it raises. In the present study we focused only on the possible role of illness cognitions in the regulation of *emotional* outcomes, which were operationally defined as emotional



**Fig. 1.** A schematic representation of the Self-regulation Model (SRM) based theoretical framework for the current study, linking the cognitive representation of infertility, strategies of coping with infertility and its treatment, and emotional outcomes.

distress and emotional well-being. The reason for this focus is that there is very little that women undergoing infertility treatments can do to affect the *physical* outcome of the treatment (i.e., conception), with the exception of adherence to treatment. Adherence is typically very high, regardless of the likelihood of success (Becker & Nachtigall, 1994), leaving very little variance among women. Figure 1 shows a simplified schematic representation of the SRM-based theoretical framework for the current study. We will now briefly review the literature on the associations proposed by the SRM between cognitive representations of illness and emotional outcomes and then turn to research conducted within the context of infertility.

### **Research on the Relationships Between Illness Representations, Coping and Outcomes**

Early research on illness representations was based on open-ended or semi-structured interviews with patients who were confronted with various health threats and medical procedures (Leventhal et al., 1984). In 1996, Weinman, Petrie, Moss-Morris and Horne published the Illness Perception Questionnaire (IPQ), a standardized closed-ended measure they developed for assessing subjective illness perceptions. The availability of an easily applicable measure has triggered many studies of the role of illness representations in regulating responses to various health threats (though some of the recent studies were also carried out using open-ended questioning and/or instruments other than the IPQ, see for example, Kemp, Morley, & Anderson, 1999; Schiaffino, Shawaryn, & Blum, 1998). Therefore, most of the empirical research on the SRM is quite recent.

A recent meta-analysis of empirical studies adopting the SRM provided support for the theoretically predictable relations between illness cognitions, coping and outcomes (Hagger & Orbell, 2003). This analysis confirmed the construct and discriminant validity of the five components of the illness representation across illness types and the relations between the representation and coping, between coping and adjustment, and between the representation and adjustment. Relationships between the various illness cognitions and emotional outcomes were documented in a variety of disease contexts. For example, among patients after their first myocardial infarction, a stronger illness identity, a more chronic timeline, weaker belief in cure/control,

and the perception of graver consequences, were all related to greater anxiety and psychological distress (Petrie, Weinman, Sharpe, & Buckley, 1996); among psoriasis patients, a stronger illness identity and greater perceived consequences were related to more depression and psoriasis-related life stress (Fortune, Richards, Griffiths, & Main, 2002); and, among rheumatoid arthritis patients, beliefs about the consequences of the disease predicted future depression, controlling for initial depression, pain and disability (Sharpe, Sensky, & Allard, 2001). These issues have also been studied with regard to other illnesses such as diabetes, cancer, hypertension, and chronic fatigue syndrome (Petrie & Weinman, 1997).

Hagger and Orbell (2003) also concluded from their meta-analysis that there is support for the notion that illness representations shape coping procedures in many illness contexts. The final direct relationship, between coping and psychological adjustment, has been a main focus of the vast coping literature. Many studies used measures of psychological distress as the standard for judging coping effectiveness. Problem-focused coping was often found to be more effective in situations that were appraised as controllable or changeable while emotion-focused coping was more effective in uncontrollable situations (Forsythe & Compas, 1987; Sorgen & Manne, 2002; Vitaliano, DeWolfe, Maiuro, Russo, & Katon, 1990).

Only a few studies tested the association of outcomes to both illness representations and coping strategies. The SRM proposes that illness representations guide coping which in turn predicts outcomes, so that coping serves as the mediator. However, empirical evidence suggests that illness representations may have direct effects on emotions and adjustment that are not mediated by coping (Weinman, Petrie, Moss-Morris, & Horne, 1996). When the associations of illness representations and of coping to outcomes were tested separately, both were significant among individuals with a diagnosis of Huntington's disease (Helder et al., 2002); among chronic fatigue patients, illness representations explained a greater percentage of the variance in levels of disability and psychological well-being than did the coping strategies used by the patients (Moss-Morris, Petrie, & Weinman, 1996). When illness representations and coping strategies were examined within a single regression model explaining various measures of adjustment, in some studies both types of factors had independent contributions to adjustment (Fortune et al., 2002; Sharpe et al., 2001). In other studies, coping strategies contributed much less than illness representations (Heijmans, 1998, 1999; Kemp et al., 1999) or even had no significant effects on outcomes after illness representations were entered into the model (Scharloo et al., 1998; Steed, Newman, & Hardman, 1999). To the best of our knowledge, only one study provided evidence supporting the SRM proposition that coping mediates the illness representation–outcome association: Among patients with irritable bowel syndrome, for each of four psychological outcomes examined, path analyses suggested that illness representations had both direct effects on the outcomes and indirect effects mediated by coping (Rutter & Rutter, 2002).

### **The Context of Infertility**

Infertility is typically defined as the failure to conceive a pregnancy following 12 months or more of regular sexual intercourse without contraception. Estimates

of the prevalence of infertility vary but are mostly around 15% of couples. Infertility is not life-threatening and not even a “disease” in the common use of the term: aside from failing to conceive, these couples are young and healthy. However, in most cases it results from anatomical or physiological malfunctioning of the male or female reproductive systems and treating it entails deep involvement with the medical care system. Stress arises both from the threat to the major developmental milestone of parenthood (Cook, 1987) and from undergoing treatment that is time-consuming and emotionally draining. Although infertility is not physically debilitating, its emotional impact is comparable to that of serious chronic diseases (Domar, Zuttermeister, & Friedman, 1993). It affects many domains of life—personal, social, work/career, financial, and more (Newton, Sherrard, & Glavac, 1999). Women are almost always the patients, regardless of the source of the problem (female or male). Though men often report high levels of stress, infertility was found to be overall more stressful for women (Greil, 1997) and women’s self-esteem and feelings of womanhood are more likely to be affected eventually (van Balen & Trimbos-Kemper, 1993). Therefore, the current study focused on women’s cognitive representations of the infertility problem, their ways of coping and emotions.

Though the ultimate goal of infertility treatments is childbearing, emotional aspects are not a trivial issue, for two main reasons. First, because success rates per treatment cycle are low, treatments often span months and years. Coping with cycles of hope and disappointment can greatly affect couples’ psychological health and quality of life during this period. Second, though nowadays most cases of infertility can be clearly attributed to biomedical and not to psychogenic causes, recent studies showed that stress could affect treatment outcomes (e.g., Boivin & Takefman, 1995; Demyttenaere et al., 1998; Merari, Feldberg, Elizur, Goldman, & Modan, 1992). Even if stress is more a consequence than a cause of infertility, a vicious cycle may result, in which stress could play a causal role in treatment outcome (Greil, 1997) because stress can alter hormone secretion and interfere with ovulation (Schenker, Meiorow, & Schenker, 1992). Psychological stress has also been identified as the major reason for discontinuing infertility treatment, even before entitled insurance benefits have been used up (Domar, 2004; Olivius, Friden, Borg, & Bergh, 2004). Therefore, it is all the more important to understand how to help women maintain their well-being and cope with the distress caused by infertility and its treatments.

### **Research on Patient Representations of Infertility**

Though the SRM has not served as the theoretical framework for any of the studies on adjustment to infertility, previous research has attended to some of the illness cognitions proposed by this model. The relationships between perceived causal attributions and distress were the focus of several studies (Abbey & Halman, 1995; Litt, Tennen, Affleck, & Klock, 1992; Mendola, Tennen, Affleck, McCann, & Fitzgerald, 1990; Vieyra, Tennen, Affleck, Allen, & McCann, 1990). Appraisals of threat, that is, of the extent to which infertility had the potential for harm in various life domains—a concept similar to the consequences component—correlated with more distress (Stanton, Tennen, Affleck, & Mendola, 1991). Lower control over pregnancy was unrelated to depression whereas lower control over the medical treatment or the

emotional reactions was related to more depression (Campbell, Dunkel-Schetter, & Peplau, 1991). Perceptions of infertility were also found to be related to ways of coping with this stressor: women who viewed their infertility as a loss were more likely to cope through action, wishful thinking, and fatalism, compared with women who viewed it as a challenge, a threat, or as not stressful (Hansell, Thorn, Prentice-Dunn, & Floyd, 1998).

The effect of coping on adjustment to infertility has received more research attention. Coping through avoidance or seeking social support was related to greater distress (Hynes, Callan, Terry, & Gallois, 1992; Stanton, Tennen, Affleck, & Mendola, 1992). Problem-focused coping or direct action was related to better adjustment (Hynes et al., 1992), sometimes only if it was associated with some degree of acceptance of the problem (Edelmann, Connolly, & Bartlett, 1994). Different findings were reported by Terry and Hynes (1998) who referred to infertility as a low-control situation and used finer distinctions between types of coping strategies. They found that problem management strategies and avoidant strategies were associated with poorer adjustment while problem-appraisal strategies and emotional-approach strategies were associated with better adjustment.

### Study Aims and Hypotheses

Three main conclusions arise from the review of the literature: (1) Ample support was reported for each of the three direct associations proposed by the SRM when they were studied separately in various disease contexts. However, very few studies examined all three associations together and the possible mediating effect of coping on the association between illness representation and emotional outcomes has rarely been studied; (2) Most of the measures of emotional adjustment to health threats involved negative aspects, such as depression, while positive emotions were not often studied. Yet both theoretically and empirically, positive and negative measures of emotional adjustment are only moderately interrelated (Lucas, Diener, & Suh, 1996) and are correlated with different constructs (Shiloh, Berkenstadt, Meiran, Bat-Miriam-Katznelson, & Goldman, 1997). Moreover, research by Susan Folkman and her colleagues has shown that positive affect can co-occur with distress and has important adaptational significance of its own in the context of stress (Folkman & Moskowitz, 2000). Positive affect influences perceptions of health more strongly than negative affect does (Benyamini, Idler, Leventhal, & Leventhal, 2000); (3) In the context of infertility, subjective representations of infertility have not received much research attention (with the exception of causal attributions).

In light of these conclusions, the aim of the current study is to test the SRM model using structural equations modeling (SEM). This test included the direct associations of cognitive representations of infertility with both negative and positive emotions and the mediating effects of the use of coping strategies. The emotions were measured by scales of distress and well-being. We focused on three of the components of the common-sense representation of a health problem: its timeline, consequences, and controllability. The identity component was not explored because it mainly involves assessing symptoms attributed to the disease and there are no specific symptoms to infertility. The causes component was not explored because it involves a long list of

single causes and not a multi-item scale that is more compatible with SEM. Our first hypothesis was that *the perception of a longer timeline, more severe consequences, and lower controllability, will be related to greater emotional distress and lower well-being.*

Regarding coping, we focused on three main clusters of strategies of coping with infertility (Benyamini, Geffen-Bardarian, et al., 2004): inward-anger (e.g., blame, self-neglect), self-nurturing (e.g., compensation), and problem-management (e.g., active information-seeking). Our second hypothesis was that *cognitive representations of infertility would be related to the choice of coping strategies, which in turn will be related to emotional distress and well-being. Coping will mediate at least part of the association of representations with distress and well-being.*

## METHOD

### Participants

Participants were 310 women recruited at a regional infertility clinic. Their mean age was 30.6 ( $\pm 5.0$ ), most (95%) were married (for  $5.1 \pm 3.6$  years) and childless (63%). The mean number of years of education was 14.2 ( $\pm 2.4$ ). Average time since the problem was diagnosed (according to the participants' reports) varied: up to 5 months for 4%; 6–12 months for 43%; 13–36 months for 34%; and longer for 19% of the women. Regarding type of treatment, 32% were receiving ovulation-inducing medication in the form of pills, 43% by injection, 16% were undergoing IVF, 5% were undergoing other treatments, and 4% had not yet begun treatment. Most of the women (71%) had completed three or less treatment cycles of the type of treatment they were currently undergoing.

### Measures

*Illness cognitions* were assessed using the Illness Perception Questionnaire (IPQ, Weinman et al., 1996). The IPQ was developed to fit diverse patient populations and was tested on different chronic illness populations. The authors suggest viewing it as a core set of items but amending it to fit specific health threats. Indeed, factor analyses and reliability tests of our data proved the need for several modifications and all items were worded in reference to “my problem” instead of “my illness” (the general instructions called for “your personal opinions about your fertility problem”). Three subscales were used: (1) the *timeline* subscale included four items ( $\alpha = .82$ ; all reliabilities reported are for the present sample): the three items originally in this IPQ subscale (e.g., “my problem will last for a long time”) and a fourth item, “my problem is serious” which originally belonged to the consequences subscale. This change makes sense because the main meaning of seriousness in the case of infertility is a long timeline; (2) the *consequences* subscale included six items ( $\alpha = .76$ ): two that refer to the presence or absence of general effects on one's life and four that assess the perception of specific consequences, i.e., effects on the way I see myself as a person, the way others see me, economic and financial consequences, and effects on my intimate relationship with my partner (the last item was added by our research

team because of its salience in the context of infertility); and, (3) the *controllability* subscale included five items ( $\alpha = .63$ ) that refer to perceived personal control over the problem (“What I do can determine whether my problem gets better or worse”) and over the treatment (“There is a lot I can do to control the course of my treatment”; this item referred to control over symptoms in the original IPQ), to control via the treatment (“My treatment will be effective in curing my illness”) and to general perceptions of control or lack of control over the improvement of the situation, without specifying the source of control (“My problem will improve in time” and “there is very little that can be done to improve my problem”). Two additional items from the original IPQ were not included in the analyses because they decreased the internal reliability of their respective subscales (these items were removed from the recently published revised-IPQ, Moss-Morris et al., 2002).

*Coping strategies* were assessed using the main clusters of the Coping with Infertility Questionnaire (CIQ, Benyamini, Geffen-Bardarian, et al., 2004), a situation-specific coping measure which was developed on the basis of open-ended interviews with women undergoing treatment, a literature search on coping with infertility, and existing coping theories and measures. Three main clusters of strategies were investigated in the current study: (1) the *Inward-anger* cluster – 12 items ( $\alpha = .84$ ), 3 each for the strategies of denial, self-blame, social avoidance, and self-neglect. An additional CIQ strategy that belonged to this cluster, expressing emotions, was not used in order to avoid confounding with the emotional outcomes; (2) the *Self-nurturing* cluster – 11 items ( $\alpha = .85$ ), 3 each for the strategies of investing in myself, compensation, and keeping busy, and 2 items for self-care; (3) the *Problem Management* cluster – 12 items ( $\alpha = .80$ ), 3 each for the strategies of active-information seeking, planning, maintaining control over decision making, and seeking social support. The CIQ also included several strategies which were not used in the current analyses for the following reasons: strategies that were unrelated to the emotional outcomes (e.g., problem disclosure, recruiting husband support), cognitive strategies that included items which could confound the IPQ scales with the coping scales (acceptance and positive reinterpretation), and the Faith cluster, which included strategies with high correlations among them but inconsistent correlations with the emotional outcomes.

*Emotional adjustment* was assessed using the short version of the Infertility Specific Well-being and Distress Scales (Stanton, 1991), which include 10 moods and feelings each: for emotional distress – empty, depressed, lonely, angry, disappointed, left out, sad, frustrated, impatient, and worried ( $\alpha = .90$ ); and for emotional well-being – happy, optimistic, proud, confident, contented, capable, secure, competent, enthusiastic, and pleased ( $\alpha = .89$ ). Women were asked to indicate to what extent each item was descriptive of their feelings *recently* (this differs from the original scale that asked women to describe their feelings *regarding their fertility problem*, because we wished to focus on their overall emotional status and not only on feelings which they attributed to their infertility).

Scores for each scale were created by computing the mean response across items of the scale. All items which were originally worded in English were translated to Hebrew and back-translated. Psychometric qualities of the Hebrew version of the IPQ have previously been reported regarding coronary heart disease patients

(Benyamini & Garfinkel, 1999) and healthy adults who rated diabetes and other diseases (Shiloh, Rashuk-Rosenthal, & Benyamini, 2002).

### **Procedure**

Women were approached while waiting for their appointment with the infertility specialist. Over 80% of the women agreed to participate. The interviewers, female graduate students, explained the purpose of the study and asked the women to sign an informed consent form before they filled in the questionnaire in private. The questionnaire took 20–30 min to complete.

### **Statistical Analyses**

Structural Equation Modeling testing the hypothesized associations among study variables was done with the EQS program (Bentler, 1995). To reduce the ratio of estimated parameters to participants, we used the accepted approach of parceling (Bandalos, 2002) to create three indicators each for the IPQ factors and for distress and well-being and four indicators each for the CIQ clusters (each indicator represented a single coping strategy, as detailed above in the description of the clusters). The analyses were performed using covariance matrices. Three measurement models were first tested, separately for the IPQ scales, the CIQ clusters, and the emotional-adjustment measures. All three models showed good fit to the data and are not presented. About 6% of the observations had missing values in one or two indicators. In the model reported, we used pairwise deletion of missing values. We also repeated the analysis using listwise deletion of missing values and obtained a very similar model. The program provides estimates of the coefficients for both the direct and the indirect paths and computes the *t* value for each estimated coefficient, which enables a test of its statistical significance. Regarding the overall fit of the model, we report the non-normed fit index (NNFI, also known as TLI) and the comparative fit index (CFI), for which the values close to .95 are considered to indicate good fit; the root-mean squared error of approximation (RMSEA) and the standardized root-mean squared residual (SRMR), for which values greater than .06 and .08, respectively, indicate lack of fit (Hu & Bentler, 1999).

## **RESULTS**

Descriptive information about the study measures as well as their intercorrelations are presented in Table I. The three illness cognitions were interrelated in expected and logical ways: the perception of a longer timeline was related to lower perceived controllability and more serious consequences. However, consequences and controllability were unrelated. The findings support our first hypothesis regarding the association of illness cognitions with emotional adjustment: the perceptions of a longer timeline for the solution of the problem, more severe consequences, and less controllability, were related to greater distress and lower well-being. Perceptions of the timeline and consequences were also related to the use

**Table I.** Means, Standards deviations, and Intercorrelations among Study Measures ( $N = 310$ )

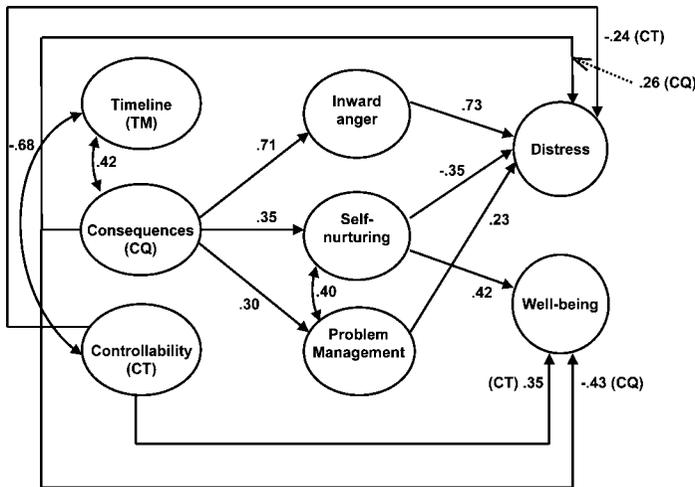
Measure	Standard								
	Mean	deviation	2 (CQ)	3 (CT)	4 (IA)	5 (SN)	6 (PM)	7 (DS)	8 (WB)
1 IPQ—Timeline (TM)	2.47	.81	.37***	-.44***	.24***	.09	.12*	.29***	-.26***
2 IPQ—Consequences (CQ)	2.89	.78	—	-.06	.55***	.23***	.25***	.59***	-.36***
3 IPQ—Controllability (CT)	3.69	.59	—	—	.03	.09	.06	-.11 <sup>†</sup>	.31***
4 CIQ—Inward Anger (IA)	0.89	.69	—	—	—	.25***	.12	.63***	-.24***
5 CIQ—Self-nurturing (SN)	1.84	.78	—	—	—	—	.30***	.05	.19**
6 CIQ—Problem management (PM)	2.51	.63	—	—	—	—	—	.21***	-.03
7 Emotional distress (DS)	2.44	.90	—	—	—	—	—	—	-.38***
8 Emotional well-being (WB)	2.85	.87	—	—	—	—	—	—	—

Note. Maximal range for the IPQ and emotional adjustment mean scores is 1–5 and for the CIQ scores it is 0–4.

<sup>†</sup>  $p < .10$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

of coping strategies, whereas controllability was related only to the emotional outcomes. Inward-anger strategies were related to greater distress and lower well-being, whereas self-nurturing was related only to greater well-being and problem management coping was related only to greater distress.

Figure 2 presents the SEM testing the relations among all measures. Non-significant paths are not shown. Perceived consequences and controllability each had



**Fig. 2.** The structural equations model (SEM) depicting the associations found between three components of the cognitive representation of infertility (perceived timeline, consequences, and controllability), three major ways of coping with infertility, distress and well-being ( $N = 310$ ). The lines represent paths significant at  $p < .05$ . The model includes additional nonsignificant paths that are not shown (between all illness cognitions and all coping strategies, distress and well-being; between all coping strategies and distress and well-being; among the different measures of each type). Goodness-of-fit indices: NNFI = .930, CFI = .941, SRMR = .061, RMSEA = .048.

independent effects on both distress and well-being. In addition, coping strategies significantly mediated part of the consequences-to-distress path (with a coefficient of .46 for the indirect path,  $p < .001$ ). Higher perceived consequences were also related to greater use of self-nurturing strategies, which in turn were related to greater well-being, but in this case the mediation effect was not significant. Thus, our second hypothesis was supported in part: only one of the three illness cognitions was related to the use of coping strategies and had indirect effects on emotional adjustment through the use of coping in addition to its direct effects.

It is worthwhile noting that the zero-order correlation between distress and well-being was negative but far from suggesting that they mirror one another ( $r = -.38$ ). In the full model their correlation was weak and nonsignificant. These findings support the importance of attending to both negative and positive emotional outcomes.

## DISCUSSION

The findings are in line with the hypotheses derived from the SRM: cognitive representations of the timeline, consequences, and controllability of the health threat at question, infertility and its treatment, were related to women's emotional adjustment, as manifested in their reports of distress and well-being. Perceived consequences had the strongest associations with greater distress and lower well-being. Its association with distress was mediated in part by the more intensive use of inward-anger coping and problem management strategies (that were related to greater distress) and of self-nurturing strategies (that were related to less distress). The effects of coping strategies and the potential mediation effect of some of the cognition-emotion association via the use of coping were stronger than have been reported before in research based on the SRM. This may be due to the use of a situation-specific coping measure, which was developed specifically to tap the coping procedures employed by women who are undergoing infertility treatments.

It is important to note that the data fit the criteria for mediation only in part: In accord with the criteria proposed by Baron and Kenny (1986), illness cognitions were related to emotional outcomes, and this relationship became significantly weaker in a model that included an indirect path from cognitions through coping to emotions. However, Kraemer and her colleagues have recently emphasized the importance of the temporal relationship: In our case, illness cognitions should precede coping efforts, which precede the outcomes (Kraemer, Stice, Kazdin, Offord, & Kupfer, 2001). Cross-sectional data does not satisfy this criterion and can only suggest a potential mediation effect, in line with the theoretically derived mediation hypotheses. In general, the good fit of the SEM model to the data can only show that the associations proposed by the theoretical model are possible but cannot determine their causal direction. Negative perceptions of a health threat can lead to negative emotional responses and vice versa: Negative emotions can contribute to a negative perception of the situation. Likewise, a positive perception of the threat can enable one to maintain a higher level of well-being, which in turn can serve as a resource that enables one to perceive the health threat less negatively.

### The Role of Coping in the Cognition–Emotion Associations

The findings suggest that coping plays an important role in the cognition–emotion association. First, women who perceived severe consequences simultaneously refused to accept that infertility has struck them and blamed themselves for it. Though seemingly paradoxical, this actually makes sense: Until menopause, infertility entails a potential and not an actual loss (Menning, 1980) and therefore creates an approach–avoidance dilemma, which is exemplified in the inward-anger cluster of coping strategies. Negative perceptions may make it more difficult to come to terms with infertility and these difficulties can also lead to social avoidance and self-neglect (the additional strategies in the inward-anger cluster). The rising negative emotions triggered by these coping strategies can in turn amplify processes of blame, neglect and avoidance (and increases in negative emotions and maladaptive coping strategies can actually result in more severe consequences for one’s quality of life).

Second, the findings suggest that negative perceptions of the threat of infertility can lead one to attempt to alleviate the threat by seeking more information, support, and control. These coping efforts can affect distress and well-being, and vice versa. For example, greater distress could drive more efforts to manage the problem by tactics such as seeking information or support. However, because additional information, support or control do not necessarily reduce the uncertainty involved in infertility treatments, these problem management strategies could lead to greater focus on the infertility threat and treatment, at the expense of focus on other domains of life. In the short-term, focusing mostly on the infertility problem may be easier than juggling between its demands and those of other life domains; in the long term such a focus-on-infertility strategy deprives women of the benefits and satisfaction they could have derived from investing in several life domains simultaneously (Benyamini, 2003). Eventually, this means more negative effects on one’s life, which could explain why these problem management strategies were ineffective in this context.

Third, the findings suggest that positive coping processes could also take place: the perception of severe consequences may also lead some women to gather the energy needed in order to cope with the burden of the treatments *and* with other areas of their lives. At minimum, they found ways to compensate themselves for not being able to fulfill their goals at the moment and having to undergo stressful procedures. Some women went to greater lengths: instead of simply pampering themselves, they invested in themselves (for example, by enrolling in various classes). Such ways of coping do not alleviate the distress inherent in the situation but they divert energy to other fulfilling domains of life that can provide satisfaction and thus increase emotional well-being. These findings also underscore the importance of measuring both positive and negative moods, because these moods are separate even if they are negatively correlated, as has been found with other medical conditions (Zautra et al., 1995). Similarly, the implication is that it is equally important to find out which cognitions are related to positive moods, as it is to identify those that are related to negative moods. The positive emotions that result from the positive perceptions and coping strategies can serve as a resource for long-term coping with the adverse aspects of this stressful situation, as has been found in other contexts (Aspinwall, 1998; Fredrickson, 1998).

### **Limitations of the Study and Implications for Future Research**

Our study has several limitations. First, as noted above in detail, the cross-sectional nature of the study limited our ability to identify the causal direction of the relationships found and therefore this area of research could benefit from additional longitudinal studies. Second, we did not have access to physiological measures or treatment outcomes. Future research could examine the relationships between reported cognitions and moods and medical indicators that may be related to the probability of treatment success. Third, the sample included only women and its findings cannot be generalized to their partners. Lastly, our findings are based on a sample of women who are mostly in initial stages of treatment and thus faced with the threat of infertility, not with the need to adjust to lifetime childlessness. Though we assume that illness cognitions would be related to emotions among women in later stages too, these relationships and the specific content of the more adaptive cognitions could be different among women facing the need to end treatment altogether.

### **Implications for Therapy**

The links between cognitions, coping, and emotions have been supported in many illness contexts (Hagger & Orbell, 2003). Our study adds support specific to the context of infertility, in a relatively large sample of women at a variety of stages of infertility treatment. The next step is to translate this knowledge into effective interventions. A recent study showed that a three-session intervention designed to change patients' illness representation, resulted in improved recovery from a myocardial infarction (Petrie, Cameron, Ellis, Buick, & Weinman, 2002). The assessment of the patients' illness cognitions was based on the SRM and the intervention was specifically structured to change highly negative perceptions and to alter the patients' views of the timeline and consequences of their illness. The current study's findings can serve as a basis for planning a similar intervention among women undergoing infertility treatments. Such an intervention should be aimed at reducing distress and boosting positive emotions by targeting: (1) negative perceptions of daily consequences; (2) perceptions of various types of controllability of infertility and of the course of treatment and its outcomes; and (3) alleviating negative consequences by increasing the use of self-nurturing coping strategies.

The first recommendation listed above is based on the finding that the strongest direct and indirect effects were related to the perception of the daily consequences and *not* to those of the seriousness and prognosis of the threat itself, which are more clearly symbolized by the perception of a longer timeline. The social stereotype of infertility is much more focused on the problem itself and its source (e.g., male vs. female, see Shiloh, Larom, & Ben-Rafael, 1991) and on the stigma of childlessness (Whiteford & Gonzalez, 1995). Needless to say, the most important problem these couples face is indeed the fact that they are currently childless and failing to conceive. Yet, the findings suggest that on a daily basis these women may be just as troubled by specific aspects of the infertility treatment and its concomitants (Shiloh et al., 1991) and by a variety of related personal, social, financial, bureaucratic, and other

difficulties (Benyamini, Gozlan, & Kokia, in press). The practical implication is that these women may benefit from support and counseling on how to work infertility into their daily life without paying too high an emotional price. This issue is not less important than working out the broader issues of accepting the possibility of childlessness or coping with uncertainty over a long period of time.

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