Risk Factors, Resilient Resources, Coping & Outcomes:

A Longitudinal Model of Adaptation to POI

by

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ABSTRACT

Female infertility can present a significant challenge to quality of life. To date, few, if any investigations have explored the process by which women adapt to premature ovarian insufficiency (POI), a specific type of infertility, over time. The current investigation proposed a bi-dimensional, multi-factor, model of adjustment characterized by the identification of six latent factors representing personal attributes (resilience resources and vulnerability), coping (adaptive and maladaptive) and outcomes (distress and wellbeing). Measures were collected over the period of one year; personal attributes were assessed at Time 1, coping at Time 2 and outcomes at Time 3. It was hypothesized that coping factors would mediate associations between personal attributes and outcomes. Confirmatory Factor Analysis (CFA), simple regressions and single mediator models were utilized to test study hypotheses. Overall, with the exception of coping, the factor structure was consistent with predictions. Two empirically derived coping factors, and a single standalone strategy, avoidance, emerged. The first factor, labeled "approach coping" was comprised of strategies directly addressing the experience of infertility. The second was comprised of strategies indicative of "letting go /moving on." Only avoidance significantly mediated the association between vulnerability and distress.

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Infertility is a common, chronic and challenging health problem requiring the adjustment of important life goals for many women. The causes of this condition are many and adaptation varies considerably. For those suffering from spontaneous 46,XX primary ovarian insufficiency (POI), a distinct type of infertility, little is understood about the process of adjustment. However, more general models highlighting adjustment to chronic life stressors may help to craft a framework with which to understand adaptation in the context of POI. In particular, recent paradigm shifts in the field include the following elements a) recognition of two dimensions of health (well-being and distress); b) individual difference factors that may promote "resilience" or convey "risk" in the context of stress, and c) those that incorporate coping strategies as mediators of the link between individual difference factors and outcomes. Extrapolating from the existing literature, a model of distress and wellbeing that is both longitudinal and bi-dimensional is proposed for those suffering from POI.

Infertility as a Health Threat

Approximately 7% of married women between the ages of 15 and 44 are infertile (Chandra, Martinez, Mosher, Abma, & Jones, 2005). Regardless of the precipitant, the repercussions of such a diagnosis have the potential to be emotionally and psychologically devastating (Cousineau & Domar, 2007). Because the value placed on biological parenting is so great, women who are unable to bear children often feel isolated (Gonzalez, 2000). Many experience a

diminished sense of self-worth and feel that they have lost control of their lives (Greil, 1991). Moreover, rates of depression, anxiety, and hostility among infertile women are much higher than for their fertile counterparts (Cwikel, Gidron, & Sheiner, 2004; Domar, Zuttermeister, Seibel, & Benson, 1992; Downey, & McKinney, 1992; Wright, Duchesne, Sabourin, Bissonnette, Benoit, Girard, 1991). In fact, rates of depression and anxiety in this population are comparable to rates in women suffering from cancer, hypertension, myocardial infarction and HIV (Domar, Zuttermeister, & Friedman, 1993). Among those confronting health threats only persons with chronic pain evidence higher rates of depression (Domar, et al. 1993).

Spontaneous 46,XX primary ovarian insufficiency (POI), or premature ovarian failure (POF) is only one of many infertility diagnoses. POI affects approximately 1 % of women before the age of 40 (Coulam, Adamson, & Annegars, 1986). It is diagnosed when a woman under the age of 40 experiences four or more consecutive months of amenorrhea, with two or more FSH serum levels in the menopausal range (Rebar & Connolly, 1990; Nelson, Anasti. & Flack, 1996). Consequently, the condition is akin to early onset menopause. Once diagnosed, only 5-10% conceive and deliver a child naturally (Rebar & Connolly, 1990; Rebar, Erickson, & Yen, 1982; Nelson, Anasti, Kimzey,Defensor, Lipetz, White, et al. 1994).

Variability in Adaptation to POI

When compared with healthy controls, women with POI report greater shyness, and social anxiety, along with lower levels of self-esteem and social

support (Schmidt, Cardoso, Ross, Haq, Rubinow, & Bondy, 2006; Orshan, Ventura, Covington, Vanderhoof, Troendle, & Nelson, 2009). Furthermore, a recent study comparing women with POI to age-matched controls on measures of psychological adjustment revealed results consistent with the general infertility literature (Davis, Ventura, Wieners, Covington, Vanderhoof, Ryan, et al. 2009). Specifically, patients endorsed more symptoms of anxiety and depression, along with higher levels of negative affect and lower levels of positive affect.

The aforementioned findings suggest that the experience of infertility is stressful and may have significant implications for personal wellbeing. Because those suffering from infertility exhibit higher rates of psychological maladjustment than healthier persons (Cwikel, et al. 2004; Domar, et al. 1992; Downey, & McKinney, 1992; Wright, et al. 1991) interest in understanding factors that contribute to risk of poor adaptation has increased. Moreover, diminished emotional wellbeing has been increasingly implicated as a poor prognostic indicator in women undergoing targeted infertility treatments like in vitro fertilization (IVF; Boivin, & Takefman, 1995). Because those suffering from infertility exhibit higher rates of psychological maladjustment than healthier persons (Cwikel, et al. 2004; Domar, et al. 1992; Downey & McKinney, 1992; Wright, et al. 1991) researchers and clinicians alike are vested in identifying markers of adjustment.

It is important to note, however, that although women with POI are worse off than healthy controls, many do adjust to their condition and maintain adaptive levels of psychosocial functioning. For example, in their 2009 investigation

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Davis, et al. (2009), determined that many women adjust to the condition without experiencing elevations in psychological distress. Over 60% of women in this sample denied symptoms of depression, compared with 80% of controls. Thus, there is great variation in adaptation to POI.

Individual Traits, Coping Under Stress, and Outcomes

D*iathesis-stress* models postulate that pre-existing personal attributes may interact with stressors to predict psychological outcomes. Consistent with such a framework, research suggests that personal attributes may influence coping selection in the context of stress (Taylor & Stanton, 2000). In particular, certain personality traits have been found to differentially account for the selection of adaptive and maladaptive coping strategies (McCrae & Costa, 1986). For instance, neuroticism has been observed to predict selection of coping strategies deemed less effective (escapism, withdrawal, wishful thinking, indecisiveness); in sum, more passive, maladaptive or avoidant strategies. By contrast, extraversion consistently predicted strategies rated as more effective (rational action, positive thinking, self-adaptation, and humor); strategies classified as more active, approach-oriented, or adaptive.

A 1995 investigation by Bolger and Zuckerman lends credibility to the assertion that personal attributes may contribute to adjustment and coping selection in the context of stress. Specifically, personality traits have been hypothesized to account for variations in adaptation via their influence on stressor exposure, stressor reactivity, and coping (Bolger & Zuckerman, 1995). By virtue of its association with high negative affect and autonomic lability (Eysenck &

Eysenck, 1985) it was postulated that trait neuroticism would predict greater exposure to stress and greater reactivity to stressors. To test hypotheses, college undergraduates completed an initial measure of personality along with daily reports of interpersonal conflicts, coping, and distress (anger, depression, anxiety).

Hierarchical linear models revealed that higher levels of neuroticism predicted greater psychological reactivity to stress in the form of greater depression and anger. Moreover, those with higher levels of neuroticism endorsed more social support seeking, self-control, escape-avoidance, and planful problem solving. Furthermore, when those high on neuroticism engaged self-controlling mechanisms, they reported greater depression the following day. By contrast, their low neuroticism counterparts evidenced less depression when endorsing this strategy. Thus, it appears that those high on neuroticism may engage more strategies, but with limited effectiveness.

A 1999 investigation by Skewchuk, MacNair-Semands, Elliott, and Harkins sought to probe the contribution of personality traits to both appraisals and coping in the context of stressful events. Data were collected from university undergraduates and assessed at three separate time points; initial measures included personality, stress appraisals and coping. Assessments of appraisals and coping were, again, collected at 2 weeks and 4 weeks following initial measurement. Path analysis revealed that personality traits predicted the selection of specific coping strategies. Whereas conscientiousness predicted the selection of problem-focused strategies, baseline neuroticism was predictive of emotion-

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focused coping; these findings were consistent across all time points. Likewise, stable patterns of emotion-focused strategies have been associated with increased distress under conditions of stress (Ormel, Sanderman, & Stewart, 1988). Accordingly, personal traits may, indeed, be direct and indirect determinants in adjustment to stress.

Additional research lends support for this framework in the context of health. Among those confronting a health threat, individual traits have been found to predict coping selection and adaptation (Brenner, Melamed, & Panush, 1994). For example, a longitudinal investigation of patients with rheumatoid arthritis suggests that baseline optimism was associated both with problem-focused coping and improvements in psychosocial adjustment 16 months later (Brenner, et al. 1994). Moreover, problem-focused coping was predictive of positive social adjustment, though only marginally, and not across time.

Much like personality traits, personal beliefs, attitudes and world views tend to remain stable over time. Accordingly, pre-existing attitudes may be associated with adjustment and with the tendency to select certain coping strategies. Of particular relevance for women with POI, Brothers and Maddux (2003) revealed that attitudes concerning the importance of biological parenthood as necessary for life satisfaction and happiness were linked to emotional distress in those suffering from infertility, and indirectly via rumination.

As highlighted here, the observed associations between individual personality traits, coping and adjustment have garnered credible support in samples confronting both general daily stressors, and health threats (e.g. pain,

infertility). These results suggest that personal attributes AND coping may be important to consider when developing models of adaptation in POI.

Distress and Wellbeing as Separate Dimensions of Health

Investigations probing adjustment in the context of a health threat frequently focus on psychological constructs that predict distress, but ignore wellbeing. The underlying assumption, of course, is that identifying and correcting things that increase vulnerability/distress/risk, will result in improved wellbeing. Put more simply, it is often thought that distress is the polar opposite of wellbeing; that distress and wellbeing are strongly inversely correlated or "mirrored" outcomes. For this to hold true, the absence of distress (depression, anxiety, negative affect, etc) should be associated with elevated levels of psychological adjustment (Ryff, Love, Urry, Muller, Rosenkranz, Friedman, et al. 2006). Yet, these researchers cite several studies suggesting this may not be the case (Keyes, 2002; Singer, Ryff, Carr, & Magee, 1998); it is the case that some people exhibit elevated levels of both distress and wellbeing, while others endorse the absence of both. Thus, the presence of wellbeing may not be contingent upon the absence of distress.

Investigations of mood suggest that negative and positive affect are best represented by separate and relatively uncorrelated dimensions (Bradburn, 1969; Reich, Zautra, & Davis, 2003). Drawing on this body of research, investigators have proposed that wellbeing is more than "an absence of pathology" (Ryff, *&* Singer 1998; World Health Organization, 1948). More specifically, it has been hypothesized that distress and wellbeing are best conceptualized as distinct

constructs. Several investigations with varying methodologies lend support for this theory (Massé, Poulin, Dassa, Lambert, Belair, & Battaglini, 1998; Keyes, 1998; Ryff, et al. 2006). In fact, Massé, et al. (1998) utilized confirmatory factor analysis and structural equation modeling to identify two distinct dimensions of mental health, one termed psychological distress and the other psychological wellbeing. The former was comprised of depression, anxiety, self-deprecation, and social disengagement. The latter included self-esteem, social involvement, mental balance, control of self/events, sociability and happiness.

A 2005 investigation by Keyes sought to distinguish the presence of mental health, which he termed "flourishing" from the presence of mental illness, termed "languishing." Consistent with the methodology utilized by Massé, et al. (1998) Keyes employed factor analysis and structural equation modeling to probe this distinction. Mental health measures included assessments of emotional, psychological and social wellbeing (positive affect; Psychological Wellbeing Scale, Ryff, 1989; Social Wellbeing Scales, Keyes, 1998). Mental illness measures included assessments of depression, anxiety, and substance use. Results revealed that mental illness and mental health or "languishing" and "flourishing" represented independent but correlated latent factors.

Using biological markers such as salivary cortisol, norepinephrine, weight, blood pressure, etc., Ryff, et al. (2006) sought to clarify whether a two dimensional model of mental health could be supported physiologically. Measures of distress included trait anxiety, trait anger, depression and negative affect. By contrast, measures of wellbeing included autonomy, mastery, personal growth,

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positive relations with others, purpose in life, self-acceptance, and positive affect. Results revealed that three biomarkers (cortisol, norepinephrine, HDL cholesterol) were positively associated with measures of wellbeing, but were unrelated to measures of distress. Two more markers (waist/hip ratio, lower total/HDL cholesterol) were independently and negatively associated with wellbeing measures. Additionally, two physiological measures (DHEA-S, systolic blood pressure) were significantly associated with markers of distress, but not wellbeing. Only two biomarkers (weight, glycosylated hemoglobin) were associated with distress AND wellbeing. In sum, seven of the nine investigated physiological variables were uniquely associated with either distress or wellbeing; a finding that lends support for the two dimensional hypothesis.

Of particular relevance for POI is the recent finding that distress and wellbeing represent distinct dimensions for those suffering from chronic pain, another health threat (Huber, Suman, Biasi, & Carli, 2008). A series of self-report measures were obtained from a sample of fibromyalgia patients. The State Trait Anxiety Inventory (STAI), the Symptom Checklist-90 (SCL-90), and the Emotional Pain Scale from the Multidimensional Pain & Affect Survey (MAPS) were administered as assessments of distress. A series of wellbeing constructs were also derived from the MAPS (mental engagement, physical activity, affiliated feelings, and positive affect). The method utilized to analyze variables represented a departure from previous investigations inasmuch as Pearson correlations were used to determine relations between measures of distress and wellbeing. Strong relations were observed among all measures of wellbeing and

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among distress measures. With the exception of positive affect which evidenced a moderately strong negative correlation with measures of distress, the remaining wellbeing variables were correlated with distress variables weakly or not at all.

Another recent investigation explored associations between markers of vulnerability and resilience, social interactions and affect in women with arthritis and healthy controls (Smith & Zautra, 2008). Consistent with research postulating distinct constructs of distress and wellbeing, it was hypothesized that markers of vulnerability (anxiety, depression, interpersonal sensitivity, emotionality, and pessimism) would converge onto a single factor and would predict weekly increases in negative social interactions. It was further suggested that this vulnerability factor would be unrelated to changes in levels of positive social interactions. Markers of resilience (optimism, purpose in life, active coping, positive reinterpretation/growth, and acceptance coping) were also hypothesized to converge on a single factor. It was proposed that this factor would predict weekly increases in positive social interactions, and be unrelated to negative social interactions. Results were consistent with predictions. In addition, vulnerability, but not resilience predicted changes in negative affect. Both vulnerability and resilience predicted changes in positive affect, however effects for the former were smaller relative to those of the latter.

Recent cross-sectional evidence lends support for a bi-dimensional model of risk and resilience in the context of infertility (Benyamini, Gefen-Bardarian, Gozlan, Tabiv, Shiloh, & Kokia, 2008). Efforts to develop a coping instrument specific to this condition revealed that less problem management (attempts to

plan/seek information) was associated with less distress and unrelated to wellbeing (positive affect). By contrast, self-nurturing, and positive reinterpretation, predicted greater wellbeing, but were not associated with distress (negative affect). Moreover, only moderate correlations between measures of wellbeing and distress were observed.

Taken together, the results garnered in the context of pain and infertility maintain the legitimacy of exploring concomitant constructs of distress and wellbeing in samples confronting a health threat. Turning attention to POI specifically, recent research points to some evidence of dimensions of health reflecting both increased negative affectivity/distress and decreased positive affectivity (Davis, et al. 2010). Accordingly, research hypothesizing a two dimensional model of health may be salient in developing an understanding of adaptation to POI.

Individual Difference Factors: Predictors of Distress & Wellbeing

Individual difference variables have frequently been probed as predictors of adaptation. However, it has been only recently that investigators have begun to taut the benefits of identifying constellations of variables representing latent constructs. Mancini & Bonanno (2009) propose an individual differences model whereby psychosocial traits (e.g. personality, attachment, worldviews, capacity for positive, etc) associated with "resilient" outcomes (e.g. minimal symptoms, positive experiences, etc) have both direct and indirect effects on adaptive coping (e.g. emotion regulation, downward comparison, self-disclosure) in the context of loss. Indirect effects are hypothesized to operate through appraisals, and social

support. Their contention that "our understanding of resilient processes can be advanced by integrating and organizing these factors along the lines of common or shared mechanisms (p. 20; manuscript)" is noteworthy and of particular relevance to the present proposal.

Their model is salient because it lends considerable support to the notion that psychosocial indicators (personality, traits, beliefs) may be critical determinants in the process by which individuals cope with and adapt to stress. Much like Bolger & Zuckerman (1995), who demonstrated that neuroticism was predictive of coping selection, Mancini & Bonanno (2009) argue that psychosocial traits should be included in models depicting adaptation to stress. However, more than independently exploring associations between individual variables (e.g. neuroticism, and self-control strategies), Mancini & Bonanno (2009) advocate that many psychosocial variables be considered in concert. They purport that it is the totality of indicators and not the presence or absence of any one that predicts adaptation. Accordingly, they propose that several indicators may converge to create a single construct representative of psychosocial resilience in the context of loss.

Because there are so few comprehensive models incorporating trait markers of both risk and resilience investigators have begun to propose models incorporating indicators from multiple domains in order to identify relevant latent factors representative of these constructs (Wright, Zautra, & Going, 2008). Drawing on the diathesis stress model and using a using a sample of patients with arthritis, Wright, et al. (2008) predicted that resilient traits along with traits

indicative of risk would be associated with somatic health. More specifically, these researchers identified convergent indicators that yielded two separate factors, one indicative of psychological resilience and the other of psychological vulnerability. Positive affect, vitality, and extraversion comprised the former, while negative affect, depression and neuroticism comprised the latter.

Once identified, the factors were entered into a structural equation model whereby self-efficacy and physical activity were hypothesized to mediate their association with somatic outcomes (pain, physical functioning). One factor and two factor models were tested. Results were consistent with the distress and wellbeing literature discussed earlier. They revealed that the two factor model provided better fit, suggesting that trait markers were represented by two distinct factors, one "risk" and one "resilience." In addition, consistent with hypotheses, resilience was positively associated with self efficacy which was, in turn, associated with higher physical functioning and less pain. Hence, the mediation model was supported, but only for resilience and only in the context of self efficacy. This model is noteworthy for several reasons. First, it is bi-dimensional; risk and resilience are both represented and are identified as separable constructs. Second, it proposes latent psychological risk and resilience factors comprised of salient individual difference indicators. Moreover, the model was developed and successfully applied in the context of a health threat.

As highlighted above the loss and chronic pain literatures lend compelling support for the utility of identifying latent individual difference factors in studies of adaptation. Of note, the model proposed by Mancini & Bonanno (2009) was

conceptualized using the loss/grief literature as a backdrop. In addition to being investigated as a health threat (Benyamini, Gozlan, & Kokia, 2004), infertility has also been examined as a bereavement event (Gonzalez, 2000). Indeed, a diagnosis of infertility often requires extensive grief considerations as the afflicted party must mourn the biological children they may never have and come to terms with the loss of social roles (biological parenting; parenthood). Consequently, the resilient pathway articulated by Mancini & Bonanno (2009) may be particularly salient for women suffering with POI. Additionally, the investigation by Wright, et al. (2008) was conducted in the context of chronic pain. Like infertility, chronic pain is categorized as a persistent health threat. Accordingly the identification of latent individual factors predictive of adaptation among those with chronic pain may be particularly salient for those with POI.

Coping as a Mediator of Personal Attributes and Outcomes

Existing literature lends support for the inclusion of coping strategies as mediators between personal attributes and outcomes (Bolger & Zuckerman, 1995; Brothers & Maddux, 2003; Carver, Pozo, Harris, Noriega, Scheier, et al. 1993). Citing literature supporting linkages between optimism, self-views, and self-enhancement with downward social comparisons, reframing, self-disclosure, etc., Mancini & Bonanno (2009) suggest that the former markers of psychosocial resilience, represented by a single latent factor, directly predict selection of adaptive coping strategies, the latter of which can also represented by a single latent factor (Mancini & Bonanno, 2006; Helgeson & Taylor, 1993; Taylor, Wood, & Lichtman, 1983; Taylor & Armor, 1996). Of importance, the model

developed by Mancini & Bonanno (2009) proposes only a resilient pathway. That is, an alternative risk pathway is not included. Their resilient pathway, however, specifies a role for an adaptive coping factor to mediate the association between resilient resources and adaptive psychological outcomes in the context of loss.

Perhaps even more central to the current discussion is an investigation completed by Horner in 1998. In particular, she examined stress, personality, coping, and affective dimensions thought to influence health status in a sample of undergraduates. Her investigation is noteworthy for several reasons. In addition to the inclusion of a single personality factor, termed "vitality," her model incorporated two distinct coping factors, one thought to represent adaptive strategies and the other, maladaptive ones. Of significance, these coping factors mediated associations between personality and affective outcomes.

Horner's personality factor, vitality, was comprised of personality traits (neuroticism, extraversion, ego resiliency, locus of control, and hardiness). Consistent with Bolger & Zuckerman (1995) she proposed that personality would influence both perceived stress and coping selection. With respect to coping, Horner's distinct coping factors were labeled according to their composition as either emotion-focused or problem focused. These were then hypothesized to be associated with different affective (negative and positive) consequences.

As predicted, emotion focused coping mediated the association between vitality and positive affect (PAFF). However, contrary to predictions, emotion focused coping predicted elevations in PAFF. Problem focused coping mediated the association between perceived stress and affective outcomes; of note,

perceived stress was predicted by vitality. Consistent with hypotheses problem focused coping predicted greater positive affect, however, it was also associated with negative affect. Because affective findings were not entirely as expected Horner (1998) cites Bolger (1990) and Lazarus & Folkman (1984) in an effort to make some sense of the results. She suggested that though emotion focused coping was associated with short term elevations in positive affect, over time, this strategy may precipitate a downward spiral in which maladaptive coping and negative affect prevail. Similarly, problem focused strategies may be associated with temporary elevations in negative affect, along with positive affect, possibly because the individual remains intent on the stressor.

With these considerations in mind, it is improbable that the cross-sectional nature of Horner's data accurately captured adaptation to stress over time. Perhaps a longitudinal investigation such as the one proposed herein may offer insight into the process by which people adjust to stress. Still, Horner's model remains noteworthy for its inclusion of factors reflecting personality, and coping, along with results suggesting coping factors mediate associations between personality and affective consequences.

Applying a Bi-Dimensional Model of Risk and Resilience to Infertility

Existing research lends support for a bi-dimensional model of risk and resilience in the context of infertility. Specifically, coping strategies were uniquely associated with either distress or wellbeing, but not both in a sample of infertile Israeli women (Benyamini, et al. 2008). To the extent that investigators can incorporate personal attributes, coping strategies and outcomes in a model

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depicting adaptation to POI, interventions can be identified to bolster wellbeing and/or reduce distress.

A recent investigation suggested that trait like indicators are relevant constructs when considering adaptation to infertility (Mahajan, Turnbull, Davies, Jindal, Briggs, & Taplin, 2009). To assess wellbeing, these researchers administered the Fertility Adjustment Scale (Glover, Hunter, Richards, Katz, & Abel, 1999), a measure assessing levels of infertility related distress. Though employing standard regression rather than identifying constellations of indicators, it was determined that 49% of the variance in adjustment could be accounted for by intrapersonal variables, including relational attachment style, trait anxiety, neuroticism, traditional beliefs about parenting, locus of control, and intrinsic religiosity. By contrast, 29% of the variance was attributable to interpersonal measures (social support, marital satisfaction, life satisfaction, and sexual satisfaction). A more parsimonious approach might determine whether these intrapersonal and interpersonal measures converge on latent factors. Still, results are indicative of a salient role for both intrapersonal and interpersonal psychosocial factors in studies of adjustment to infertility.

The infertility literature identifies additional associations between individual psychosocial indicators and outcomes, along with coping and psychological outcomes. These associations highlight potentially resilient resources, as well as those that may be indicative of risk. High levels of optimism, self-esteem, and intrinsic religiosity, along with low levels of neuroticism, and helplessness have all been associated with psychological

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wellbeing and/or reduced distress in those with infertility (Litt, Tennen, Affleck, & Klock, 1992; Mahajan, et al. 2009; Schneider & Forthofer, 2005; Glover, et al, 1999). By contrast, perceived stigma, illness uncertainty and higher levels of both neuroticism and helplessness have been associated with greater psychological distress (Verhaak, Smeenk, Evers, van Minnen, Kremer, & Kraaimaat (2005); Davis, et al. 2010). Additional research reveals that the perception of children as necessary for marital completion and avoidant attachment are associated with maladjustment and constitute risk (Mahajan, et al. 2009).

Turning attention to coping strategies, positive reappraisal, goal reengagement, and goal disengagement have been associated with better adjustment in the context of infertility (Kraaij, et al. 2008; Davis, et al. 2010; Peterson, Newton, Rosen, & Skaggs, 2005; Litt, et al. 1992). Results with respect to planful problem solving and support seeking remain mixed with some investigations linking them to positive outcomes (Litt, et al. 1992) and others to poor ones (Benyamini, et al. 2008). Avoidance, distancing, rumination, catastrophizing and self-blame have been overwhelmingly associated with maladaptive outcomes, such as depression, negative affect, and infertility related stress (Morrow, Thoreson, & Penney, 1995; Kraaij, et al,, 2008; Bayley, Slade, & Lashen; 2009; Benyamini, et al. 2008). Thus, evidence suggests that adjustment to infertility relies, at least in part, on psychosocial indicators and coping. Moreover, some personality attributes and coping strategies appear to be associated with more adaptive outcomes than others.

As yet, limited empirical attention has been focused on the association between psychosocial indicators and coping selection, at least in the context of infertility. That said some preliminary evidence has been garnered. For women with infertility, research links psychosocial traits, like attachment, to coping selection in the prediction of emotional wellbeing and infertility related stress (Bayley, et al. 2009). Specifically, path analysis revealed that self-blame/avoidance mediates the association between attachment anxiety and outcomes in this population. In particular, results suggest that those high on attachment anxiety are likely to select avoidant strategies. This, in turn, was associated with greater distress and diminished well-being. Though this investigation does not include an analysis of factors per se', it suggests that coping selection mediates relations between psychosocial indicators and outcomes. Thus, some evidence for a pathway linking these constructs is indicated.

The proposed investigation endeavors to expand extant models (Mancini & Bonanno, 2009; Wright, et al. 2008; and Horner, 1998) while incorporating considerations from the general stress, mental health, and health threat literatures (Bolger & Zuckerman, 1995; Ryff & Singer, 1998; Keyes, 2005; Massé, et al. 1998; Benyamini, et al. 2008; Ryff, et al. 2006; Huber, et al. 2008; Brothers & Maddux, 2006; Brenner, et al. 1994). The present study will draw from this research to develop a bi-dimensional, multi-factor, longitudinal model of adaptation to POI. Specifically, latent factors representing personal attributes, coping and outcomes are proposed. These latent factors are thought to group into

a temporal and bi-dimensional model reflecting risk and resilient processes for women diagnosed with POI. Relevant indicators have been identified based upon the extant literature and justifications for their inclusion are offered below.

Resilient Resources

Using a well-validated measure of resilience, the Connor-Davidson Resilience Scale (CD-RISC) an investigation by Sexton, Byrd, & von Kluge (in press) studied a sample of women with infertility. This measure is comprised of several subscales reflecting personal resources such as tenacity/personal control, spirituality, emotional stability, adaptability, etc. Results revealed that infertile women reported resilience scores well below published norms. However, they further demonstrated that those reporting higher levels of resilient resources evidenced less distress, and engaged in more active coping. Of importance, the scales included in the CD-RISC are reflective of many of the resilient resources proposed herein

Resilient resources refer to a constellation of personal traits that are proposed to be protective in the context of POI. For present purposes, resilient resources are predicted to be optimism, self-esteem, mastery, and ego resiliency. All have been positively associated with wellbeing and/or adaptive coping. Optimism, psychological control/mastery, self-esteem (Taylor & Stanton, 2007) and ego resiliency (Pearlin & Schooler, 1978) have been identified as stable and protective individual difference variables that improve coping ability, minimize distress and maximize wellbeing in a variety of populations (Taylor & Stanton, 2007). Of particular relevance to the present investigation, a cluster of

psychosocial traits (optimism, mastery, and self-esteem) was associated with

positive mental health outcomes (Taylor, Lerner, Sherman, Sage & McDowell,

2003); thus, three of the four traits proposed to be indicative of trait resilience

have been successfully grouped together as adaptive predictors of wellbeing.

Optimism. A personality construct positively associated with adaptation

to stress in the general population, the presence of dispositional optimism has also

been associated with emotional wellbeing in women suffering from infertility

(Scheier & Carver, 1985; Litt, et al. 1992). Additionally, optimism was positively

associated with physical recovery and psychological adjustment (life satisfaction,

subjective well-being) following coronary bypass surgery (Scheier, Magovern,

Abbott, Matthews, Owens, Lefebvre, & Carver, 1989). Results of such studies

suggest that optimism may be implicated in both psychological and physical

wellbeing in the context of a health threat.

Turning attention to coping, Billingsley, Waehler, & Hardin (1993)

examined whether adjustment might be attributable to the coping strategies

selected by optimists. Acknowledging that some strategies are adaptive in the

context of controllable stressors (e.g. active coping) while others are deemed

adaptive in the context of uncontrollable stressors (emotion-focused coping),

these researchers asked participants to indicate how they "usually" respond to

stress. Thus, rather than assess situation specific coping, they requested a general

endorsement of respective strategies. In addition, these researchers were

interested in a measure of coping stability. Consequently, they administered

measures of optimism and coping at 2 separate times, 4 weeks apart. Their results

consistently suggest that optimists demonstrate a preference for active coping, behavioral disengagement, planning, positive reinterpretation, and seeking social support for emotional reasons. Of these 5, all but behavioral disengagement have been regarded as adaptive.

Among women confronting a health threat, optimism is associated with adaptive coping. For example, a 1998 investigation of women recovering from coronary bypass surgery revealed that those high in optimism were more likely to accept their situation and less likely to engage avoidant strategies than their less optimistic counterparts (King, Rowe, Kimble, & Zerwic, 1998). In sum, optimism's association with adaptive outcomes in the context of stress coupled with its fairly stable association with adaptive coping strategies lends support for this construct as an indicator of psychosocial resilience.

Self-Esteem. Described by Rosenberg (1965) as a favorable attitude toward the self, self-esteem has been associated with both adaptive outcomes and coping. Within the broader health threat literature and the more narrow body of infertility research, self-esteem has been associated with psychological adjustment (Schneider & Forthofer, 2005). Specifically, a 2 year longitudinal study of those undergoing infertility treatments revealed that for women, those with higher self-esteem at baseline showed diminished stress 24 months later. Such a study suggests that self-esteem may play an important role in adjustment over time.

In addition, self-esteem has been implicated in selection of coping strategies (Fickova & Korcova, 2000; Gibert & Strong, 1997). At present, few, if any, investigations identify direct associations between self-esteem and specific

coping techniques for those with infertility. However, several more general

studies suggest that those high on self-esteem tend to endorse selection of positive

thinking, seeking social support, and problem focused strategies (Fickova &

Korcova, 2000; Gibert & Strong, 1997). By contrast, those low on self-esteem

often select avoidant strategies and have demonstrated difficulty engaging

problem-focused techniques (Fickova & Korcova, 2000; Gibert & Strong, 1997)

Mastery. Mastery refers to an individual's confidence that he or she can

deal with a given situation, task, or challenge and influence outcomes. A 1986

investigation by Folkman, Lazarus, Gruen, & DeLongis examined the relative

contribution of personality, appraisal, and coping variables in relation to

psychological adjustment and somatic health. Personality variables included

mastery and interpersonal trust. Because personality constructs are thought to

precede appraisals and coping selection, these variables were entered first and

together accounted for 18 % of the variance in psychological adjustment as

measured by the Hopkins Symptom Checklist (HSCL; Derogatis, Lipman, Covi,

Rickels, &Uhlenhuth; 1970). Part correlations revealed that mastery, alone, was

significantly and negatively correlated with distress. Additional research suggests

that a low sense of control is associated with depression (Beck, 1967) while

elevated levels of control are associated with better psychological health (Haidt,

& Rodin, 1999).

An investigation of coping resources, strategies and adjustment with those

who suffer from asthma revealed a significant association between mastery and

health related quality of life. Specifically, lower levels of mastery predicted

diminished health related quality of life (Hesselink, et al. 2004). Of additional note, in a sample of patients diagnosed with cardiac disease, pre-morbid mastery was found to be inversely related to depressive symptoms and anxiety one year later (van Jaarsveld, Ranchor, Sanderman, Ormel, & Kempen, 2005). Based upon the aforementioned literature, it appears that mastery has been associated with better psychological outcomes in general populations and in those confronting a health threat.

   Ego resiliency. Ego resiliency can be defined as a "dynamic capacity to contextually modify one's level of control in response to situational demands or affordances." Put more simply, it is the extent to which an individual can flexibly adapt in the context of positive and negative stressors. A 1997 investigation probing physiological and state psychological responses revealed that ego resiliency was associated with lower physiologic reactivity under both stressful and control conditions (Spangler, 1997). In addition, this construct was associated with lower post stressor reports of anxiety, suggesting that ego resiliency is associated with the ability to quickly "down-regulate emotional excitation." Such findings suggest that ego resiliency may be indicative of diminished susceptibility to stress, which certainly has implications for wellbeing. Additional experimental research reveals that ego resiliency was associated with quicker adaptation to task demands as measured by affective recovery in the context of an anticipated, but unrealized threat (Waugh, Fredrickson, & Taylor, 2008).

   A similar investigation revealed that ego resiliency was negatively associated with activation in the anterior insula (Waugh, Wager, Fredrickson,

Noll, & Taylor, 2008). This is significant because activity of this brain region is augmented in anxious persons (Simmons, Strigo, Matthews, Paulus, & Stein, 2006). Specifically, those high on the trait evidenced activation only when exposed to aversive photographs, whereas those low on the trait evidenced activation in the context of aversive AND neutral pictures (Waugh, et al. 2008). Results suggest that those high on ego resiliency may more "appropriately adjust the level of emotional resources needed to meet the demands of the situation (p. 322)." Additionally, optimism was also found to predict insula activation, and in a manner consistent with ego resiliency (Waugh, et al. 2008). Acknowledging this, both traits were simultaneously entered into a regression equation predicting activation. Interestingly, each trait explained variance. This suggests that a "metaconstruct of resilience" might include optimism along with ego resiliency. Consequently, it appears that ego resiliency may appropriately converge with the aforementioned traits to create a factor indicative of resilient resources.

Risk

Risk, too, is comprised of convergent indicators. However, these indicators are thought to convey vulnerability in the context of POI. Based upon observed associations with coping and/or psychological outcomes, neuroticism, need for parenthood, perceived stigma and illness uncertainty are thought to converge to represent a risk factor.

Neuroticism. Neuroticism has been associated with maladaptive outcomes in various domains. As highlighted earlier, higher levels of neuroticism predict greater exposure to and reactivity to stress (Bolger & Zuckerman, 2005). In

addition, this trait has been associated with elevated levels of depression in both physically healthy (Hirschfeld, Klerman, Lavori, Keller, Griffith, & Coryell, 1989; Krueger, Caspi, Moffitt, Silva, & McGee, 1996) and unhealthy populations (van Jaarsveld, et al. 2005). With respect to the latter, a recent longitudinal investigation of those with cardiac disease revealed that pre-morbid levels of neuroticism were associated with short term (6 weeks) and long term (1 year) elevations in depression and anxiety following diagnosis (van Jaarsveld, et al. 2005). Such findings suggest that pre-existing levels of this trait may be salient constructs in the adjustment to a health threat.

With respect to coping, Bolger & Zuckerman (1995) suggested that those high on neuroticism engaged a wider range of coping strategies, but they did so with diminished effectiveness. Moreover, in the context of stress, high levels of neuroticism have been widely associated with the selection of avoidant coping strategies including behavioral disengagement, wishful thinking, self-blame, avoidance, and venting, indecisiveness, passivity, and hostile reactions all thought to be maladaptive (McCrae & Costa, 1986; O'Brien & DeLongis, 1996; Watson & Hubbard, 1996; Bolger, 1990). Of note, in their 1986 investigation McCrae & Costa revealed that these coping strategies were minimally effective in reducing distress, suggesting that those high in neuroticism tend to select strategies that are of limited usefulness.

Need for parenthood. Women who believe children are critical for marital adjustment have demonstrated diminished ability to adapt to infertility (Mahajan, et al. 2009). Moreover, those women most motivated to be parents

were found to be more distressed prior to IVF relative to those who were less motivated; these women also evidenced a greater negative reaction following IVF failure (Newton, Hearn, Yuzpe, Houle, 1992). The development of the Fertility Problem Inventory yielded a subscale reflecting traditional parenting attitudes (Newton, Sherrard, & Glavac, 1999). Scores on this subscale have been positively associated with depression and anxiety (Newton, et al. 1999). Taken together, these findings suggest that traditional parenting attitudes may constitute vulnerability for those confronting infertility.

Research examining gender roles may lend support for this assertion. Women reporting more masculine and/or androgynous traits were found to cope better with their infertility than women who self-reported more traditionally feminine traits (Adler & Boxley, 1985). Though as yet unstudied, it may be the case that those who are more androgynous place less emphasis on the need for parenthood. Accordingly, they may find it easier to disengage from the goal of getting pregnant or to engage alternative ones.

Stigma. Research in the broader health and mental health domains has revealed that perceived stigma has been associated with diminished wellbeing and maladaptive coping in mental health population (Slade, O'Neill, Simpson, & Lashen, 2007; Panter, 2004; Kleim, Vauth, Adam, Stieglitz, Hayward, & Corrigan, 2008; Davis, et al. 2009). In particular, a 2004 investigation of epileptics suggests that greater perceived stigma was inversely related to measures of mental and physical quality of life (Panter, 2000). Moreover, elevated levels of perceived stigma in those suffering from schizophrenia have been associated with

lower reported self-efficacy. Turning attention to infertility, evidence does suggest that higher rates of perceived stigma have been associated with greater distress (Davis, et al. 2009; Slade, et al. 2007). Moreover, a sample of infertile women from Southern Ghana revealed that perceived stigma was associated with increased levels of infertility related distress (Donkor, & Sandall, 2007). And finally, a qualitative study probing the experience of women coping with infertility revealed that perceived stigma is frequently endorsed (Gonzalez, 2000).

A relative dearth of investigations explores associations between perceived stigma and coping. Those that do exist typically report on psychiatric populations. For example, perceived stigma accounted for a significant amount of variance in the coping strategy known as withdrawal (Kleim, et al. 2008). It has also been associated with behavioral avoidance (Perlick, Rosenheck, Clarkin, Sirey, Salahi, Streuning, et al. 2001). Both coping strategies are widely accepted to be maladaptive.

Illness uncertainty. Illness Uncertainty refers to characteristics of the disease situation including perceptions of ambiguity, unpredictability, inconsistency and/or a general lack of information (Mishel, 1981). This variable has consistently been associated with poor psychological outcomes in a variety of domains, including chronic pain (Reich, Johnson, Zautra, & Davis, 2006), multiple sclerosis (Mullins, Cote, Fuemmeler, Jean, Beatty, & Paul, 2001), asthma (Hommel, Chaney, Wagner, White, Hoff, & Mullins, 2003), diabetes (Hoff, Mullins, Chaney, Harmant, & Domek, 2002) and POI (Davis, et al. 2009). Higher levels of illness uncertainty have been associated with depression, anxiety,

tension, and anger (Hommel, et al. 2003; Reich, et al. 2006; Hoff, et al. 2002;

Mullins, et al. 2001; Davis, et al. 2009). In addition, in the context of pain, cross-

sectional analyses reveal that this construct has been associated with increases in

coping difficulty (Johnson, Zautra, & Davis, 2006). It has also been positively

associated with the selection of avoidant coping and found to be unrelated to

approach strategies (Reich, et al. 2006). Furthermore, longitudinal analyses by

these same researchers, indicate that illness uncertainty interacts with pain to

predict lower levels of positive affect, a finding that suggests this construct may

be a salient indicator of affective adjustment

Coping Strategies

Efforts to study adaptation in the context of stress have lent considerable

energy to the task of identifying adaptive and maladaptive coping strategies.

Generally, problem-focused strategies are heralded as beneficial and emotion

focused ones as harmful. However, a great deal of controversy regarding the

utility of emotion focused strategies remains. This may be, in part, because

emotion-focused coping is not consistently defined.

A 2004 manuscript by Austenfeld and Stanton carefully critiqued

discrepancies in the use and definition of emotion focused coping. Comparing the

three most commonly utilized measures of coping, Carver, & Scheier's COPE

(1989), Lazarus & Folkman's Ways of Coping Scale (WOC; 1985), and Endler &

Parker's Coping Inventory for Stressful Situations (CISS; 1990) these researchers

highlighted inherent inconsistencies that have made it difficult to draw

conclusions, and perhaps, have led to erroneous assumptions about emotional

coping strategies. Despite overwhelming evidence suggesting that emotion focused coping is maladaptive, these researchers critique this assumoption. In fact, citing Carver, Scheier, & Weintraub (1986) they point out that many markers of emotion focused coping are actually inversely correlated. Moreover, Austenfeld & Stanton (2004) remind the reader that many of the investigations of emotion focused coping include corrupted measures of the construct rather than previously validated ones, and may thus contribute to erroneous conclusions about the utility of emotion focused coping.

Stanton, Danoff-Burg, Cameron, & Ellis (1994) proposed a need to parse "self-deprecating and emotional distress" items from those emotional items more indicative of "acknowledging, processing." They tested this assertion. Results revealed that efforts to approach emotions through processing and expression, strategies they classified as emotional approach coping (EAC) were adaptive. Later investigations by a myriad of researchers lent credibility to this conclusion and revealed positive correlations between EAC and problem-focused strategies (Stanton, Danoff-Burg, Cameron, Bishop, Collins, & Kirk, et al. 2000a; Stanton, Kirk, Cameron, & Danoff-Burg, 2000b). Of further significance, they noted that EAC was found to be uncorrelated with avoidant strategies (Stanton, et al. 2000a; Stanton, et al. 2000b). An earlier study examining the lone construct of emotional processing in conjunction with personal traits in undergraduate women suggests that this strategy is positively associated with self-esteem and negatively associated with neuroticsm (Jack & Dill, 1992). Moreover, emotional processing

was found to correlate negatively with depression and anxiety (Stanton, et al. 2000b).

Investigations of EAC in medical samples suggest that this strategy is beneficial. When compared with the more self-deprecating/distressing emotion focused strategies (e.g. wishful thinking, venting, avoidance, self-blame, etc) EAC was associated with wellbeing among those with myofascial pain (Smith, Lumley, & Longo, 2002). The more self-deprecating strategies, by contrast, were associated with greater negative affect. As Austenfeld & Stanton (2004) suggested, this lends credibility for the utility of some forms of emotional coping. In addition to predicting adaptive adjustment in chronic myofascial pain, EAC has been found to be beneficial for couples who have unsuccessfully completed an artificial insemination procedure for infertility (Berghuis & Stanton, 2002). Specifically high endorsement of EAC prior to insemination predicted better adjustment after the failed attempt.

In addition to the arguments offered by Austenfeld & Stanton (2004) it is possible to imagine that seeking emotional support may be beneficial, especially for someone who wishes to discuss problem solving or to process information/feelings in the context of a supportive exchange. Moreover, strategies like acceptance and positive reinterpretation have both been categorized as emotion focused strategies, yet they often involve cognitive restructuring which have been associated with improved psychological outcomes in several investigations of varied health populations including infertility (Felton, Revenson, Hinrichsen, 1984; Knibb, & Horton, 2008, Kraai, Garnefski, &Shroevers, 2009).

Turning attention to problem-focused coping, the literature overwhelmingly suggests that these strategies are most beneficial in situations where the stressor is controllable (Folkman, Schaefer, & Lazarus, 1979). That said, research on coping in those confronting a health threat appears to suggest that strategy selection may be independent of the perceived controllability of the condition. In fact, a 1984 study of adults suffering from diabetes mellitus, hypertension, cancer, and rheumatoid arthritis revealed that cognitive restructuring and information seeking were associated with greater positive affect (Felton, et al. 1984). By contrast, strategies typified by emotional avoidance/distress/deprecation (e.g. wishful thinking and self-blame) were predictive of greater negative affect. Despite the potential for varying degrees of controllability among these health conditions, no differences were observed across diagnosis in terms of coping preferences or their associations with positive and negative affect.

Perhaps classification as adaptive depends less on categorization as problem or emotion focused and more on distinctions between approach and avoidance/passivity. By definition, active coping strategies are those that typify efforts to confront or deal with the stressor whether it be through problem-solving, goal adjustment, seeking support (emotional or instrumental), and processing emotion; these are generally acknowledged to be more adaptive than more passive or avoidant strategies (Li, 2008; Yi- Frazier, Smith, Vitaliano, Yi, Mai, Hillman, et al. 2009). By contrast, passive and avoidant coping include such

things as denial, withdrawal, substance use, venting, self-blame, and wishful thinking.

In the context of infertility, EAC strategies (Berghuis & Stanton, 2002) and emotionally relevant cognitive restructuring techniques (e.g. positive reappraisal) have been associated with better psychological adjustment (Kraaij, et al. 2009). Moreover, additional approach oriented strategies such as goal adjustment, planning and support seeking have been associated with adaptation in the context of infertility (Berghuis, & Stanton, 2002; Davis, et al. 2009; Litt, et al. 2002). Emotionally self-deprecating/distressing and avoidant strategies such as self-blame, avoidance, distancing, rumination and catastrophizing have all been associated with poor psychological outcomes (Morrow, et al. 1995; Kraaij, et al. 2008; Bayley, et al. 2009).

Recent research with an infertility sample has set up an alternative coping conceptualization, one that is not entirely consistent with the findings highlighted above (Benyamini, et al. 2008). Notably these researchers establish a precedent for identifying coping meta-constructs in this population. Analyses were based on cross-sectional data and were empirically rather than theoretically derived. Three coping factors were identified: spouse involvement (recruiting spousal support), approach/avoidance (e.g., denial, self-blame, positive reinterpretation) and practical management (investing in self, hope, planning/information seeking, spiritual coping). Rather than identifying distinct approach (adaptive) and avoidant (maladaptive) factors, these strategies converged on the same factor but were distinctly associated with outcomes.

For example, constructs loading on the approach/avoidance factor were classified as either emotionally self-deprecating strategies (denial) or problem appraisal strategies (positive reinterpretation); the former were associated with greater distress and the latter with greater wellbeing. Those constructs loading on practical management were classified as reflective of problem management (seeking information or social support, planning) and emotional approach (self-nurturing); here again, these respectively predicted greater distress and greater well-being. Rather than engaging a theoretically driven investigation identifying factors indicative of risk and resilience, each factor contains protective strategies and strategies that convey vulnerability. Moreover, it might be argued that each factor includes approach oriented strategies; thus the classification of latent constructs is confusing. Because the factors were empirically derived these researchers acknowledged the possibility that alternative factor structures may be possible.

Integrating the aforementioned literature, a discrepancy emerges. Specifically, in the context of infertility, planning and support seeking have been identified as adaptive in some studies (Litt, et al. 1992; Berghuis & Stanton, 2002) and maladaptive in others (cite; Benyamini, et al. 2008). In order to address this inconsistency, competing coping conceptualizations are postulated. Both endeavor to identify bi-dimensional coping factors each uniquely comprised of either adaptive or maladaptive strategies. The first conceptualization is consistent with the theoretical argument that planning and support seeking are approach oriented. Moreover, provided that support seeking is centered on garnering

instrumental assistance or processing/expressing emotion, these strategies are helpful in the context of infertility (Berghuis & Stanton, 2002). In fact, the measure of support seeking included in the present analysis is consistent with this description. Accordingly, a single adaptive factor is hypothesized to be comprised of more approach oriented strategies whether they are emotional or problem-focused in nature. Thus, benefit finding/positive reinterpretation, goal disengagement, goal reengagement, planning and support seeking are apt to converge to predict wellbeing, but not distress. In addition, a maladaptive coping factor is postulated to be comprised of emotionally self-deprecating strategies such as self-blame, along with avoidance, and substance use; these will predict distress but not wellbeing.

The alternative conceptualization also postulates bi-dimensional coping factors, again comprised of adaptive strategies and the other of maladaptive ones. However, consistent with the findings of Benyamini, et al. (2008), which were not theoretically derived, planning and support seeking are expected to converge on the maladaptive factor. A factor structure consistent with this framework would yield a latent adaptive construct comprised of benefit finding/positive reinterpretation, goal disengagement and goal re-engagement. Because these strategies require the ability to flexibly adjust thoughts and goals such a construct might be classified as flexible coping. The alternative factor might then be comprised of avoidance, self-blame, substance use, planning and support-seeking. Because the factor structure identified by Benyamini, et al. (2008) was not

theoretically grounded, the underlying latent construct representing such a constellation remains elusive.

Summary and Specific Hypotheses

For those confronting a chronic health threat, the literature points to personal attributes as salient predictors of psychological adjustment (Brenner, et al. 1994; Brothers & Maddux, 2003); additional research suggests that coping may mediate these associations (Bolger & Zuckerman, 1995; Brothers & Maddux, 2003; Mancini & Bonanno, 2009; Horner, 1998). Although much of the empirical focus has been on distress as the primary indicator of adjustment, accruing evidence suggests that adjustment may be conceptualized not as a single bipolar dimension, but as two distinct bivariate dimensions referred to as wellbeing and distress (Ryff & Singer, 1998; Keyes, et al.2005; Huber, et al.2008; Smith & Zautra, 2008; Benyamini, et al. 2008). Some investigators have made a case for identifying separable individual difference factors reflective of resilient resources (Mancini & Bonanno, 2009; Horner, 1998), while others have advocated identifying two separate individual difference factors reflective of both resilient resources and vulnerability factors (Wright, et al. 2008; Smith & Zautra, 2008). It has been suggested that these factors differentially contribute to markers of wellbeing and distress (Mancini & Bonanno, 2009; Horner, 1998; Smith & Zautra, 2008). Coping mediates the associations between individual difference factors and psychological adjustment (Bolger & Zuckerman, 1995; Brothers & Maddux, 2003), and recent models of coping have highlighted the potential utility of

identifying distinct factors comprised of adaptive (Mancini & Bonanno, in press; Horner, 1998) and maladaptive coping (Horner, 1998).

Few longitudinal investigations have explored the processes by which individuals adapt to a chronic health threat over time. Consequently, the current study drew on longitudinal data collected over one year to investigate the process by which women with premature ovarian insufficiency (POI) adapted to biological childlessness following cessation of infertility treatments. Utilizing self-report psychosocial measures at three time points, a model of adaptation was proposed (See Figure 1).

Within the context of infertility, the current study aimed first to identify latent factors comprised of measures indicative of baseline vulnerability and resilience (Time 1), measures of adaptive and maladaptive coping four months later (Time 2), and measures of distress and wellbeing at one year follow up (Time 3). Thus, six factors were hypothesized: resilient resources and vulnerability factors, adaptive and maladaptive coping, and distress and wellbeing. Once identified, the resilient resources and vulnerability factors at Time 1 were expected to predict differential use of adaptive and maladaptive coping strategies at Time 2, and different outcomes at Time 3. Consistent with the diathesis-stress theory, a constellation of pre-existing resilient resources was expected to predict both adaptive coping and indices of well-being, whereas a constellation of traits indicative of vulnerability was expected to predict both maladaptive coping and distress.

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Hypotheses were based on relations between psychosocial indicators, coping, and outcomes in the extant literature. The specific hypotheses tested in the current project were as follows:

1) Separate factors indicative of resilient resources and psychosocial vulnerability were proposed to emerge at the Time 1 assessment. Indicators of vulnerability were predicted to be neuroticism, need for parenthood, perceived stigma, and illness uncertainty. Resilient resources were predicted to be optimism, self-esteem, mastery, and ego resiliency.

2) Two competing conceptualizations of maladaptive coping at Time 2 were proposed.

   Hypothesis A: Avoidance, substance use, and the emotionally self-deprecating strategy of self-blame were predicted to load on a latent factor (See Figure 1).

   Hypothesis B: Avoidance, substance use, self-blame, planning, and support seeking were proposed to load on a single maladaptive factor (See Figure 2).

3) Two competing conceptualizations of adaptive coping were proposed.

   Hypothesis A: Planning, benefit finding, goal re-engagement, goal disengagement and support seeking were expected to load on a latent factor (See Figure 1).

   Hypothesis B: Benefit finding, goal reengagement and goal disengagement were predicted to load on a single adaptive factor (See Figure 2).

4) Separate factors indicative of distress and wellbeing were predicted to emerge at Time 3. Negative affect, depression, and anxiety were expected to load on one latent factor, and positive affect and purpose in life were expected to load on a second factor.

5) Time 1 psychosocial vulnerability was expected to predict Time 2 maladaptive coping, and Time 1 resilient resources were expected to predict Time 2 adaptive coping.

6) Time 1 psychosocial vulnerability was expected to predict Time 3 distress, and Time 1 resilient resources were expected to predict Time 3 wellbeing.

7) Maladaptive coping was hypothesized to mediate the association between psychosocial vulnerability and distress.

8) Adaptive coping was predicted to mediate the association between resilient resources and indices of well-being.

Method

Participants

One hundred and two women between the ages of 18 and 42 ($M = 32$ years old) were enrolled in the investigation. To be eligible for participation, women had to report that they experienced amenorrhea (menstrual irregularity) for a period lasting at least 4 months prior to age 40. Furthermore, in all cases, this amenorrhea was associated with two follicle stimulating hormone (FSH) serum levels (taken at least one month apart as part of screening for study eligibility) in the menopausal range. Participants with POI resulting from surgery, radiation, chemotherapy, and/or karyotype abnormalities were excluded

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from the study. In addition, at the time of baseline assessment, participants had to report that they had abandoned infertility treatments. The average age at POI diagnosis in the sample was 28 years, which was an average of 41 months prior to study enrollment. Demographic characteristics of the sample are provided in Table 1. An additional 60 healthy age matched controls were also recruited and assessed at Time 1as a convenience sample, however, the focus of this investigation remains centered on the sample with POI.

Participants were recruited via published and internet advertisements between June 2005 and February 2006. Of the 102 POI participants originally included in the "baseline data collection" at Time 1, 86 women completed the Time 2 assessment at month 4 and 80 women completed the Time 3 assessment at month 12.

Procedure

Participants were enrolled in a 12-month longitudinal investigation to assess indicators of psychosocial adjustment, coping strategies and emotional wellbeing in women suffering from 46,XX POI. Participants completed a battery of questionnaires at four separate intervals (baseline, 4, 8, and 12 months). For the current study, only baseline, month 4, and month 12 responses were utilized. Measures of psychosocial traits/attitudes assessed at baseline (Time 1), coping strategies measured at month 4 (Time 2), and outcomes measured at month 12 (Time 3) were included in analyses.

Baseline Assessment. At baseline, participants were administered self-report assessments designed to assess dimensions of personality and psychosocial

beliefs/attitudes. These included measures of neuroticism (John, 1990), optimism (Scheier, Carver, & Burgess, 1994), illness uncertainty (Mishel, 1981), perceived stigma (Lennon, Link, Marbach, & Dohrenwend, 1989), self-esteem (Rosenberg, 1989), ego resiliency (Block & Kremen, 1996), perceived mastery (Pearlin & Schooler, 1978) and need for parenthood (Newton, et al. 1999). Measures of depression (Radloff, 1977), anxiety (Spielberger, Gorusch, & Lushene, 1983), affect (Watson, Clark, & Tellegen, 1988), purpose in life (Ryff, & Keyes, 1995), coping (Carver & Scheier, 1989; Wrosch, Scheier, Miller, Schulz, & Carver, 2003; Antoni, Lehman, Kilbourn, Boyers, Culver, Alferi, et al. 2001) and adjustment to infertility (Newton, et al. 1999) were also completed. Furthermore, self-report assessments of social support (ISEL), and coping (Carver & Scheier, 1989) were administered.

Four Month Assessment. Four months following the baseline assessment, participants were again asked to complete a packet of self-report questionnaires. These measures assessed their propensity to utilize varied coping strategies to manage their POI, including planning, self-blame, avoidance, substance use, and emotion focused coping (Carver, & Scheier, 1989), along with benefit finding (Antoni, et al. 2001) and goal reengagement (Wrosch, et al*,*, 2003). Measures of depression, anxiety, affect, infertility-related distress, and purpose in life were again administered.

Twelve Month Assessment. One year following study initiation, participants completed self-report assessments of depression (Radloff, 1977), anxiety (Spielberger, et al.1983), purpose in life (Ryff, & Keyes, 1995), positive

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and negative affect (Watson, et al. 1988), and adjustment to biological childlessness (Newton, et al. 1999). Additionally, measures of coping were again administered.

Measures

A complete list of the scales utilized, including the number of items, response scale ranges, sources, and reliabilities, is available in Table 2. A complete list of study measures and items, including response scales, can be found in Appendices A through C.

Optimism. Dispositional Optimism was assessed via the Life Orientation Test-Revised (LOT-R; Scheier, et al. 1994). The scale includes 6 items such as *"In uncertain times, I usually expect the best,"* and *"I'm always optimistic about my future."* Participants reported the extent to which they agreed with items using a 5 point Likert Scale ranging from *1"disagree strongly"* to *5 "agree strongly."* The internal consistency for this sample as measured by Cronbach's alpha was 0.82.

Neuroticism. Neuroticism was assessed using 8 of the 12 neuroticism items from John's (1990) Big 5 inventory. This subscale is comprised of items such as *"I see myself as someone who can be moody," "I see myself as someone who can be tense,"* and *"I see myself as someone who gets nervous easily."* Participants endorsed the extent to which they agreed with these statements on a 5-point scale ranging from 1 *"disagree strongly"* to 5 *"agree strongly."* Cronbach's alpha for this sample was 0.80.

Illness uncertainty. Illness uncertainty was measured using the Mishel Uncertainty in Illness Scale (Mishel, 1981). This instrument was adapted for use with this sample. Specifically, only 14 of the original 23 original items were applicable. Questions about symptoms or treatments that are not relevant for POI were excluded. The 14 item, self-report measure included items such as *"I don't know what is wrong with me,"* and *"Because of the unpredictability of my condition, I cannot plan for the future."* Items were rated on a 5-point Likert scale ranging from 1 *"Strongly Disagree"* to 5 *"Strongly Agree."* Cronbach's alpha for this sample was 0.87.

Stigma. To assess perceived stigma, the Lennon Stigma Scale (Lennon, et al. 1989) was modified to refer specifically to POI by including the following stem: *"Now that I have been diagnosed with POI."* The original scale is comprised of several distinct subscales, including personality problems, estrangement, and secrecy. Because the 5- item estrangement subscale was thought to be the most salient measure of perceived stigma for this population, only this subscale was included. The estrangement subscale includes items such as *"Having this condition has made me feel different from other people,"* and *"I often feel totally alone with my condition."* Items were rated using a 6-point Likert scale, ranging from 1 *"Strongly Disagree"* to 6 *"Strongly Agree;"* they reflected the extent to which participants endorsed feeling stigmatized by their condition. Cronbach's alpha for this sample was 0.78.

Self-esteem. To assess personal evaluations of self-worth, the 10 item Rosenberg Self-Esteem scale was administered (Rosenberg, 1989). Using a 4

point-Likert scale, participants endorsed the extent to which they agreed with 10 statements. Scores for each statement ranged from 1 *"Strongly Disagree"* to 4 *"Strongly Agree."* Examples of items included *"I feel that I am a person of worth, at least on equal plane with others," "I take a positive attitude toward myself,"* and *"I feel that I do not have much to be proud of."* Negatively valenced items were reverse scored, and all items were then summed to obtain a measure of self-esteem. Cronbach's alpha for this sample was 0.88.

Ego resiliency. The Ego Resiliency Scale measures the extent to which individuals adaptively respond to situational demands, both positive and negative (Block & Kremen, 1996). Using a 4-point Likert scale ranging from 1 *"does not apply at all"* to 4 *"applies very strongly,"* participants reported their level of agreement with 14 different statements. The measure is comprised of items such as *"I quickly get over and recover from being startled"* and *"I usually think carefully about something before acting."* Cronbach's alpha for this sample was 0.80.

Mastery. Perceived mastery was assessed using the 7-item Mastery scale developed by Pearlin & Schooler (1978). The measure includes items such as *"There is really no way I can solve some of the problems I have,"* and *"What happens to me in the future mostly depends on me."* Scores range from 1 *"not at all like the way I have been feeling"* to 4 *"very much like the way I have been feeling."* Negatively valenced items were reverse scored and a summary score was then taken so that higher values reflected greater perceived mastery. Cronbach's alpha for this sample was 0.78.

Need for parenthood. Attitudes toward parenting were captured using the Need for Parenting subscale from the Fertility Problem Inventory (Newton, et al. 1999). This scale is comprised of 10 items and measures the extent to which parenting is central to an individual's identity. This subscale includes items such as *"For me, being a parent is a more important goal than having a satisfying career,"* and *"Pregnancy and childbirth are the two most important events in a couple's relationship."* Participants endorsed the extent to which they agreed with these statements using a 6 point scale where 1 meant "*strongly disagree"* and 6 meant *"strongly agree."* Cronbach's alpha for this sample was 0.88.

Coping. Coping preferences were assessed with 19 items selected from subscales of the Brief COPE (Carver, & Scheier, 1989). Participants were asked to indicate the extent to which they have utilized a variety of coping mechanisms in the time since they were diagnosed with POI. Items included *"I talk to someone about how I feel," "I've been criticizing myself"* and *"I use alcohol and/or drugs to make myself feel better."* Scores on each item ranged from 0 "*not at all"* to 3 *"a lot of the time."* Items were included from the following subscales: planning coping (k=4 items), support seeking (instrumental and emotional; k=7 items), substance use (k=4 items), avoidance (k=2 items) and self-blame (k=2 items). Cronbach's alpha for the former three subscales were 0.88, 0.90, and 0.92, respectively. Because the latter two scales are each comprised of only two items, Pearson correlations were calculated to assess internal consistency reliability. They were as follows: avoidance $r = 0.53$, and self-blame $r = 0.37$.

Benefit finding. Benefit finding was assessed with the 16-item developed by Antoni and colleagues (Antoni, Lehman, Kilbourn, Boyers, Culver, Alferi, et al. 2001) amended to reflect the ability to positively reframe adversity in the context of POI. Responses on items ranged from 1 *"not at all"* to 5 *"extremely."* Items included statements such as *"having POI has led me to be more accepting of things"* and *"having POI has helped me become more aware of the love and support available from other people."* Cronbach's alpha for this sample was 0.95.

Goal flexibility. Goal flexibility was measured using the Goal Disengagement and Reengagement Scales (Wrosch, Scheier, Miller, Schulz, & Carver, 2003). The instrument was modified to specify pregnancy as the goal. The goal reengagement scale (k=6) is comprised of items such as *"I put effort toward other meaningful goals"* and *"I think about other new goals to pursue."* The goal disengagement scale (k=4) reflects the tendency to abandon unattainable goals. Items include *"It's easy for me to reduce my efforts toward the goal,"* and *"I find it difficult to stop trying to achieve the goal."* Participants endorsed the extent to which they agreed with these statements utilizing a 5-point Likert scale. Responses ranged from 0 *"Not true at all"* to 4*"True nearly all of the time."* Cronbach's alpha was 0.95 for goal reengagement and 0.91 for goal disengagement.

Depression. Depression was measured using the 20-item Center for Epidemiological Studies Depression Scale (CESD; Radloff, 1977), and included symptoms such as "loneliness," "sadness," and "hopelessness." Participants indicated how frequently they experienced each symptom over the prior week

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using a 4-point scale, ranging from 0 *"Rarely, or none of the time (less than one day)"* to 3 *"Most or all of the time (5-7 days)."* Scores on this measure were computed by summing scores across items. Cronbach's alpha for this sample was 0.91.

Anxiety. Anxiety was measured using the 20-item state anxiety subscale of the State Trait Anxiety Inventory (STAI; Spielberger, Gorusch, & Lushene, 1983). Participants rated the extent to which they felt anxious or calm at the present moment on a scale ranging from 0 *"Not at all"* to 3 *"Very much so."* Items were scored so that higher scores reflect higher anxiety. Cronbach's alpha for this sample was 0.94.

Positive and negative affect. The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) was utilized to measure the two primary emotional dimensions: positive and negative affect. This 20-item self-report instrument yields both a positive affect (PAFF; k=10) score and a negative affect (NAFF; k=10) score. The PAFF scale comprises mood states such as "active," "enthusiastic," "interested," and "excited." By contrast, the NAFF scale is represented by states such as "blue," irritable," "hostile," and "distressed." Items were rated using a 5-point scale ranging from 1 *"Very slightly/Not at All,"* to 5 *"Extremely"* and reflected the extent to which participants endorsed each mood state over the prior month. Responses were then summed to yield scores for PAFF and NAFF. Cronbach's alpha in the sample was 0.93 for PAFF and 0.87 for NAFF.

Emotional wellbeing. Emotional wellbeing was assessed using the 9-item

Purpose In Life (PIL) subscale from the Positive Mental Wellbeing Inventory

(Ryff, & Keyes, 1995). Items included statements such as *"I tend to focus on the*

present because the future nearly always brings me problems" and *"I don't have*

a good sense of what it is I'm trying to accomplish in life," scored on a 6-point

Likert scale. Responses ranged from 1 *"Strongly Disagree"* to 6 *"Strongly*

Agree." Cronbach's alpha for this sample was 0.85.

Data Analysis

First, distributional properties of all study variables were examined in

SPSS Version 19.0 to evaluate deviations from normality. Skew and kurtosis

values greater than 2 and 7, respectively, are widely acknowledged to be

problematic for maximum likelihood estimation in Structural Equation Modeling

(SEM), in part because they can lead to inflation of the chi-square test of model fit

and also underestimation of standard errors of loadings (West, Finch, & Curran,

1995). Next, intercorrelations among study variables were calculated and

reported.

To identify latent factors of psychosocial vulnerability, resilient resources,

maladaptive coping, adaptive coping, distress and wellbeing, a series of

Confirmatory Factor Analyses (CFAs) were estimated with full information

maximum likelihood estimation (FIML) with MPLUS 6.0 (Muthen & Muthen,

2010); FIML permits estimation of parameters in the presence of missing data

(Enders, 2001). Chi-square tests of fit were examined. Because this particular

test is a positive function of sample size, fit indices are simultaneously used to

evaluate the model. For the present analyses, both goodness and badness of fit indices are included with results. Specifically, the Comparative Fit Index (CFI; Bentler, 1990), Root Mean Square Error of Approximation (RMSEA; Steiger & Lind, 1980; Steiger, 1980), and Standardized Root Mean Square Residual (SRMR; Joreskog & Sorbom, 1981; Bentler, 1995) are reported. CFI is a goodness of fit index in that larger values indicate better fit; CFI has a maximum of one. By contrast, SRMR and RMSEA represent badness of fit in that larger values represent worse fit; both indices have a minimum of zero.

These particular indices were selected because they tend to be sensitive to model misspecification. It is important to note, however, that RMSEA and CFI can be unreliable with sample sizes less than 200 (Curran, Bollen, Chen, Paxton, & Kirby, 2003). Because the present sample is small (n=102), ambiguity among the three indices prompted strongest consideration of SRMR when interpreting model fit. CFI values greater than .95, RMSEA values equal to or less than .06 and SRMR values less than or equal to .08 were considered to reflect good fit (Hu & Bentler, 1999).

Correlations between factors were estimated and examined to determine whether the factors represented separable constructs (e.g., is the psychosocial vulnerability factor distinct from resilient resources?). Where possible, chi-square difference tests were utilized to compare nested models (i.e., one factor versus two factor models containing the same variables). Once a decision was reached as to whether a single factor or a multiple factor representation of a construct was

more appropriate, composites or scale scores were calculated and then included in regression models that tested meditational hypotheses (i.e., Hypotheses 8 and 9).

Composites were formed first by standardizing each of the relevant indicators. That is, the total scores for each measure (e.g. optimism, perceived mastery) were standardized. When composites represented indicators of similar valence (i.e., with loadings of the same sign), standardized scores were then added together to represent each latent construct. An alternative method was utilized in the single instance when constructs included indicators of both positive and negative valence (e.g., two positive loadings and one negative). Under these circumstances, items were recoded before standardizing so that higher scores reflected better adaptation. These standardized values were then summed to form a composite so that all items were equally weighted.

Before estimating single mediator models, a series of simple regressions were estimated in order to test hypotheses 5 and 6 and to identify associations between the independent variables, putative mediators, and dependent variables. Specifically, the following paths were estimated: the path between the independent variable and the mediator, the path between the mediator and outcome (not including the independent variable) and the path between independent variable and outcome (not including the mediator). See Figure 3. These individual regressions were calculated only when correlations between variables were significant.

Finally, single mediator models were estimated to test hypotheses 7 and 8 in MPLUS 6.0 (Muthen & Muthen, 2010) with FIML to provide parameter

estimates in the presence of missing data. See Figure 4. Specifically, the

following paths were tested: 1) independent variable predicting mediator (path a);

2) mediator predicting dependent variable in an equation also containing the

independent variable (path b); and 3) independent variable predicting dependent

variable in a model also containing the mediated path (path c'). Demographic and

illness-related variables, including age at diagnosis, time since diagnosis, parental

status and income, were considered as covariates because they have been linked

with key study variables in infertility samples (Abbey, Halman & Andrews, 1992;

Holahan & Moos, 1987; Domar, Broome, Zuttermeister, Seibel, & Friedman,

1992; Edelmann & Connolly, 1986; McEwan, Costello, & Taylor, 1987). They

were included in models only if they were significantly associated with a

predictor, a mediator, and/or an outcome.

Wherever the "a" and "b" paths were significant, a modified Sobel (1982)

test was utlilized to examine the significance of the "ab" (indirect) path.

Specifically, this modification entails replacing Sobel's delta method for

approximating standard error estimates with 95% confidence intervals constructed

by the bias-corrected bootstrap (Mackinnon, 2008). The classic Sobel test is

greatly under-powered (MacKinnon, Lockwood, Hoffman, West, & Sheets,

2002). The bias-corrected bootstrap leads to substantially smaller standard errors

than the Sobel test and therefore to substantially greater power for the test of

mediation.

<center>**Results**</center>

Preliminary Analyses

       Distributional properties. Preliminary analyses were conducted to

examine the distributional properties of key variables for the entire sample. See

Table 3. For the most part, variables had low skew and kurtosis. Three exceptions

were avoidance, purpose in life, and substance use. Avoidance exhibited

substantial positive skew and kurtosis, with 70% of all valid responses of zero on

a 0-3 scale. Purpose in life exhibited substantial negative skew and positive

kurtosis; 50% of all responses in the highest category on a 1 to 6 point scale.

Substance use was extremely skewed and kurtotic (4.18 and 22.78, respectively),

with 81% of all participants reporting no use of substances as a coping strategy.

These values far exceed the guidelines of West, Finch, and Curran (1995) of skew

greater than 2 and kurtosis greater than 7 for causing difficulties with maximum

likelihood estimation. An examination of the frequency table for substance use

revealed infrequent endorsement. Only 19% of the sample people endorsed

utilizing this strategy at all. Of those, only 2 % (2 people) acknowledged turning

to this strategy more than occasionally. Consequently, a log transformation of this

variable was not considered, and substance abuse was dropped from subsequent

analysis.

       Table 4 presents the sample mean item scores and range of item scores for

all study variables. Examination of mean item scores for each measure indicated

that in terms of resilient resources, participants endorsed moderate amounts of

self-esteem, mastery, and ego resiliency (respective mean item scores of 3.25,

<center>52</center>

3.08, and 3.17 on four point scales ranging from 1-4). With respect to optimism, participants were largely neutral (mean item score of 3.00 on a five point scale ranging from 1-5; 3 denotes "neither agree nor disagree"). At the same time, the sample as a whole reported some level of psychosocial vulnerability. Mean item scores indicated that the group was neutral with respect to neuroticism, (mean item score 3.00 on a 5 point scale ranging from 1-5; 3 denotes "neither agree nor disagree"). The group felt mildly to moderately stigmatized by their POI (mean item score 4.31 on a six point scale ranging from 1-6; 4.00 represents slight agreement), and they described themselves as neither certain nor uncertain about their condition (mean item score 2.79 on a five point scale from 1-5; 3 denotes "undecided").

Mean item scores revealed that they were neutral with respect to need for parenthood (3.43 on a 6 point scale ranging from 1-6, where 3 denotes slight disagreement and 4 denotes slight agreement). Only participants who both were partnered and wanted children were asked to respond to this measure. Accordingly, almost a quarter of the participants did not complete it. To ensure that the participants who completed the measure were not fundamentally different from those who did not, a series of independent t-tests was conducted to compare means across the 20 key study variables. Only a single significant difference was observed between groups; goal reengagement scores were higher among responders than non-responders ($t = 1.96$, $p = .05$). However, with 20 variables and .05 probability, at least one test would be expected to emerge as significant by chance. Accordingly, it is appropriate to conclude that there were no meaningful

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differences on key study variables between those who responded to the need for parenthood measure and those who did not.

With respect to adaptive coping, participants endorsed reengaging with alternative goals often (mean item score of 2.91 on a scale ranging from 0-4 where 3 represents often true). Mean item scores on goal disengagement were a bit lower, indicating that the sample was reluctant to disengage from the goal of getting pregnant (2.15 on a scale ranging from 0-4 where 2 denotes sometimes true). The sample endorsed mild to moderate use of support seeking and planning (respective mean item scores of 1.26 and 1.72 on a scale ranging from 0-3, where 2 denotes a "medium amount"). Moreover, the sample acknowledged mild to moderate use of benefit finding (mean item score 2.62 on a scale ranging from 1-5, where 3 denotes moderate). With respect to maladaptive strategies, participants reported limited use of avoidance and self-blame (respective mean item scores of .25 and .47 on a scale ranging from 0-3, where 1 reflects "a little bit").

Mean ratings on outcome measures revealed that the sample as a whole scored below the Radloff's (1977) cutoff score of 16 for mild levels of depressive symptomatology on the CESD ($M = 13.08$). See Table 2. However, 27 women scored 16 or above. Women in the sample also reported mild levels of anxiety on the STAI (mean item score .99 on a scale ranging from 0-3, where 1 reflects "somewhat"), negative affect (mean item score 2.00 on a 5 point scale, where 2 denotes "a little"), and purpose in life (mean item score 4.92 on a scale ranging from 1-6, where 4 designates slight agreement). They reported moderate levels of

positive affect (mean item score 3.34 on a scale ranging from 1-5; 3 denotes "moderate").

Thus, as a whole, the sample reported moderate levels of self-esteem, mastery, and ego resiliency, and endorsed feeling stigmatized. Accordingly, they seemed to maintain traits reflective of resilience and vulnerability. Additionally, they used moderate levels of adaptive coping and infrequently used maladaptive coping. Finally, they reported some distress and well-being.

Table 5 includes additional population based norms for depression, and anxiety, along with those for positive and negative affect. Relative to these norms, the POI sample evidenced greater depression, anxiety, and negative affect along with lower positive affect at Time 1 (Radloff, 1977; Spielberger, 1983; Crawford & Henry, 2004). However, scores on positive affect and negative affect were more in line with population based norms at Time 3. Moreover, relative to 60 healthy, age matched female controls, the POI group reported higher levels of negative affect, depressive symptoms, and anxiety, lower levels of positive affect, and comparable levels of purpose in life at Time 1 (Davis, et al. 2010).

Attrition. The three waves of data collection took place over a one-year period. The longitudinal nature of this investigation lent itself to a certain amount of attrition. One hundred and two women enrolled at baseline. Of these, 16 were lost to Time 1 follow-up (month 4) and an additional 6 were lost to Time 2 follow-up (month 12). Appropriate difference tests were applied to the data based upon the classification of the measure as continuous or categorical to probe for baseline differences between the 80 participants who completed all measures and

the 22 who dropped out by Time 3. Specifically, independent samples t-tests were applied to continuous variables; chi-square tests were utilized for categorical variables. Results of these tests are reported in Tables 6 and 7. Significant differences ($ps < .05$) were observed only with respect to neuroticism and age. Those who dropped out of the study were older ($M = 34.70$, $SD = 4.32$) than those who did not ($M = 31.20$, $SD = 5.47$). Moreover, those who dropped out were less neurotic ($M = 21.64$, $SD = 6.08$) than those who completed all measures ($M = 24.70$, $SD = 6.27$).

Correlations. Pearson Product Moment correlations among study variables are reported in Table 8. For variables assessed at baseline, there were significant and moderate associations ($rs > .36$, $ps < .05$) between three of the four hypothesized measures of psychosocial vulnerability: neuroticism, stigma, and illness uncertainty. Need For Parenthood (NFP), however, failed to correlate with any of the other vulnerability measures. As expected, there were strong positive associations ($rs > .50$, $ps < .05$) between the four variables thought to denote resilient resources: optimism, mastery, self-esteem, and ego resiliency. Of note, measures of psychosocial vulnerability were less tightly clustered together, and generally evidenced weaker associations than those reflecting resilient resources. NFP was also unrelated to any measures of resilient resources. The measures of psychosocial vulnerability and resilient resources were significantly inversely correlated ($rs > -.38$, $ps < .05$).

The pattern of associations among adaptive and maladaptive coping strategy variables, assessed four months following collection of baseline

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measures, was mixed. Contrary to predictions, the five indicators hypothesized to comprise adaptive strategies were not all related. Consistent with predictions, planning, support seeking, and benefit finding were significantly and positively correlated ($rs > .26$, $ps < .05$). The remaining two adaptive strategies, goal disengagement and goal reengagement, were strongly positively correlated with each other ($r = .57$, $p < .05$), and goal reengagement showed a modest positive association with benefit-finding ($r = .22$, $p < .05$). With regard to the two maladaptive coping indices, avoidance and self-blame evidenced a small but significant positive association ($r = .26$, $p < .05$). In addition, self-blame was negatively associated with both goal disengagement and goal reengagement ($r = -.31$, $p < .01$ and $r = -.33$, $p < .01$, respectively). These preliminary correlations suggest that the latent factor structure proposed within this investigation may not accurately reflect the data. Instead, self-blame, goal disengagement, and goal reengagement may comprise an alternate adaptive latent factor characterized by low self-blame along with high goal disengagement and reengagement.

With regard to outcome measures, the associations among the three distress variables and two wellbeing variables were as expected. The distress variables of anxiety, depressive symptoms, and negative affect exhibited correlations that were both positive and strong ($rs > .68$, $ps < .05$). Positive affect and purpose in life were less strongly related but still evidenced a strong association ($r = .55$). The associations among measures of distress and wellbeing were negative and strong in magnitude ($rs > -.53$, $ps < .05$).

To better characterize the sample and to understand how Time 1 measures of personal attributes were associated with Time 1 measures of adjustment, Table 9 provides concurrent inter-correlations to highlight these relations. Specifically, correlations between variables thought to reflect vulnerability were moderately to strongly correlated with distress measures also measured at Time 1 (rs ranged from .35-.59, ps < .01). Indeed, some of these correlations were higher and more tightly clustered those observed amongst the three vulnerability variables. Correlations between variables thought to reflect resilient resources were strongly correlated (rs > .54, ps < .01) with wellbeing variables measured at Time 1. These correlations cluster tightly with those observed amongst the four resilient variables.

Finally, because correlations amongst Time 1 measures of personal attributes and Time 1 measures of distress/wellbeing were noteworthy, a third set of correlations examined the associations between Time 1 measures of adaptation and Time 3 measures of adaptation. Table 10 details these correlations. Correlations between Time 1 measures of distress and Time 3 measures of distress were modest to moderate in strength (rs ranged from .28-.49, ps< .05. Correlations between Time 1 measures of wellbeing and Time 3 measures of wellbeing were, for the most part, moderate (rs ranged from .31-.48, ps < .01) with one exception. Time 1 purpose in life was strongly correlated with Time 3 purpose in life ($r = .63$, $p < .01$), suggesting that there was strong stability in this variable over the 12 month investigation. Though the remaining variables

exhibited moderate levels of stability, correlations suggest there was also some variability over time.

Additional preliminary analyses. Additional analyses were conducted to verify the underlying factor structure of each scale. Specifically, each individual measure (e.g., STAI, CESD, Optimism, Mastery) was evaluated with an Exploratory Factor Analysis (EFA) to verify that the factor structure observed in the current sample corresponded to the structure described in the extant literature. That is, if the measure was intended to be one factor, it behaved that way. With the exception of illness uncertainty, the results of a series of EFAs revealed that the factor structures of the measures were consistent with previously published articles detailing their psychometric properties.

With respect to illness uncertainty, the three reverse scored items loaded poorly (i.e., less than .3) on a single latent factor. These items are so indicated in Appendix A. Of relevance to this observation is a series of papers justifying the removal of reverse scored items in instances such as this (Woods, 2006; Rodebaugh, Woods, & Heimberg, 2007). Essentially these researchers suggest that items written with reverse valence are not always reliable estimates of the construct in question and may be particularly susceptible to careless responding. Consequently, these three reverse coded items were dropped from the analysis, leaving a scale comprised of the 11 remaining items for illness uncertainty that loaded on one factor.

Psychometric Structure of Measures

  Personal Attributes. Confirmatory Factor Analyses (CFAs) were

conducted to determine whether baseline individual difference variables of

psychosocial vulnerability and resilient resources were best represented by one or

two latent factors (Hypothesis 1). It was hypothesized that optimism, mastery,

self-esteem, and ego resiliency would represent a single underlying construct

referred to as resilient resources. By contrast, neuroticism, perceived stigma,

illness uncertainty, and need for parenthood were predicted to load together on a

single factor, psychosocial vulnerability. Initially, this two factor structure,

including all of the proposed indicators, was estimated in MPLUS 6.0 (Muthen &

Muthen, 2010$)$ utilizing full information maximum likelihood estimation (FIML).

This model exhibited good fit to the data, $\chi2$ (19) = 18.58, $p = ns$, CFI = 1.00,

RMSEA = .000 (90% CI: 0-.09), SRMR = .037. As predicted, optimism, mastery,

self-esteem and ego resiliency loaded .63 or higher on one factor, resilient

resources. In keeping with the hypothesis, neuroticism, perceived stigma, and

illness uncertainty loaded .61 or higher on a second factor, psychosocial

vulnerability   However, need for parenthood, had a factor loading of -.05 on the

psychosocial vulnerability factor. Consequently, a revised two factor model was

estimated in which the factor loading of NFP was constrained to zero. This model

also yielded good fit, χ^2 (20) = 18.74, $p = ns$, CFI = 1.00, RMSEA=.000 (90% CI:

.00-.08), SRMR = .040. To compute a chi-square difference test, the chi-square

statistic for the initial two factor solution (18.58) was compared with the chi-

square statistic for the revised solution. This was done to determine whether the

fit of the larger, initial model was significantly better than that of the smaller

revised model. The test was not significant [$\Delta\chi^2$ (1) = .16, $p = ns$], indicating that

the fit of the two models was essentially equivalent.

   In light of these findings, the two factor solution was again estimated

without the inclusion of NFP. This model yielded good fit, χ^2 (13) = 17.05, $p =$

ns, CFI = .986, RMSEA=.055 (90% CI: .00-.12), SRMR = .038. See Figure 5. As

before, optimism, self-esteem, mastery, and ego resiliency loaded on one factor.

Neuroticism, illness uncertainty, and perceived stigma loaded on the other. The

psychosocial vulnerability and resilient resource factors were highly inversely

correlated (-.88). To determine whether a one-factor solution better fit the data, a

single factor model in which optimism, mastery, ego resiliency, self-esteem,

illness uncertainty, neuroticism, and perceived stigma all were indicators of a

single factor was estimated (see Figure 6). It yielded adequate to good fit, χ^2 (14)

= 21.23, $p = ns$, CFI = .975, RMSEA = .070 (90% CI: 0.00 – 0.13), SRMR =

.044. Results of a chi-square difference test of fit of the one factor versus two

factor model showed better fit of the two factor model [$\Delta\chi^2$ (1) = 4.18, $p < .05$].

Accordingly, the revised two factor solution offered the best fit to the data and

was therefore retained. The indicators and standardized factor loadings for the

final two factor solution can be found in Table 11.

   Coping. Competing hypotheses were proposed with respect to adaptive

and maladaptive coping (see Figures 1 and 2; Hypotheses 2A and 2B, and

Hypothesis 3A and 3B). In one model, planning and support seeking were

predicted to load together with the measures of goal flexibility

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(engagement/disengagement) and benefit finding to form an adaptive coping

factor (Hypothesis 3A). A second maladaptive factor was postulated to be

comprised of substance use, avoidance, and self-blame. As highlighted earlier,

because substance use was infrequently endorsed and non-normally distributed it

was dropped from all analyses. Accordingly, a two factor model including the five

aforementioned adaptive coping measures and the remaining two maladaptive

coping measures was examined (Hypothesis 2A). As before, FIML was utilized.

The factors were allowed to correlate. This model revealed a warning indicating

that the theta matrix was not positive definite. . An examination of the residuals

for two factor loadings (avoidance and support seeking) revealed that they were -

1.7 and -.13 for avoidance and support, respectively. This model was then re-

estimated by constraining the two maladaptive loadings to be equal, but the model

would not converge.

A competing two factor model was originally proposed (Hypotheses 2B

and 3B). For this model, the two measures of goal flexibility (goal

disengagement and reengagement) along with benefit finding were included as

measures of "adaptive" coping. In keeping with the empirically derived coping

factors reported by Benyamini, et al. (2008) with a sample of infertile women,

avoidance, self-blame, planning and support seeking were postulated to comprise

maladaptive coping. See Figure 7. As with the prior model, the factors were

allowed to correlate. This model failed to converge. Consequently, the model was

respecified. Because goal disengagement and goal reengagement are theoretically

related, the model was rerun allowing these indicators to correlate. This model

converged normally. See Figure 7. It yielded a poor fit to the data, χ^2 (12) =

34.830, $p < .001$, CFI = .767, RMSEA = .149 (90% CI: .09-.21), SRMR = .116.

The theoretically derived two factor coping models originally proposed

were not empirically supported. To test whether a single latent construct would

yield a good fit for the data, all seven indicators were analyzed in a one factor

model. A warning, again, suggested that the theta matrix was not positive

definite. A review of modification indices prompted a change to the model in

which goal disengagement and reengagement were, again, allowed to correlate.

Results of this model converged normally and yielded a poor fit, χ^2 (14) = 38.54,

p < .001, CFI=.75, RMSEA=.14, SRMR= .12. See Figure 8.

A subsequent examination of the observed correlation matrix (Table 7)

prompted development of an empirically derived model including goal

disengagement, goal reengagement, and self-blame on one factor (labeled

"Letting go and moving on"). A second factor comprised of planning, support

seeking, and benefit finding (labeled "Approach coping") was proposed. The

factors were allowed to correlate. Avoidance, an indicator of avoidant coping, was

omitted from the analysis. The two factor model initially yielded poor fit χ^2 (8) =

19.24, $p < .05$, CFI=.88, RMSEA=.128 (90% CI: .05-.20), SRMR= .088.

However, a review of modification indices suggested allowing planning and goal

disengagement to correlate would improve model fit. Because disengaging from

the goal of getting pregnant and actively identifying ways to deal with infertility

are theoretically opposite coping strategies, the model was re-specified allowing

these indicators to correlate. Indices of fit were mixed. The RMSEA suggested

poor fit. By contrast, the CFI and SRMR yielded good fit. Because the SRMR is least sensitive to sample size, it was given priority when evaluating fit. χ^2 (7) = 11.11, p = ns, CFI=.96, RMSEA=.08 (90% CI: .00-.17), SRMR= .07. See Figure 9. The factors were not significantly correlated (r = .19, p = ns).

To determine whether a one-factor solution better fit the data, a single factor model in which planning, support seeking, benefit finding, goal disengagement, goal reengagement, and self-blame all were indicators of a single factor was estimated. Again, active coping and goal disengagement were allowed to correlate (see Figure 10). This model yielded poor fit, χ^2 (8) = 48.13, p <.001, CFI = .563, RMSEA = .242 (90% CI: .18 – .31), SRMR = .146. Accordingly, the two factor solution was retained. The indicators and standardized factor loadings for the final two factor solution can be found in Table 12.

Original hypotheses specified the emergence of an adaptive and a maladaptive coping factor. The data instead revealed a structure in which two alternative, uncorrelated adaptive coping factors were present. Because avoidance did not emerge as a significant indicator in any model and was not included in the final factor analysis, it was retained as a standalone variable.

Adjustment. It was hypothesized that negative affect, depression, and anxiety would comprise an underlying latent construct referred to as distress, whereas positive affect and purpose in life were hypothesized to make up a second factor, wellbeing (Hypothesis 4). A two factor model reflecting these two factors was estimated in MPlus 6.0 (Muthen & Muthen, 2010). The model yielded adequate to good fit, χ^2(4) = 6.66, p = ns, CFI = .988, RMSEA = .091 (90% CI:

.00-.21), SRMR = .024. See Figure 11. Results of the CFA revealed factor

loadings of .8 or higher for each distress indicator, and .74 for each wellbeing

indicator. Factors were correlated -.85.

To be sure that the indicators of wellbeing and distress were not better

captured by a single underlying construct of adjustment, a one factor model

including the three measures of distress and the two measures of wellbeing was

evaluated. See Figure 12. The chi-square goodness of fit test was significant,

though both the SRMR and CFI suggested adequate fit to the data, χ^2 (5) =

11.373, $p < .05$, CFI = .971, RMSEA = .126 (90% CI: .02-.23), SRMR = .037.

Results of CFA analyses revealed factor loadings of approximately -.65 for the

two indicators of wellbeing, and greater than .80 for the three indicators of

distress on the single factor. The chi-square difference test of fit of the one versus

two factor model indicated better fit for the two factor model [$\Delta\chi^2$ (1) = 4.71, p <

.05]. The indicators and standardized factor loadings for the final two factor

solution can be found in Table 13.

Composite Construction

CFA results indicated that although resilient resources and psychosocial

vulnerability factors at Time 1 were highly correlated, they were best represented

by two separate factors. The same was true of wellbeing and distress dimensions

assessed at Time 3. For the remaining analyses, resilient resources, psychosocial

vulnerability, approach coping, letting go/moving on, wellbeing, and distress were

each retained as separate composites. (Refer to data analysis section for a

description of how composites were calculated.) Avoidance was retained as a single indicator variable.

Table 14 depicts the correlations among composites and of composites with demographic variables of age at diagnosis, time since diagnosis, whether the participant is a parent, and income. While wellbeing was significantly and positively correlated with letting go/moving on ($r = .384$, $p < .01$), distress was not ($r = .19$, $p < .10$). Moreover, avoidance (a separate, stand-alone coping strategy) was significantly correlated with psychosocial vulnerability ($r = .309$, $p < .01$), and with distress ($r = .354$, $p < .01$), but not with resilient resources or wellbeing.

Remaining associations revealed that correlated factors (e.g., psychosocial vulnerability/resilient resources, distress/wellbeing) shared similar patterns with other constructs. Specifically, psychosocial vulnerability was significantly and moderately associated with distress ($r = .33$, $p < .01$) and wellbeing ($r = -.38$, $p < .01$). Resilient resources, too, was moderately associated with distress ($r = -.36$, $p < .01$) and strongly with wellbeing ($r = .53$, $p < .01$). Neither resilient resources nor psychosocial vulnerability were significantly correlated with approach coping. However, they were both significantly and moderately correlated with letting go/moving on (resilient resource: $r = .386$, $p < .01$, psychosocial vulnerability $r = -.320$, $p < .01$).

Regression Analyses

Regression diagnostics. Before submitting variables to single mediator models, regression diagnostics were examined. Diagnostics identified potential

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problems with multicolinearity and influential data points. To assess problems with multicolinearity, variance inflation factors (VIFs) were examined for each model. Observed VIF statistics fell below 2.50, which met the criteria specifying values less than 10 as set forth by Cohen, Cohen, West, & Aiken (2003). Two additional casewise diagnostics, DFFITS and DFBETAS, were utilized to identify influential data points. The former is an overall measure of how influential any given point is in a statistical regression (i.e., the change in the predicted score by the inclusion versus exclusion of the case). The latter measures the standardized change in each regression coefficient when a case is removed. There were several instances in which DFFITS and DFBETAS exceeded 1, the cutoff recommended for small to moderate samples by Neter, Wasserman, & Kutner (1989). For each case yielding values in excess of this, the raw data were reviewed. Three cases evidenced extreme scores on certain indicators (e.g., positive affect, purpose in life, goal disengagement, and optimism). When examined in the context of other indicators, these scores did not appear to represent a misspecified data point. Consequently, there was not sufficient reason to remove any of these cases from subsequent analyses. However, to ensure that these cases were not exerting excessive influence on results, subsequent analyses were run such that these cases were excluded from relevant analyses on a case by case basis.

Simple regression analysis. Prior to submitting variables to single mediator models, a series of simple regressions were estimated to test study hypotheses (5 and 6) and to establish associations between the independent variables, putative mediators, and the dependent variables. Specifically, the

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following three paths were individually examined; the path between independent variable and mediator, the path between mediator and outcome (not including the independent variable), and the path between independent variable and outcome (not including the mediator). Again, see Figure 3. These individual regressions were calculated only when correlations between variables were significant. Analyses were conducted in MPLUS 6.0 (Muthen, & Muthen, 2010) with FIML estimation. Income was covaried in all analyses. Age at diagnosis, time since diagnosis and parental status were also explored as covariates, but were not found to correlate with the other study variables. Consequently, they were not utilized.

The models were all just identified so no fit statistics are provided. Results of these analyses are reported in Tables 15 and 16. Consistent with correlational analyses, resilient resources predicted less distress, greater wellbeing, and greater use of letting go/moving on, controlling for income. Likewise, psychosocial vulnerability predicted greater distress, less wellbeing, greater avoidance and less use of letting go/moving on, also controlling for income. Letting go/moving on predicted greater wellbeing. Avoidance predicted greater distress. Significant predictions were maintained when analyses were rerun excluding the influential outliers on a case by case basis.

Tests of Mediation

Remaining hypotheses (7 and 8) specified that coping mediates associations between individual difference factors and outcomes. Consistent with these hypotheses, three models were considered for mediation analysis. The path from resilient resources →approach coping → wellbeing was not estimated

because approach coping was not related to either the independent variable or the outcome. (See Table 14). The remaining two models, 1) resilient resources →letting go/moving on → wellbeing (see Figure 13), and 2) psychosocial vulnerability → avoidance → distress (see Figure 14) were evaluated as set forth below.

Initially, the three sets of paths necessary for mediation were examined for each of the mediated models. First was examination of the "a" paths relating independent variables and mediators; this included the paths between resilient resources and letting go/moving on, and between psychosocial vulnerability and avoidance. Also estimated were the "b" paths, which included the paths from each of the coping mediators and their respective outcomes (i.e., letting go/moving on→wellbeing; avoidance→distress) in a model that also contained the independent variable. Finally, the c' path was estimated, which provides an estimate of whether there is complete mediation (path essentially equals zero) or incomplete mediation (path is not zero).

Single mediator path models were analyzed whenever significant "a" and "b" paths were detected. As highlighted earlier, mediation was tested using the product of the coefficients method and 95% confidence intervals for bootstrapping. Psychosocial vulnerability and resilient resources were very highly correlated. Therefore, in the mediation analysis of resilient resources, vulnerability was controlled. In the mediation analysis of vulnerability, resilient resources were controlled.

First, the resilient pathway was tested. Specifically, the model from

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resilient resources ($r = .39$, Table 11) →letting go/moving on ($r = .37$, Table

14)→ wellbeing was considered. See Figure 15. Controlling for psychosocial

vulnerability was accomplished by (1) correlating vulnerability with resilient

resources, (2) including vulnerability as a predictor of letting go/moving on and

(3) including vulnerability as a predictor of wellbeing. Including vulnerability as a

predictor of the mediator yielded an estimate of the "a" path from resilient

resources to letting go/moving on that eliminated any relation of vulnerability to

letting go/moving on. Likewise, the inclusion of vulnerability as a predictor of

wellbeing yielded estimates of the "b" path from letting go/moving on to

wellbeing and the "c prime" (direct) path from resilient resources to wellbeing

that were free of any relation of vulnerability to wellbeing.

The regression estimating the "b" pathway (that is, the equation predicting

wellbeing from letting go/moving on while simultaneously including resilient

resources) was not significant. Consequently, mediation was not a possibility.

Because the model failed to yield significant mediation, no further control

variables were considered. See Table 17 for unstandardized coefficients. Because

the latent correlation between resilient resources and vulnerability was so high

(again, -.88), the model was rerun without the inclusion of vulnerability as a

control variable in order to eliminate the possibility that it was partialing out part

of the phenomenon in question. The results remained unchanged; the "b"

pathway was not significant.

The next model, the mediation analysis of psychosocial vulnerability ($r =$

.31, Table 14)→avoidance ($r = .35$, Table 11)→distress, is shown in Figure 16.

Controlling for resilient resources was accomplished by (1) correlating resilient

resources with vulnerability, (2) including resilient resources as a predictor of

avoidance, and (3) including resilient resources as a predictor of distress.

Including resilient resources as a predictor of the mediator yielded an estimate of

the "a" path from vulnerability to avoidance that eliminated any relation of

resilience to avoidance. Similarly, including resilient resources as a predictor of

distress yielded estimates of the "b" path from avoidance to distress and the "c

prime" (or direct) path from risk to distress that were free of any relation of

resilience to distress.

This model was just-identified. Consequently, fit statistics were not

reported. Avoidance mediated the association between psychosocial vulnerability

and distress, such that higher levels of distress were associated with greater

avoidance, which was, in turn, associated with greater vulnerability. As before,

the model was re-estimated removing the influence of resilient resources.

Avoidance remained a mediator of the association between vulnerability and

distress.

Because income is acknowledged to relate to distress and avoidance

amongst infertile women (Abbey, et al. 1992; Holahan & Moos, 1987; Berghuis

& Stanton, 2002), the model was re-specified to add income to the model as a

control variable. See Figure 17. Controlling for income was accomplished by (1)

correlating it with vulnerability and resilient resources, (2) including income as a

predictor of avoidance and (3) including income as a predictor of distress.

Because the re-specified model controlled for resilient resources and income, the

estimation of the "a" path from vulnerability to avoidance eliminated any relation of income or resilience to avoidance. Moreover, estimates of the "b" path from avoidance to distress and estimates of the "c prime" (or direct) path from risk to distress were free of any relation of income or resilience to distress. Again, this model was just identified. Avoidance remained a significant mediator of the association between vulnerability and distress, when adding income as a control variable.

Over and above resilient resources and income, age at diagnosis, time since diagnosis, parental status, and education were included as control variables in the model. Each failed to significantly predict avoidance or distress. Moreover, they were not significantly correlated with psychosocial vulnerability. Consequently, they were not retained in the final model. Table 17 includes the coefficients for the final mediation model.

Summary of Results

In summary, consistent with hypotheses, support was garnered for distinct representations of psychosocial vulnerability and resilient resources. Likewise, findings supported separate conceptualizations of distress and wellbeing. Results failed to support theoretical conceptualizations of adaptive and maladaptive coping, but an empirically derived model encouraged an alternative conceptualization of coping in this sample that was comprised of two adaptive coping factors. Specifically, strategies reflecting continued pursuit and attention to biological parenthood, that is – approach coping, was contrasted with strategies indicative of letting go /moving on.

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With respect to composite relations, hypotheses were largely supported. As expected, psychosocial vulnerability emerged as a significant predictor of avoidance, distress, and wellbeing. It also predicted letting go/moving on. Resilient resources predicted letting go/moving on, wellbeing, and distress. As with psychosocial vulnerability, these associations were in the expected directions. Letting go/moving on positively predicted only wellbeing. By contrast, avoidance positively predicted only distress. Surprisingly, the alternative adaptive (approach) coping factor was not significantly associated with any of the composites of interest.

Findings with regard to proposed mediation models were largely unsupported. Only the model including avoidance as a mediator between psychosocial vulnerability and distress was significant.

Discussion

Overview

For many women, irreversible infertility can be devastating. Learning that having a biological child is not possible may represent a threat to personal identity and alter life trajectories. Consequently, in response to a diagnosis of infertility many women report increases in indicators of distress – namely depression and anxiety (Domar, et al. 1993; Domar, et al. 1992; Cwikel, et al. 2004) and decreases in quality of life reflected in lower levels of positive affect and life satisfaction (Davis, et al. 2010, Schmidt, et al. 2006). Notably, however, a diagnosis of infertility does not necessarily translate into poor adjustment. Many women who carry such a diagnosis remain psychologically healthy as evidenced

by the absence of clinically significant depression or anxiety (Davis, et al. 2010). The current investigation drew on recent paradigm shifts within the field to understand how women adjust to POI, a specific type of infertility. Specifically, these shifts include recognition that a) mental health is bi-dimensional, and is comprised of both wellbeing and distress; b) distinct factors comprised of personal attributes may promote "resilience" or convey "risk" in the context of stress, and c) adaptive and maladaptive coping strategies may operate as mediators of the links between personal attribute factors and outcomes.

Accordingly, a multi-factor, longitudinal, bi-dimensional model of "risk" and "resilience" was proposed. Analyses were first conducted to identify whether multiple measures of personal attributes, coping, and outcomes clustered into latent factors reflecting separate dimensions of risk and resilience. The final set of analyses evaluated whether different coping factors would emerge as a mediators between personal attributes and outcomes for the respective risk and resilient pathways. Two strongly inversely correlated factors (resilient resources and vulnerability), two empirically derived coping factors (approach coping, letting go/moving on), and two strongly inversely related factors (distress and wellbeing) were identified. Moreover, there was some indication of mediated effects for coping that were consistent with a risk pathway but results failed to support a similar resilient pathway.

Factor Structure

Personal attributes. As expected, resilient resources and psychosocial vulnerability at Time 1 emerged as two factors. Though this factor structure was

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retained the latent correlation between the factors was extremely high (-.88). Thus, elevated resilient resources, comprised of optimism, self-esteem, mastery, and ego resiliency, corresponded with low vulnerability, comprised of neuroticism, illness uncertainty, and perceived stigma. Essentially, resilient resources appear to reflect general beliefs about the self and the world. Those high on the construct believe they are capable people and that good things will happen to them. By contrast, vulnerability seems to capture negative affectivity and beliefs specific to POI. Those who are highly vulnerable feel stigmatized by and uncertain about their condition; they are also prone to experience negative emotion.

There is great variability in the literature with respect to how "risk" and "resilience" factors are operationalized. For example, Smith & Zautra (2008) endeavored to identify factors reflecting trait risk and resilience. In their sample of pain patients, risk was characterized as a constellation of anxiety, depression, emotionality, interpersonal sensitivity, and pessimism. Resilience included active coping, acceptance, purpose in life, and optimism. Factors were correlated -.3, which is much lower than the latent correlation reported here. Relative to the present investigation, which separately considered trait levels of personal attributes, along with situational coping and state adjustment, the previous study combined trait levels of personality, coping, and affectivity on a single factor. Accordingly, direct comparison of these studies, though not impossible, is difficult.

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Measured traits comprising resilience were more global and stable assessments of personality in the current study (Taylor & Stanton, 2007). Prior research with a sample derived from a university community demonstrated that optimism, esteem, and mastery clustered onto one latent factor entitled "self-enhancement" (Taylor, et al. 2003). This was consistent with present findings regarding resilient resources. Notably, however, two of the three retained vulnerability indicators in the current study were specific to infertility– illness uncertainty and stigma. As stated above, current results suggest that those high on resilient resources were low on vulnerability and vice versa. Logically, individuals high on global personality traits widely acknowledged to be stable such as optimism, esteem, and mastery, would be less prone to exhibit high levels of illness uncertainty and/or stigma.

Perhaps a vulnerability factor comprised of additional, global assessments of self and the world, rather than infertility beliefs specific to the experience of infertility, would have strengthened the model and attenuated correlations between resilient resources and vulnerability. The inclusion of alternative personality measures such as those employed by Smith and Zautra (2008), which included emotionality, pessimism, and interpersonal sensitivity might have yielded two less related factors.

Finally, it is worth noting that the construct of resilience postulated by Mancini and Bonnano (2009) included attachment style, repressive defenses, optimism, self-enhancing biases, and worldviews, among several other measures. Included in their commentary was an acknowledgement that resilience is hard to

characterize. Put simply, their model is not exhaustive. They further suggested that several clusters of individual difference constructs associated with resilience might emerge. Integrating this idea with results from the present analysis, it is plausible that a general factor (personal attributes) might be comprised of two (or even more) domain specific factors (e.g., resilient resources, vulnerability) that account for meaningful variance over and above that contributed by the general factor. Indeed, Chen, West, and Sousa (2006) argue for the use of bifactor models as a means to more accurately characterize the phenomenon.

Coping. A number of models have framed coping strategies along two dimensions, one adaptive and the other maladaptive. For example, some theorists have suggested that problem-focused coping is adaptive and emotion-focused coping is maladaptive (Billings & Moos, 1984; Cronkite & Moos, 1984; Kohn, 1996). Likewise, active coping is viewed as adaptive whereas passive coping is viewed as maladaptive (Li, 2008; Yi-Frazier, et al. 2009). In the current study, results were not consistent with the hypothesis that coping with infertility would align along two dimensions, one of resilience and one of risk. Instead, two empirically derived factors emerged. The first factor, labeled "approach coping" was comprised of planning, support seeking, and benefit finding. These strategies are indicative of efforts to actively address infertility, both emotionally and instrumentally. The second factor, labeled "letting go and moving on," was comprised of goal disengagement, goal reengagement, and self-blame. High levels of the former two strategies and lower levels of the latter were thought to

be adaptive. The small and non-significant correlation between these two factors supports classification as separable constructs.

In a past investigation of infertile women, researchers identified coping meta-constructs labeled practical management (investing in self, planning, spiritual coping), approach/avoidance (denial, self-blame, positive reinterpretation), and recruiting spousal support (Benyamini, et al. 2008). Similar to the approach coping factor identified in the present study, the practical management construct included emotional and instrumental strategies. Like their approach/avoidance construct, letting go/moving on in the present investigation yielded cognitive strategies that involved reorienting in order to move forward.

Though the overall structure of coping among infertile women was similar in the current study and that of Benyamini et al. (2008), there were some inconsistencies between the investigations. Specifically, Benyamini et al (2008) found that positive reinterpretation did not load with planning. Additionally, support seeking emerged as a standalone construct. These variations may be due, in part, to sample differences. Approximately 49% of their sample had been diagnosed with infertility within the last year, 33% were diagnosed 1-3 years prior and only 18% carried the diagnosis for a period greater than 3 years. Thus, though not reported, average duration of the condition was likely shorter in the sample examined by Benyamini et al. (2008). Coping dimensions may look different for those with a fresh diagnosis as compared with those who have carried it longer.

Some evidence that the dimensions of coping may change over time following diagnosis with a health problem can be gleaned from a study of women with breast cancer. In particular, utilizing such a sample, a group of researchers employed Multidimensional Scaling (MDS) to determine whether coping meta-constructs (or groupings of specific strategies) remained stable over three time periods following diagnosis (Heim, Augustiny, Schaffner, & Valach, 1993). The authors reported that dimensions did in fact remain stable; however, examination of findings revealed that this may have been a simplified interpretation. For example, at Time 1, dimensions of denial, cognitive/behavioral diversion, and a factor akin to the present approach coping emerged. At Time 2, the denial factor was no longer present, and although cognitive/behavioral diversion and approach coping dimensions remained, their makeup was slightly different. Moreover, specific strategies within each dimension were differentially weighted. Whether similar changes in coping dimensions emerge over time in infertile women remains an open question.

In both the current work and that of Benyamini et al. (2008) distinct coping factors or constructs emerged, but in neither case were coping factors consistent with an "adaptive" versus "maladaptive" framework. This has been true in other investigations of coping, as well (Heim, et al. 1993). What is adaptive largely depends on context (Lazarus & Folkman, 1984). For example, problem-focused coping is widely acknowledged to be adaptive when a situation is controllable (Folkman, 1984). Alternatively, emotion-focused coping is helpful when the issue is uncontrollable (Folkman, 1984). Accordingly, a model pitting

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"good coping" versus "bad coping" may be overly simplified because what is helpful in one situation may be detrimental in another.

Adjustment

Many researchers have proposed that distress and wellbeing represent two distinct dimensions of mental health (Bradburn, 1969; Keyes, 2002; Ryff & Singer, 1998; Singer, et al. 1998). In the current study, findings did in fact indicate that the affective outcomes were represented by two latent factors of adjustment, as expected. However, as was the case with baseline personal attribute factors, there was a high latent correlation ($r = -.85$) between distress and wellbeing, which suggests that evidencing high levels of distress translated to low levels of wellbeing in this sample. Thus, the sample appeared to exhibit low levels of differentiation between positive and negative affective outcomes.

Of relevance to the present investigation, Wright, et al. (2008) identified a construct of risk and an alternative one of resilience in a sample of people with early knee osteoarthritis. The former was comprised of negative affect, depression, and neuroticism. The latter included positive affect, vitality, and extraversion. Neuroticism is highly related to negative affect, and reflects a predisposition to experience it (Larsen & Ketelaar, 1989; 1991; Meyer & Shack, 1989; Rusting & Larsen, 1997). By contrast, extraversion is related to positive affect (Larsen & Ketelaar, 1989; 1991; Meyer & Shack, 1989; Rusting & Larsen, 1997). Accordingly, though termed "risk" and "resilience" one might argue that the factors reported by Wright, et al. (2008) reflect negative and positive

affectivity. Therefore they may be consistent with the outcome factors (distress and wellbeing) in the present sample.

As in the current investigation, Wright, et al. (2008) reported that their factors were also strongly and inversely correlated (-.7). Thus, results with respect to affective adjustment were comparable across the two studies, but stand in contrast to research purporting that indices of distress and wellbeing or positive and negative affectivity are less related (Meyer & Shack, 1989). Notably, each sample explored these associations in populations respectively acknowledged to be chronically stressed: pain and infertility.

One possible explanation for the high inverse association between adjustment factors is that the chronic stress experienced by women with infertility prompts a collapse of the two dimensional model of affect (Reich, Zautra, & Davis, 2003). Indeed, Reich, et al. (2003) proposed that the association between positive and negative affect is dynamic. That is, under normal circumstances, individuals maintain the ability to experience positive and negative affect simultaneously. However, stress may precipitate circumstances in which this ability is attenuated, such that the affects converge on a single bipolar dimension. The chronic nature of infertility-related demands along with the social, psychological, and identity sequelae of the condition may precipitate levels of chronic stress sufficient to disrupt the process by which the affective domain is regulated.

Thus, women in the throes of managing infertility may be less emotionally differentiated than other individuals without similar health burdens. Indeed, an

investigation comparing conjugally bereaved older adults and disabled adults with age/gender matched controls revealed that the association between affects was more closely related for the former two groups (Zautra, Potter, Davis, Potter, & Nicolson, 2000). Correlations were $r = -.56$ for the bereaved, $r = -.42$ for the disabled, and $r = -.22$ for non-bereaved controls. In the current sample, the correlation between Time 3 negative and positive affect was $r = -.50$. Thus, for the chronically stressed, there is a stronger association between indices of distress and those of wellbeing.

Modeling Longitudinal Adaptation to POI

The final question in the current investigation addressed whether links between resilient resources and vulnerability factors at Time 1 and outcomes at Time 3 were mediated by distinct coping factors at Time 2. The resilient resources factor was expected to predict wellbeing, mediated by adaptive coping, whereas the vulnerability factor was expected to predict distress, mediated by maladaptive coping. The observed model revealed both consistencies and inconsistencies with predicted pathways. In particular, resilient resources predicted greater use of letting go/moving on coping at Time 2 along with both higher distress and lower wellbeing at Time 3. Vulnerability predicted both greater use of avoidance coping and lesser use of letting go/moving on coping at Time 2, as well as higher distress and lower wellbeing at Time 3. Thus, personal attribute factors were not differentially associated with outcomes. That is, each of the personal resource factors predicted both of the future outcomes. Because vulnerability was not controlled when examining simple regression pathways in

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models of resilient resources, and vice versa, this is likely a function of the high intercorrelation between the factors. Nonetheless, it is inconsistent with research supporting distinct representations of risk and resilience.

Findings with respect to coping were mixed. Only two of the three coping constructs demonstrated significant and distinct associations with future adjustment. In particular, letting go/moving on predicted wellbeing, but not distress; avoidance predicted distress, but not wellbeing. Approach coping did not predict future wellbeing or distress.

Of particular relevance to these findings, Kraaij, Garnefski, and Vlietstra (2008) explored cross-sectional along with longitudinal associations between various coping strategies and depression in a sample of definitively infertile adults (men and women). As was the case in the current sample, average time since diagnosis in the sample examined by Kraaij, et al. (2008) was rather large ($M = 5$ years). Assessments of coping and depression were measured at study initiation and again two years later. Catastrophizing measured at Time 1 predicted depression at Time 2. Similarly, in the present study, avoidance predicted future maladjustment. Thus, both the former investigation and the present one linked maladaptive coping strategies to future distress. It is worth noting, however, that neither investigation controlled for baseline distress; therefore, it is not known whether this may have influenced results.

Furthermore, each investigation identified strategies that were not useful predictors of future adjustment. Kraaij, et al. (2008) noted that self-blame, rumination and low positive appraisal were not significant predictors of future

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distress. The current study which also modeled coping and future wellbeing revealed that letting go/moving on predicted future adjustment but approach coping did not. Accordingly, both investigations suggest that some coping strategies may be more reliable predictors of future outcomes than others. Determining which strategies have the potential to be most advantageous and/or damaging will be critical to the development of maximally beneficial interventions.

Much like the present study, a separate investigation also explored constructs of wellbeing (positive affect) and distress (negative affect) in a sample of definitively infertile adults (Kraaij, Garnefski, & Shroevers, 2009). These researchers reported that coping was differentially correlated with measures of adjustment. Cross-sectional measures of coping and affect were administered approximately 8 years following diagnosis. Results suggested that strategies believed to be adaptive across a variety of settings (e.g. positive reappraisal, goal reengagement, active coping, use of emotional support) were positively correlated with positive affect and unrelated to negative affect. Those strategies acknowledged to be maladaptive (e.g. self-blame, rumination, and catastrophizing) were associated with greater negative affect and unrelated to positive affect. Similarly, the present investigation identified differential associations between coping factors (letting go/moving on, avoidance) and adjustment (wellbeing, distress). Though their results were cross-sectional and focused on individual strategies rather than latent constructs, their findings in

combination with the present ones lend credibility to a bi-dimensional model of mental health.

In addition to exploring the current bivariate associations between coping strategies and affect, Kraaij, et al. (2009) also analyzed predictive models. Specifically, when entered alongside measures of adaptive behavioral coping (active coping, use of emotional support), only positive reappraisal emerged as a significant predictor of current positive affect. Similarly, when entered alongside measures of maladaptive behavioral coping (substance use) only catastrophizing and self-blame emerged as predictors of current negative affect. Notably, though the present analysis modeled future and not current adjustment, the only strategies that emerged as significant predictors across the two investigations were cognitive. Indeed, in the present study, avoidance and letting go/moving on were comprised of strategies focused on mental circumvention and cognitive reorientation, respectively.

With respect to mediation, letting go/moving on coping did not mediate the association between resilient resources and wellbeing. Because approach coping was unrelated to measures of resilient resources or outcomes, it was not tested as a mediator. However, avoidant coping did mediate the association between pre-existing vulnerability and future distress (but not well-being). A similar finding has previously been reported in cross-sectional data with samples of infertile individuals (Bayley, et al. 2009). Specifically, avoidant coping was found to mediate the association between attachment anxiety (a personal attribute) and infertility-related distress (an outcome). Thus, the present finding in a

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prospective study is particularly noteworthy. Overall, the current analysis revealed that coping strategies exhibited distinct associations with respect to future adjustment. This is consistent with extant research suggesting that a two dimensional model of mental health may be salient (Bradburn, 1969; Keyes, 2002; Ryff & Singer, 1998; Singer, et al. 1998).

Alternative Frameworks to Consider

This investigation attempted to study women with POI over a year's time, in an effort to capture the dynamic process of adaptation to a significant health threat. Because infertility is not a discrete event, adaptation in this population may be particularly difficult to capture (Verhaak, & Hammer-Burns, 2006). As noted by Stanton and Dunkel-Schetter (1991), there is much about infertility that is ambiguous. While it is true that there are aspects of the condition that are uncontrollable (e.g., whether or not the individual will ever conceive), there are also aspects that are controllable (e.g., decisions about treatment, tests, pursuing alternative paths to parenthood). Moreover, there is great variation amongst women regarding the nature of their distress (Benyamini, Gozlan, & Kokia, 2005). In a cross-sectional investigation, these researchers asked infertile women to rate 22 different statements concerning the source of their distress. They then compiled this information. Only 30-40% of the sample endorsed each of the statements that were most frequently observed. The lack of agreement regarding the source of distress amongst these women speaks to the large degree of inter-individual variability in the experience of infertility.

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If as Benyamini, et al. (2005) report, context varies greatly across persons with infertility and effective coping relies greatly on context (Lazarus & Folkman, 1984), then it follows that coping, too, may vary greatly across both people and situations, especially given the changing demands associated with the burden of infertility. Women may try to get pregnant for years before being diagnosed. Even after diagnosis, many women pursue IVF and other alternatives with the hope that they may one day conceive. In the case of POI, 5-10% of women will successfully deliver a child (Rebar & Connolly, 1990; Rebar, et al. 1982; Nelson, et al. 1994). Even this slight chance may engender hope, and prompt women to initially appraise their difficulty as a challenge that may be overcome with effort.

With each childless year, and each unsuccessful treatment, hope may dwindle and the reality of infertility may set in. Thus, appraisals of infertility as a challenge that can be overcome may morph into appraisals of infertility as a threat to personal identity or loss of expected roles. Because appraisals are widely thought to relate to coping selection (Lazarus & Folkman, 1984), any change in the way women perceive their stress may translate to alterations in coping. For some individuals, this change in appraisal may be accompanied by different coping strategies, for others, it may not. Thus, there may be some dispositional patterns of coping, but changing situational or contextual factors may prompt alterations to these patterns. Alternatively, some women may continue to perceive their infertility as a challenge and maintain the same coping patterns year after year. In light of these considerations, there may be a great deal of variation in the source of infertility-related distress that women endure and the process by

which they appraise and cope with their condition. Despite these observations, very little is understood about how women cope across the trajectory of this chronic stressor or across variations in stress appraisals.

Some insights may be gleaned from a study of adaptation in response to a different health threat, breast cancer. A unique investigation with such a sample explored both stable and temporal patterns of coping across time and stage of treatment (Heim, et al. 1993). Women battling this form of cancer endorsed a wide range of strategies over a 5 year period. They reported use of 26 different coping strategies to varying degrees over this time frame. On average, early stages of treatment witnessed utilization of 10 or more strategies. This narrowed to 5 or fewer in later treatment stages. Notably, three forms of coping remained highly stable. These included attention and care (support seeking), acceptance, and problem analysis. However, several other strategies varied greatly according to stage. During hospitalization, which included surgical intervention, tackling or seeking clarification/information emerged as important. Self-validation, downward comparison, and hopefulness emerged as salient strategies during convalescence, which included treatment with chemotherapy or radiation. Putting the needs of others first (altruism) and diversion via thoughts/activities emerged as relevant during rehabilitation/reintegration. For those who learned that their cancer was terminal, denial and religious coping came to the fore.

In light of differences that emerged as a function of stage among women with breast cancer, a similar model might prove useful for those struggling with infertility. Stage models of infertility have been proposed in the extant literature

(Blenner, 1990; Diamond, Kezur, Meyers, Scharf, & Wernshell, 1991; Gerrity, 2001), but there is no single model that has been widely cited. Some focus on phases of treatment, while others focus on psychological stages. Of the three that have been described, all were conceptually derived; only Gerrity's was empirically explored (2001). Consequently, this model is described below.

Gerrity's (2001) cross-sectional investigation divided infertility into 5 treatment stages. Participants were assigned to the *prediagnostic* phase if their fertility problems were less than one year in duration or they were in early diagnostic workup. "*Treatment beginners*" were those for whom workup was well underway or a treatment plan had been recently initiated. "*Treatment regulars*" were individuals who had tried more than one treatment, had been seen by more than two specialists, or who had been engaged in treatment between two and five years. "*Persisters*" captured those who remained in treatment greater than five years, had unexplained infertility, and/or had seen multiple specialists. The "*Concluded treatment*" stage was relevant for those diagnosed with an unsolvable medical problem, those who had biological children, those who had adopted and those who had made the decision to accept biological childlessness.

With respect to stages of treatment, differences were observed in markers of adjustment (anxiety, marital happiness), and coping (self-control, accepting responsibility; Gerrity, 2001). Specifically, treatment beginners were happier in their marriages than persisters. State anxiety was lower for those who had concluded treatment relative to those who were in regular treatment. Moreover, turning attention to coping, those who had concluded treatment evidenced lower

levels of self-control coping than any other group; and, persisters endorsed greater amounts of accepting responsibility than those who had concluded treatment.

To revisit the appraisal framework highlighted earlier, the coping strategy referred to as "accepting responsibility" is akin to self-blame and emerged as salient in situations appraised as threatening and/or changeable/challenging (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). This strategy has been associated with greater distress in samples of infertile individuals (Peterson, Newton, Rosen & Skags, 2006). Self-control coping involves regulating or keeping feelings in check and was also found to be relevant in situations appraised to be controllable (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). It is noteworthy, then, that these two strategies were endorsed with less frequency amongst those who had concluded treatment. Movement into this stage may signal that the individual has transcended appraisals that their condition is threatening, or controllable toward appraisals of acceptance or loss.

Similar to the investigation by Heim, et al. (1993) the study conducted by Gerrity revealed differences in coping with respect to infertility stage; however, Gerrity's cross-sectional design precluded modeling changes in levels of coping/adjustment over time. As with Heim, et al. (1993), some coping strategies may remain stable with each successive stage. Still others may be more time invariant and change as a function of the contextual demands. Consequently, in order to understand how women adapt to this changing stressor, it is critical to assess the entire spectrum of time from pre-diagnosis to post-treatment (Verhaak

& Hammer-Burns, 2006). Moreover, the strict delineation of Gerrity's stages according to the medical framework failed to acknowledge the wide range of psychological reactions, sources of distress, or appraisals that may vary across individuals and influence adaptation. Indeed, in a qualitative report of 25 infertile couples, Blenner (1990) reported vast differences in the perception of circumstances within stages. Accordingly, future stage models of infertility should endeavor to include assessments of these variables along with analysis of both inter- and intra-individual processes.

Limitations

The current investigation was subject to a number of limitations that are important to consider in interpretation of the findings. First, the investigation was limited by the size of the sample. The combination of the small sample size and the complex configuration of measures presented a significant challenge. The statistical strategies employed, particularly CFA, are subject to high fit for small samples. A larger participant pool would have attenuated this problem. Moreover, it would have made it possible to use more sophisticated statistical strategies such which would have precluded the need to form composites and might have better elucidated the hypotheses pertinent to this study. A larger sample might also have allowed for a more complex model. Under such circumstances, it would have been possible to explore change in relevant constructs (e.g., adaptation and coping over time) and/or to include additional constructs widely acknowledged to be associated with personal attributes, and coping; specifically, cognitive appraisals

and interpersonal support which have both been identified as salient for infertile samples (Mahajan, et al. 2009; Salmela & Suikkari, 2008).

A second limitation was the wide variability in time since diagnosis, coupled with a one year longitudinal time frame, which made it extremely difficult to model personal attributes, coping, and adaptation in a controlled and systematic way. The average time since diagnosis was 3.5 years. Some women enrolled only months after learning they were infertile; still others had received the diagnosis many years prior. In light of earlier research suggesting that distress and stress appraisals related to infertility vary greatly as a function of time (Salmela & Suikkari, 2008), a larger sample might have allowed for stratification. Specifically, recently diagnosed women might be compared to those who had been diagnosed much earlier in order to elucidate dispositional versus contextual coping patterns along with adaptation. Moreover, one year is a very short interval to model adaptation, especially in a population acknowledged to experience emotional sequelae over a prolonged period (Blenner, 1990; Diamond, et al.m 1999; Gerrity 2001). To truly understand such a dynamic process of adaptation with a chronic stressor such as infertility, a longer measurement period that is inclusive of pre-diagnostic work-up and post treatment adjustment would be preferable.

The high correlation between the two personal attribute factors presented a third limitation. As highlighted earlier, this might have been addressed by utilizing a bifactor approach, a unique structural equation modeling specification (Chen, et al. 2006). To further elucidate this point, the present investigation

retained the two factor solution and controlled for the respective factors in the subsequent mediational analyses. Doing so had the potential to partial out relevant aspects of the phenomenon. Because the factors were so highly correlated an alternative approach might have considered personal attributes as a single factor in subsequent analyses. However, doing so could also present a challenge. In particular, such an approach might attenuate associations and obscure relevant predictive models. As highlighted by Chen, et al. (2006), use of a bifactor model would have allowed retention of a general factor, personal attributes, and tested for any remaining systematic resilience or vulnerability variation. In the event that either of these factors yielded meaningful variation, over and above that accounted for by the general factor, they would be retained. Overall, this analytic strategy might have yielded a more accurate representation of the data. In so doing, concerns about partialing out phenomenon or attenuating associations would be ameliorated.

A fourth limitation was reflected in the quality of the measurements. Specifically, the degree to which respondents attended to some of the measures may have fallen short of the precision required by the statistical strategies employed. Specifically, several instruments (e.g., neuroticism, optimism, and illness uncertainty) succumbed to issues of satisficing. For these measures, the array of possible responses included a neutral selection. Sample means on these measures suggested that respondents defaulted to this response style when given the opportunity. An array of responses limiting this option might have provided a more accurate characterization of the sample.

The limited variability in endorsements of maladaptive coping strategies (e.g., substance use, self-blame) represented a fifth limitation. This observation suggests the sample may have yielded a positive response bias. To further elucidate this point, it has been suggested that though distress is a common experience for those with infertility, only the emotionally hardy actually agree to the tumultuous experiences associated with treatment. Those who are less hardy either forgo treatment or drop out early. It is possible that those who are less emotionally stable may be more prone to the maladaptive strategies and less likely to enroll in research studies exploring adaptation. Thus, a subset of emotionally compromised infertile women may have been underrepresented in the present analysis. Additionally, this sample was highly educated, primarily Caucasian, and well to do. In terms of demographics, this was a homogenous group, so little can be generalized to more heterogeneous groups of infertile women.

Finally, the use of archival data precluded inclusion of additional salient variables. In their investigation, Kraaij, et al. (2009) included cognitive and behavioral coping strategies. Both sets of strategies evidenced significant bivariate associations with the measures of affect, however, when considering the cognitive and behavioral strategies in concert, only the cognitive strategies (blame, catastrophizing and reappraisal) emerged as significant. Indeed, this finding was consistent with the present investigation. Only avoidance, a measure of cognitive distancing, yielded significant mediation. Moreover, a review of the present correlation matrix suggests that the cognitive strategies of avoidance, self-blame, and reappraisal evidenced the most compelling bivariate associations with

the future measures of distress and wellbeing. It is noteworthy, however, that the present investigation included a small set of cognitive strategies. Thus, the inclusion of strategies such as wishful thinking, catastrophizing, and rumination and acceptance might have yielded more compelling findings.

Future Directions

Infertility represents a unique health problem. Unlike many other medical conditions, women with a primary infertility diagnosis, such as POI, are not threatened by pain, mortality, or accompanying physical symptoms. Though a medical diagnosis predominates, their symptoms tend to be more emotional and relate to issues of identity and loss. Thus, the experience of those with infertility is not generally comparable to other health populations. Consequently, models of adaptation in this population must carefully consider what is relevant from extant health models and integrate it with what is unique about the experience of infertility in order to identify potentially meaningful and clinically relevant avenues for intervention.

In view of current findings and limitations, future investigations should endeavor to include a larger longitudinal sample of women across diverse stages of treatment to allow for more sophisticated modeling, along with stratification to explore momentary and longitudinal associations between coping and adaptation. Moreover, future investigations might expand the model to include additional variables of relevance to this population (e.g. spousal support, stress appraisals) along with more varied assessments of personal attributes (e.g., pessimism, interpersonal sensitivity, extraversion, self-efficacy) and coping, especially

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cognitive strategies (e.g. acceptance, catastrophizing, mental disengagement,

wishful thinking, mental distraction).

Table 1

Demographic Characteristics of Sample

Variable	N[1]	%[2]
Race	102	
Caucasian		78%
African-American		12%
Hispanic		4%
Other		6%
Married/partnered	97	63%
College degree or higher	102	81%
Median Income	92	
0-14,999		7%
15,000-29,999		8%
30,000-49,999		16%
50,000-69,999		12%
70,000-99,999		16%
100,000-150,000		25%
150,000+		16%
Parent (at least one child)	97	32%
Parenthood via	97	
Biological child(ren)		23%
Adoptive child(ren)		5%
Egg donation		3%
Embryo child(ren)		1%

[1] N=number of women who responded to each item.

[2] Percentages are based on the number of women who responded.

Table 2

Scale Names, Number of Items, Item Response Scale, Source, and Reliabilities

Scale	Number of Items	Item Response Scale	Source	Reliability
Neuroticism	8	1-5	John, 1990	.80 [a]
Perceived Stigma	5	1-6	Lennon, Link, Marbach, & Dohrenwend, 1989	.78 [a]
Illness Uncertainty	11	1-5	Adapted from Mishel, 1981	.87 [a]
NFP	10	1-6	Newton, et al, 1999	.88 [a]
Optimism	6	1-5	Scheier, Carver, & Burgess, 1994	.82 [a]
Self-Esteem	10	1-4	Rosenberg, 1989	.88 [a]
Perceived Mastery	7	1-4	Pearlin & Schooler, 1978	.78 [a]
Ego Resiliency	14	1-4	Block & Kremen, 1996	.80 [a]
Brief Cope: Avoid	2	0-3	Carver & Scheier, 1989	.53 [b]
Brief Cope: Blame	2	0-3	Carver & Scheier, 1989	.37 [b]
Brief Cope: Substance Use	4	0-3	Carver & Scheier, 1989	.92 [a]
Brief Cope: Planning	4	0-3	Carver & Scheier, 1989	.88 [a]
Brief Cope: Support Seeking	7	0-3	Carver & Scheier, 1989	.90 [a]
Goal Disengage	4	0-4	Adapted from Wrosch, Scheier, Miller, Schulz, & Carver, 2003	.91 [a]
Goal Reengage	6	0-4	Adapted from Wrosch, Scheier, Miller, Schulz, & Carver, 2003	.95 [a]
Benefit Finding	16	1-5	Adapted from Antoni, et al. 2001	.95 [a]
Anxiety	20	0-3	Spielberger, 1983	.94 [a]
Depression	20	0-3	Radloff, 1977	.91 [a]
Negative Affect	10	1-5	Watson, Clark, & Tellegen, 1996	.87 [a]
Positive Affect	10	1-5	Watson, Clark, & Tellegen, 1996	.93 [a]
Purpose in Life	9	1-6	Ryff & Keyes, 1995	.85 [a]

[a] Cronbach's alpha in current sample. [b] Pearson correlation in current sample

Table 3

Descriptive Properties of Variables

	Variable	Mean Scale Score (*SD*)	Min[1]	Max[1]	Skew	Kurtosis
Psychosocial Vulnerability (Time 1)	Neuroticism (n= 102)	24.04 (6.33)	10	39	-.01	-.45
	Stigma (n=101)	21.55 (5.63)	6	30	-.73	-.03
	Illness Uncertainty (n=100)	30.77 (8.45)	11	46	-.41	-.47
	Need Parenthood (n=75)	34.33 (12.15)	10	57	-.27	-.81
Resilient Resources (Time 1)	Optimism (n=102)	22.90 (5.46)	7	30	-.74	-.12
	Mastery (n=102)	21.57 (4.29)	10	28	-.63	-.09
	Esteem (n=101)	32.61 (5.42)	17	40	-.56	-.20
	Ego Resiliency (n=102)	44.31 (6.01)	26	55	-.64	..29
Adaptive Coping (Time 2)[2]	Planning (n=86)	6.90 (3.35)	0	12	.07	-.78
	Support Seeking (n=86)	8.88 (5.09)	0	19	.34	-.82
	Benefit Finding (n=86)	41.92 (15.13)	16	80	.14	-.78
	Goal Reengage (n=83)	17.47 (6.15)	0	24	-1.00	.39
	Goal Disengage (n=83)	8.59 (4.62)	0	16	-.10	-.77
Maladapt Coping (Time 2)[2]	Substance Use (n=86)	.63 (1.72)	0	12	4.18	22.78
	Self-Blame (n=86)	.95 (1.16)	0	4	1.03	.22
	Avoidance (n=86)	.50 (.89)	0	4	1.89	3.15
Distress (Time 3)[3]	Negative Affect (n=80)	19.97 (6.37)	10	39	.83	.18
	CES-D (n=80)	13.08 (10.36)	0	51	1.26	1.57
	STAI (n=80)	39.79 (11.14)	1	60	.71	1.12
Wellbeing (Time 3)[3]	Positive Affect (n=80)	33.41 (7.82)	10	50	-.47	.78
	Purpose in Life (n=80)	44.28 (7.81)	11	54	-1.62	3.79

Note. [1]Min and Max reflect observed values. [2] Time 2 = 4 months post baseline. [3] Time 3 = 12 months post baseline.

Table 4

Mean Item Scores on Key Variables

	Variable	Mean Item Score	Possible Range
Psychsocial Vuln (Time 1)	Neuroticism (n= 102)	3.00	1-5
	Stigma (n=101)	4.31	1-6
	Illness Uncertainty (n=100)	2.79	1-5
	Need Parenthood (n=75)	3.43	1-6
Resilient Resources (Time 1)	Optimism (n=102)	3.00	1-5
	Mastery (n=102)	3.08	1-4
	Esteem (n=101)	3.25	1-4
	Ego Resiliency (n=102)	3.17	1-4
Adaptive Coping (Time 2)[1]	Planning (n=86)	1.72	0-3
	Support Seeking (n=86)	1.26	0-3
	Benefit Finding (n=86)	2.62	1-5
	Goal Reengage (n=83)	2.91	0-4
	Goal Disengage (n=83)	2.15	0-4
Mal Coping (Time 2)[1]	Self-Blame (n=86)	.47	0-3
	Avoidance (n=86)	.25	0-3
Distress (Time 3)[2]	Negative Affect (n=80)	2.00	1-5
	CES-D (n=80)	.65	0-3
	STAI (n=80)	1.99	1-4
Wellbeing (Time 3)[2]	Positive Affect (n=80)	3.34	1-5
	Purpose in Life (n=80)	4.92	1-6

Note. [1] Time 2 = 4 months post baseline, [2] Time 3 = 12 months post baseline.

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Table 5

Time 1 and Time 3 Means on Measures of Distress and Wellbeing as Compared with Normative Samples.

	Time 1 Mean (*SD*)	Time 3 Mean (*SD*)	Normed Sample Mean (*SD)*
Depression (CESD)	14.31 (*10.61*)	13.08 (*10.36*)	9.3 (*8.6*)[a]
Anxiety (STAI)	41.54 (*10.90*)	39.79 (*11.14*)	35.2 (*10.01*)[b]
Negative Affect (PANAS)	22.38 (*6.84)*	19.97 (*6.37*)	20.2 (*7.3*)[c]
Positive Affect (PANAS)	31.80 (*8.78*)	33.41 (*7.82*)	34.5 (*7.2*)[c]

[a] values pertain to general adult population and are derived from Radloff

(1977); [b] values pertain to adult females sampled from the general population

and are derived from Spielberger (1983); [c] Values pertain to undergraduates and

are derived from Watson & Clark, 1994.

Table 6

Independent Samples t-Tests/Chi-square Tests Comparing Attritters (n = 22) and Non-Attritters (n = 80) on Demographic and Illness-related Variables at 12 Months

Variable	t or χ^2	df	sig
	t		
Age[a]	2.25	100	>.05*
Age at Diagnosis[a]	1.65	95	.10
Time Since Diagnosis[ab]	.68	23	.51
	χ^2		
Education[c]	5.21	5	.39
Race[c]	2.69	3	.44
Marital Status[c]	3.00	4	.56
Ever Pregnant[c]	.19	1	.67
Biological Child(ren)[c]	.77	1	.38
Income[c]	6.09	6	.41

[a]Independent samples t-Test, [b]Equal variances not assumed, [c]Chi square Test

*Attritters M = 34.05(SD = 4.32), Non-Attritters M = 31.20 (SD = 5.47).

Table 7

Independent Samples t-Test Comparisons of Attritters (n = 22) and Non-Attritters (n = 80) on Baseline Variables at 12 Months

Variable	t	df	sig
Neuroticism	-2.04	100	<.05*
Perceived Stigma	-.81	99	.42
Uncertainty in Illness	-.01	97	.99
Optimism	.38	99	.71
Mastery	-.66	100	.51
Ego Resiliency	1.38	100	.17
Need for Parenthood	.44	73	.66

Note. Equal variances assumed; Levene's test not significant for all variables

*Attriters $M = 21.64$ ($SD = 6.08$), Non-Attriters $M = 24.70$ ($SD = 6.27$).

Table 8

Intercorrelations Among 20 Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1.Neurot	--	.36*	.41*	-.04	-.52*	-.60*	-.43*	-.48*	.17	.29	.07	.08	-.06	-.15	.13	.33*	.23*	.37*	-.32*	-.36*
2.Stigma		--	.55*	.04	-.40*	-.39*	.44*	-.37*	.31*	.21	.18	.11	-.09	-.23*	.01	.26*	.17	.28*	-.23*	-.32*
3Uncert			--	-.10	-.44*	-.45*	-.50*	-.34*	.25*	.29*	.12	-.05	-.07	-.20	.00	.17	.13	.23*	-.18	-.18
4.NFP				--	.06	.05	.04	-.01	-.23	.00	.21	.10	-.07	-.02	-.02	-.22	-.19	.18	.19	.10
5.Optim					--	.69*	.68*	.51*	-.11	-.19	.15	.17	.17	.43*	.27*	-.33*	-.14	-.29*	.26*	.52*
6.Esteem						--	.64*	.54*	-.10	-.36*	-.07	.09	.23*	.33*	.01	-.33*	-.30*	-.38*	.32*	.58*
7.Mastery							--	.50*	-.16	-.15	-.06	.05	.16	.38*	.03	-.28*	-.20	-.25*	.30*	.40*
8.Ego Res								--	.05	-.20	.08	.18	.02	.29*	.08	-.27*	-.24*	-.28*	.33*	.37*
9.Avoid									--	.26*	.13	.20	-.18	-.14	.01	.27*	.24*	.46*	-.17	-.18
10.Blame										--	.20	.01	-.31*	-.33*	-.10	.20	.17	.34*	-.20	-.36*
11.Planning											--	.54*	-.24*	-.02	.26*	.01	.08	.05	-.01	.08
12.Support												--	.10	.19	.36*	.05	.04	.04	.14	.15
13.Goal D													--	.57*	.02	-.06	.04	-.09	.15	.09
14.Goal R														--	.22*	-.25*	-.02	-.09	.33*	.35*
15.Benef															--	-.14	.03	-.04	.12	.27*
16.STAI																--	.72*	.68*	-.57*	-.55*
17.CESD																	--	.80*	-.58*	-.53*
18.NAFF																		--	-.50*	-.58*
19.PAFF																			--	.55*
20.PIL																				--

Note. * p<.05, Neurot = Neuroticism, Stigma = Perceived Stigma, Uncer = Uncertainty in Illness, NFP = Need for Parenthood, Optim = Optimism, Esteem = Self Esteem, Mastery = Perceived Mastery, Ego Res = Ego Resiliency, Blame = Self-Blame, Subst = Substance Use, Support = Support Seeking, Goal D = Goal Disengagement, Goal R = Goal Reengagement, Benef = Benefit Finding, STAI = State Anxiety Inventory, CESD = Center for Epidemiologic Studies Depression Scale, NAFF = Negative Affect, PAFF = Positive Affect, PIL = Purpose in Life; Correlations between Time 1 variables, n=102; Time 1 and Time 2 variables, n=86; all correlations with Time 3 variables, n=80.

Table 9

Intercorrelations Among Time 1 Measures of Resilient Resources, Vulnerability, and Distress and Wellbeing

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Neurot	--	.36**	.41**	-.52**	-.60**	-.43**	-.48**	.57**	.59**	.59**	-.49**	-.50**
2. Stigma		--	.55**	-.39**	-.40**	-.43**	-.36**	.35**	.50**	.42**	-.27**	-.31**
3. Uncert			--	-.44**	-.46**	-.50**	-.34**	.35**	.43**	.50**	-.25*	-.24*
4. Optimism				--	.69**	.68**	.51**	-.47**	-.54**	-.61**	.58**	.66**
5. Esteem					--	.64**	.54**	-.56**	-.67**	-.56**	.57**	.67**
6. Mastery						--	.50**	-.40**	-.57**	-.55**	.58**	.59**
7. Ego Res							--	-.51**	-.51**	-.43**	.63**	.54**
8. NAFF_1								--	.60**	.63**	-.37**	-.48**
9. CESD_1									--	.60**	-.65**	-.58**
10. STAI_1										--	-.50**	-.53**
11. PAFF_1											--	.58**
12. PIL_1												--

**p* < .01, **p*<.05

Note. NAFF_1 = Negative Affect (Time1), CESD_1 = Center for Epidemiological Sciences Depression Scale (Time 1), STAI_1 = State Anxiety Inventory (Time 1), PAFF_1 = Positive Affect (Time 1), PIL_1 = Purpose in Life (Time1).

Table 10

Intercorrelations Among Time 1 and Time 3 Measures of Distress and Well-being

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. NAFF_1	--	.60**	.63**	-.37**	-.48**	.44**	.21	.28**	-.10	-.34**
2. CESD_1		--	.60**	-.65**	-.58**	.35**	.37**	.36**	-.29**	-.41**
3. STAI_1			--	-.50**	-.53**	.39**	.25*	.49**	-.36**	-.44**
4. PAFF_1				--	.58**	-.16	-.20	-.23*	.48**	.45**
5. PIL_1					--	-.28*	-.24*	-.31**	.31**	.63**
6. NAFF_3						--	.80**	.68**	-.50**	-.58**
7. CESD_3							--	.72**	-.58**	-.53**
8. STAI_3								--	-.57**	-.55**
9. PAFF_3									--	.55**
10. PIL_3										--

**p < .01, *p <.05*

Note. NAFF_1 = Negative Affect (Time1), CESD_1 = Center for Epidemiological Sciences Depression Scale (Time 1), STAI_1 = State Anxiety Inventory (Time 1), PAFF_1 = Positive Affect (Time 1), PIL_1 = Purpose in Life (Time1), NAFF_3 = Negative Affect (Time 3), CESD_3 = Center for Epidemiological Sciences Depression Scale (Time 3), STAI_3 = State Anxiety Inventory (Time 3), PAFF_3 = Positive Affect (Time 3), PIL_3 = Purpose in Life (Time 3).

Table 11

Two Factor Confirmatory Personal Attributes Solution at Baseline (n =102)

Resilient Resources	Lambda	Psychosocial Vulnerability	Lambda
Optimism	.815	Neuroticism	.697
Self Esteem	.834	Illness Uncertainty	.666
Mastery	.784	Perceived Stigma	.608
Ego Resiliency	.633		

Note. Standardized loadings are reported.

Table 12

Two Factor Confirmatory Coping Solution at Time 2 (n =86)

Approach Coping	Lambda	Letting Go/ Moving On	Lambda
Planning	.553	Goal Disengagement	.617
Support Seeking	.968	Goal Reengagement	.876
Benefit Finding	.373	Self-Blame	-.374

Note. Standardized loadings are reported.

Table 13

Two Factor Confirmatory Outcomes Solution at Time 3 (*N* = 80)

Distress	Lambda	Wellbeing	Lambda
NAFF	.872	PAFF	.744
CESD	.908	PIL	.744
STAI	.802		

Note. NAFF = Negative Affect, CESD = Center for Epidemiologic Studies

Depression Scale, STAI = State Anxiety Inventory, PAFF = Positive Affect, PIL

= Purpose in Life. Standardized loadings are reported.

Table 14

Intercorrelations Among Calculated Composites and Demographic Characteristics of Sample

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.[2]	11.
1.Resilient Re	--	-.68**	.14	**.39****	-.14	**-.36****	**.53****	.05	-.04	.01	*.29***
2.Psych Vuln		--	-.12	**-.29****	**.31****	**.33****	**-.38****	.04	-.02	.08	*-.22**
3.Approach			--	.04	.15	.02	.19	.16	-.12	-.16	-.05
4.Letting Go				--	-.25*	-.19	**.38****	.08	*21*	.19	.07
5.Avoidance[1]					--	**.35****	-.20	-.01	.01	-.13	*-.24**
6.Distress						--	-.69**	.04	.13	.18	-.19
7.Wellbeing							--	.00	-.01	-.10	.35**
8. Age Dx								--	-.12	.22	-.03
9. Time Dx									--	-.05	-.02
10. Parent[2]										--	.12
11. Income											--

*p<.05, **p<.01.

Note. [1]Standardized avoidance score. [2]Parental Status – point biserial correlations. Bolded values represent significant correlations between key study factors. Italicized items represent significant correlations between key study variables and demographic variables. Correlations between Time 1 composites, n=102; Time 1 and Time 2 variables, n=86; all correlations with Time 3 variables, n=80.

Table 15

Simple Regression Analyses: Predictions to Outcomes from Personal Attributes

Predictors	*B* (*SE*)	*p*
Predictions to Distress		
Personal Attributes → Distress		
Resilient Resources	-.27(.09)	<.01
Psychosocial Vulnerability	.34(.13)	<.01
Income	-.28(.17)	.09
Coping → Distress		
Avoidance	.87(.31)	<.01
Predictions to Wellbeing		
Personal Attributes → Wellbeing		
Resilient Resources	.24(.05)	<.001
Psychosocial Vulnerability	-.23(.08)	<.01
Income	.33(.10)	<.01
Coping → Wellbeing		
Letting Go/Moving On	.35(.08)	<.001

Note: Income is controlled for in all analyses. Unstandardized coefficients are reported. Equations between Time 1 and Time 3 variables, n=102; Equations between Time 2 and Time 3 variables, n=86.

Table 16

Simple Regression Analyses: Predictions to Coping from Personal Attributes

Predictors	*B* (*SE*)	*p*
Predictions → Letting Go/Moving On		
Resilient Resources	.29(.08)	<.001
Psychosocial Vulnerability	-.23(.08)	<.01
Income	-.07(.11)	.49
Predictions → Avoidance		
Psychosocial Vulnerability	.11(.05)	<.05
Income	-.14(.06)	<.05

Note. Income was included as a control variable for in all analyses.

Unstandardized coefficients are reported. Equations between Time 1 and Time 2

variables, n=102.

Table 17

Single Mediator Models: Finalized

Model	a	b	c'	ab	95% CI of mediated effect	
					Lower	Upper
Resilient Resources → Letting Go/Moving On→Wellbeing[1]	.24(.11)*	.15(.12)	.26(.10)**	.04(.03)	-.01	.12
Psychosocial Vulnerability → Avoidance → Distress[2]	.11(.05)*	.76(.31)*	.27(.15)†	.09(.05)†	**.01**	**.21**

†p=.07 *p<.05 **p<.01

Note. [1]Model is controlling for psychosocial vulnerability in the mediator and outcome. [2]Model is controlling for resilient resources and income in the mediator and outcome.
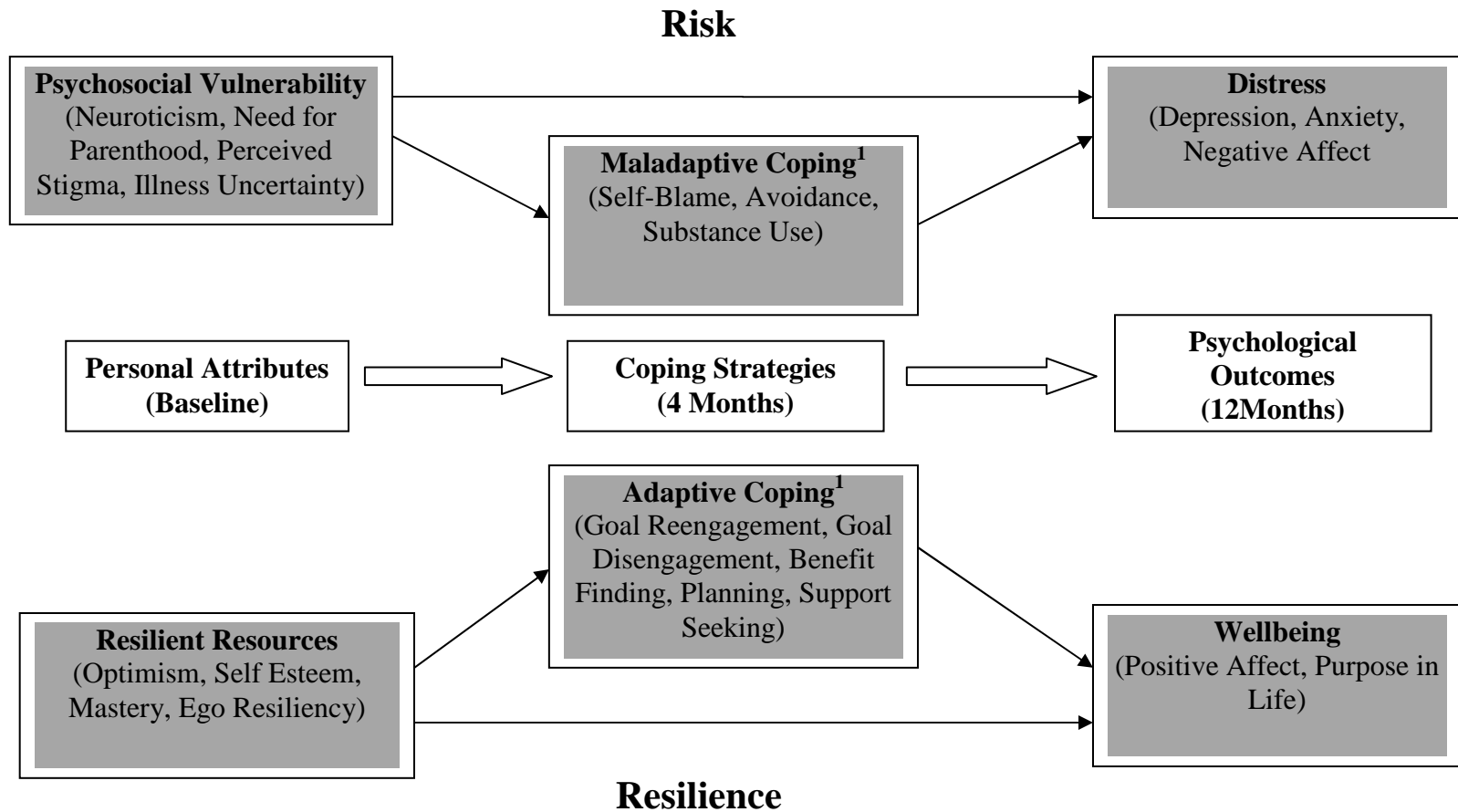
Risk

| Psychosocial Vulnerability (Neuroticism, Need for Parenthood, Perceived Stigma, Illness Uncertainty) |
| Maladaptive Coping[1] (Self-Blame, Avoidance, Substance Use) |
| Distress (Depression, Anxiety, Negative Affect |

| Personal Attributes (Baseline) | ⟹ | Coping Strategies (4 Months) | ⟹ | Psychological Outcomes (12Months) |

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| Adaptive Coping[1] (Goal Reengagement, Goal Disengagement, Benefit Finding, Planning, Support Seeking) |
| Resilient Resources (Optimism, Self Esteem, Mastery, Ego Resiliency) |
| Wellbeing (Positive Affect, Purpose in Life) |

Resilience

Figure 1. Model of risk and resilience in women with spontaneous 46,XX POI (Hypothesis 2a)

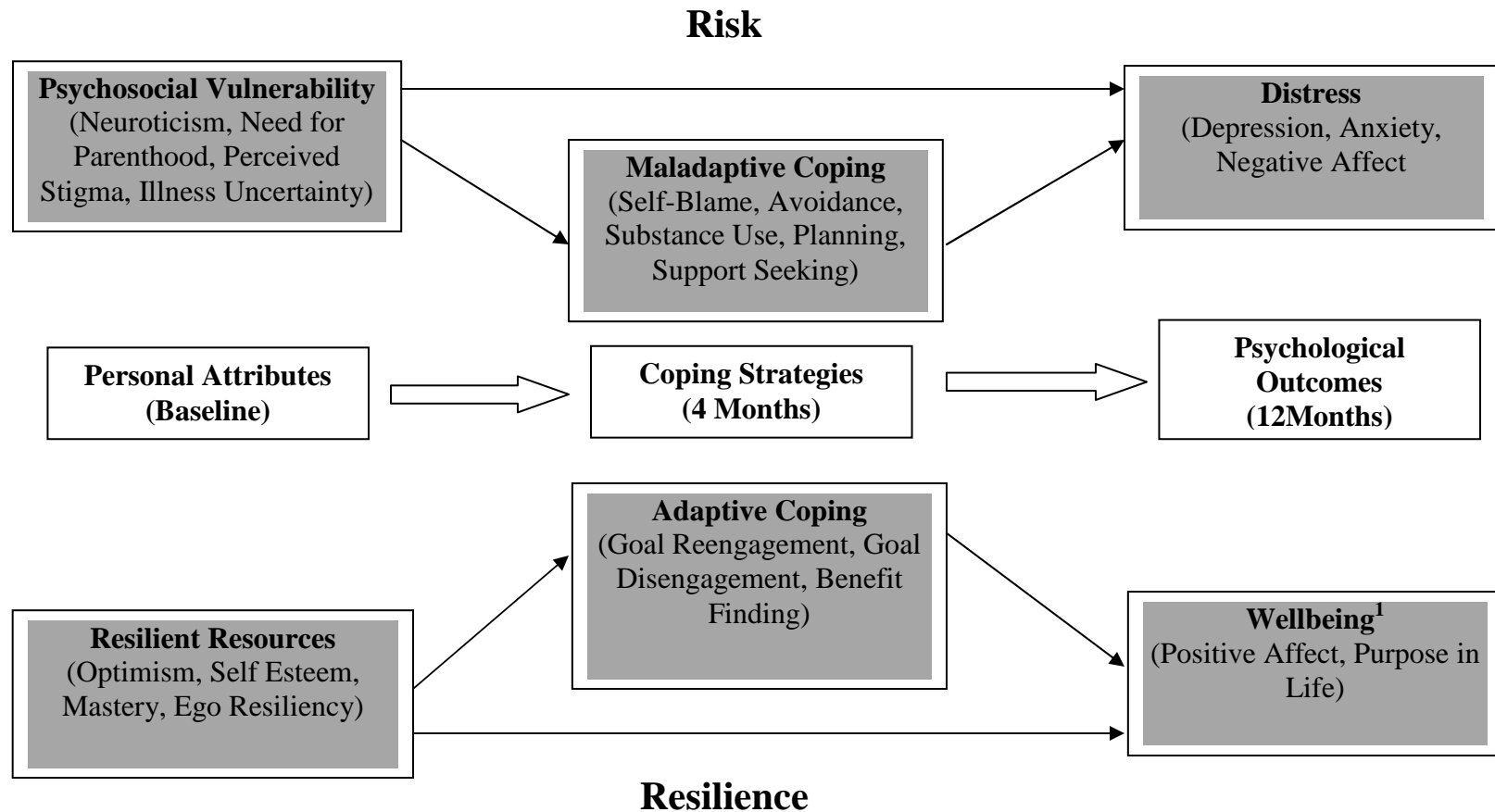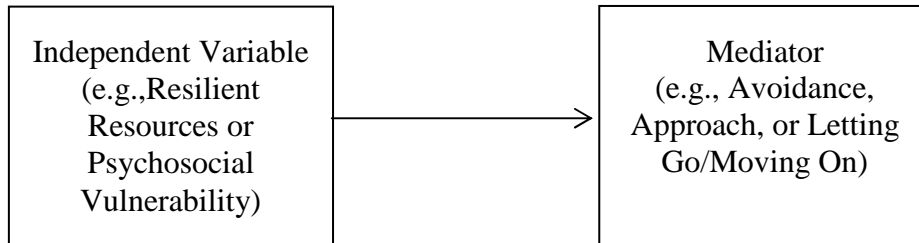[1]This model depicts coping factor structures consistent with coping Hypothesis 2a.

Risk

Psychosocial Vulnerability (Neuroticism, Need for Parenthood, Perceived Stigma, Illness Uncertainty)	**Maladaptive Coping** (Self-Blame, Avoidance, Substance Use, Planning, Support Seeking)	**Distress** (Depression, Anxiety, Negative Affect

Personal Attributes (Baseline) ⟹ **Coping Strategies (4 Months)** ⟹ **Psychological Outcomes (12Months)**

Adaptive Coping (Goal Reengagement, Goal Disengagement, Benefit Finding)

Resilient Resources (Optimism, Self Esteem, Mastery, Ego Resiliency)

Wellbeing[1] (Positive Affect, Purpose in Life)

Resilience

Figure 2. Model of risk and resilience in women with spontaneous 46,XX POI (hypothesis 2b)

[1]This model depicts coping factor structures consistent with Benyamini, et al. (2008); Hypothesis 2b.

Figure 3. Simple regressions.

1. *Total effect independent variable to mediator*

| Independent Variable (e.g.,Resilient Resources or Psychosocial Vulnerability) | → | Mediator (e.g., Avoidance, Approach, or Letting Go/Moving On) |

2. *Total effect mediators to outcomes*

| Mediator (e.g., Avoidance, Approach, or Letting Go/Moving On) | → | Outcome (e.g., Distress or Wellbeing) |
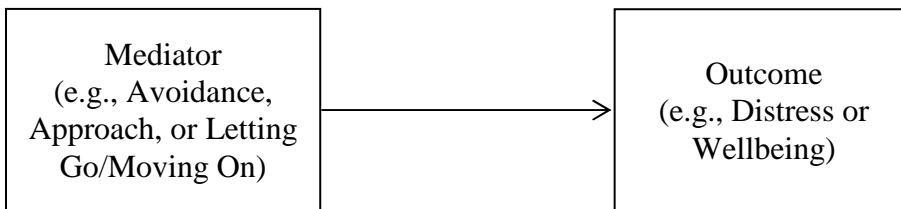
3. *Total effect independent variable to outcome, (also known as c path)*

| Independent Variable (e.g., Resilient Resources or Psychosocial Vulnerability) | c → | Outcome (e.g., Distress or Wellbeing) |
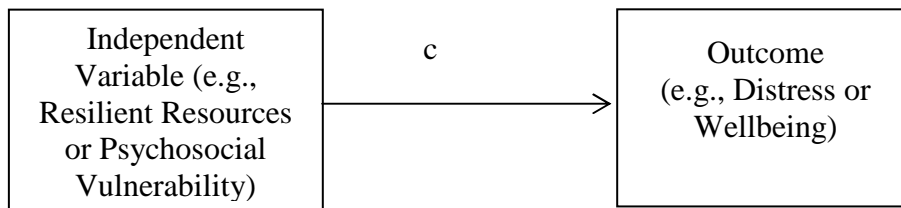
Figure 4. Mediation utilizing standard MacKinnon notation (2008).
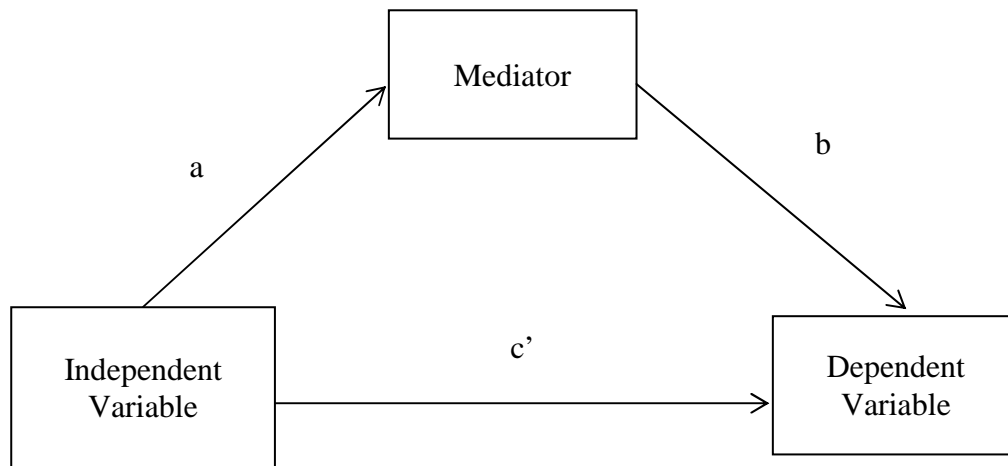
Figure 5. Standardized two factor personal attributes solution.
**p<.001
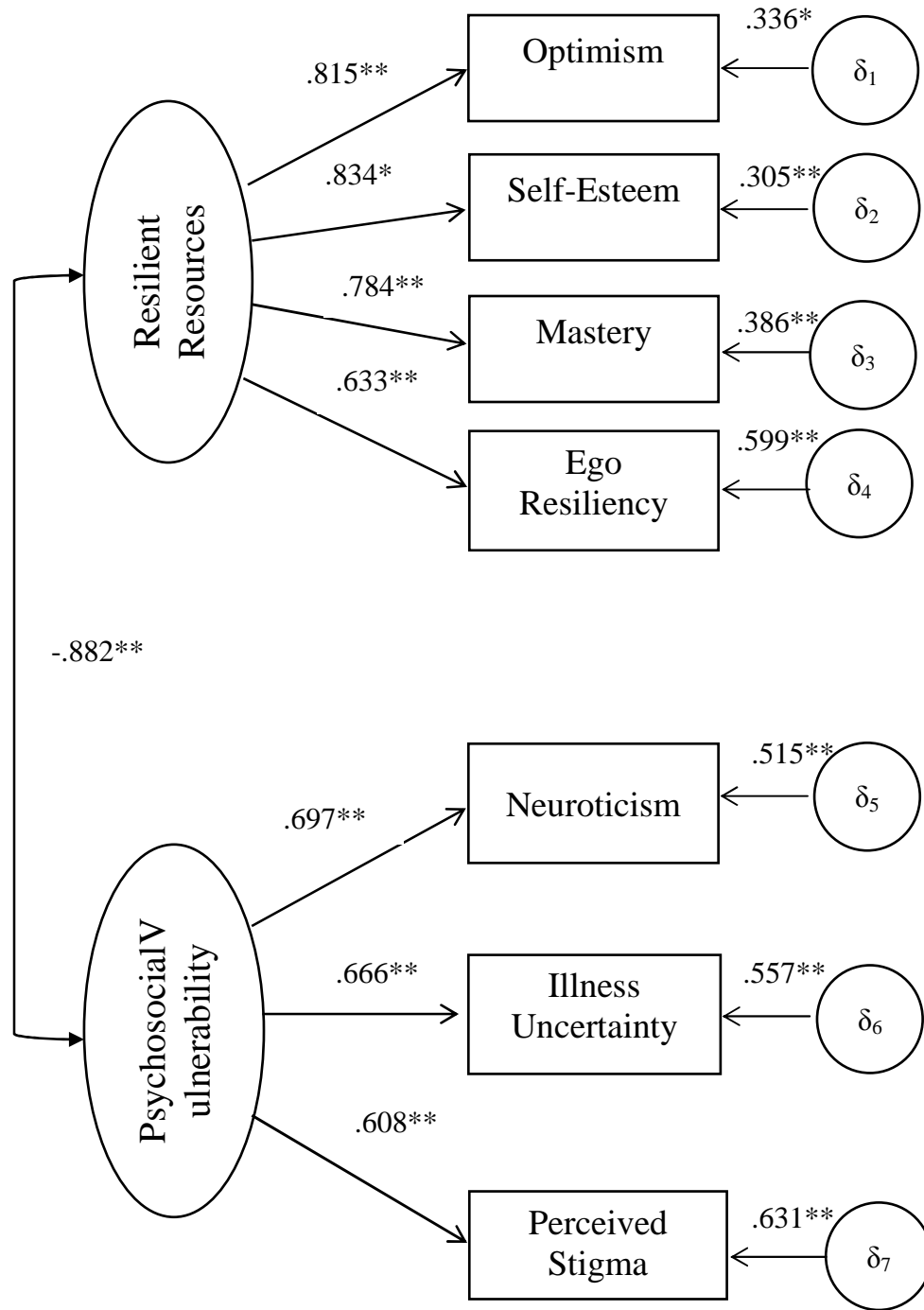
$\chi^2 (13) = 17.054$
p =ns
CFI = .986
RMSEA =.055 (90% CI: .00-.12)
SRMR = .038

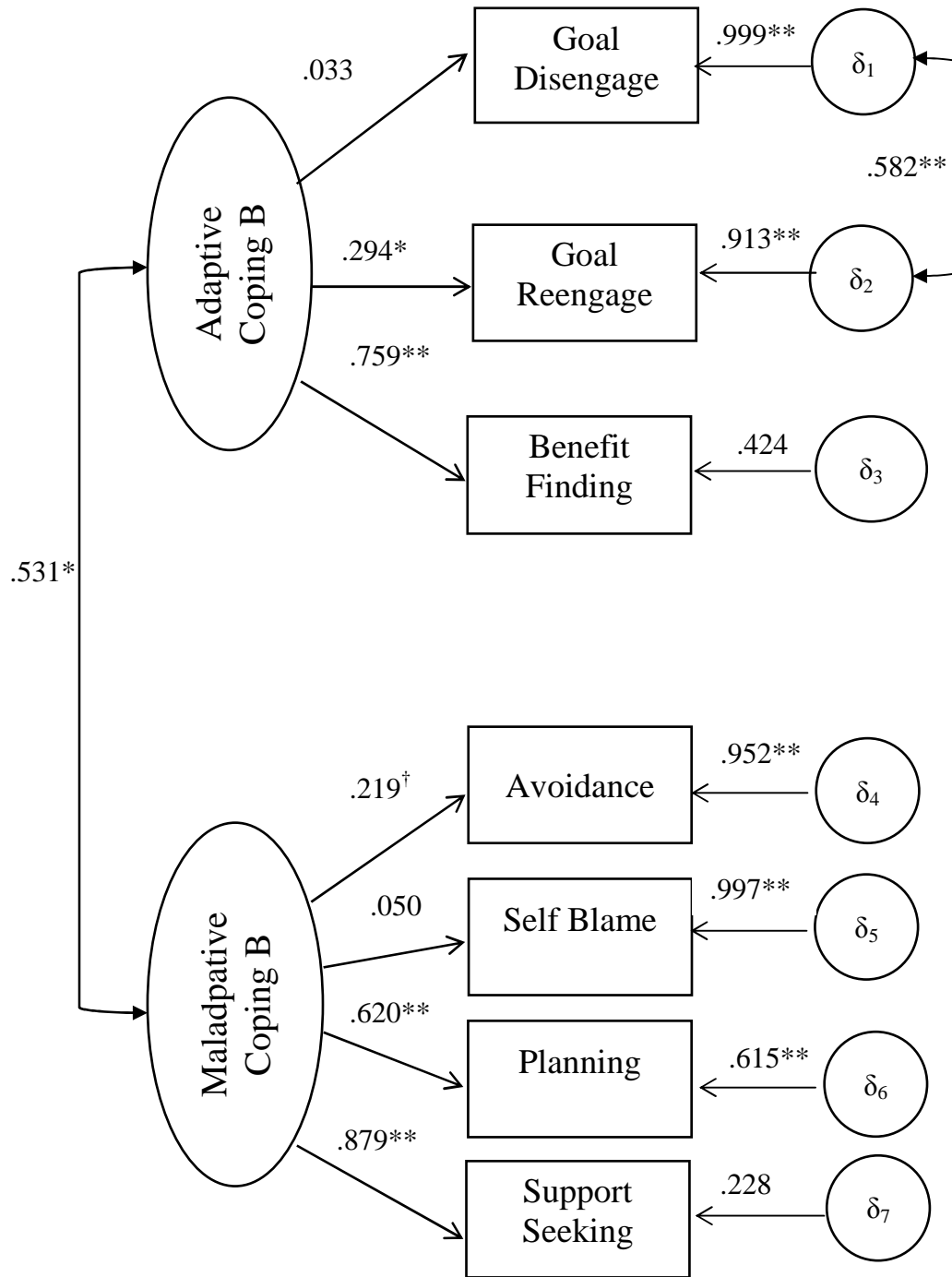*Figure 6.* Standardized one factor personal attributes solution.
**p<.001
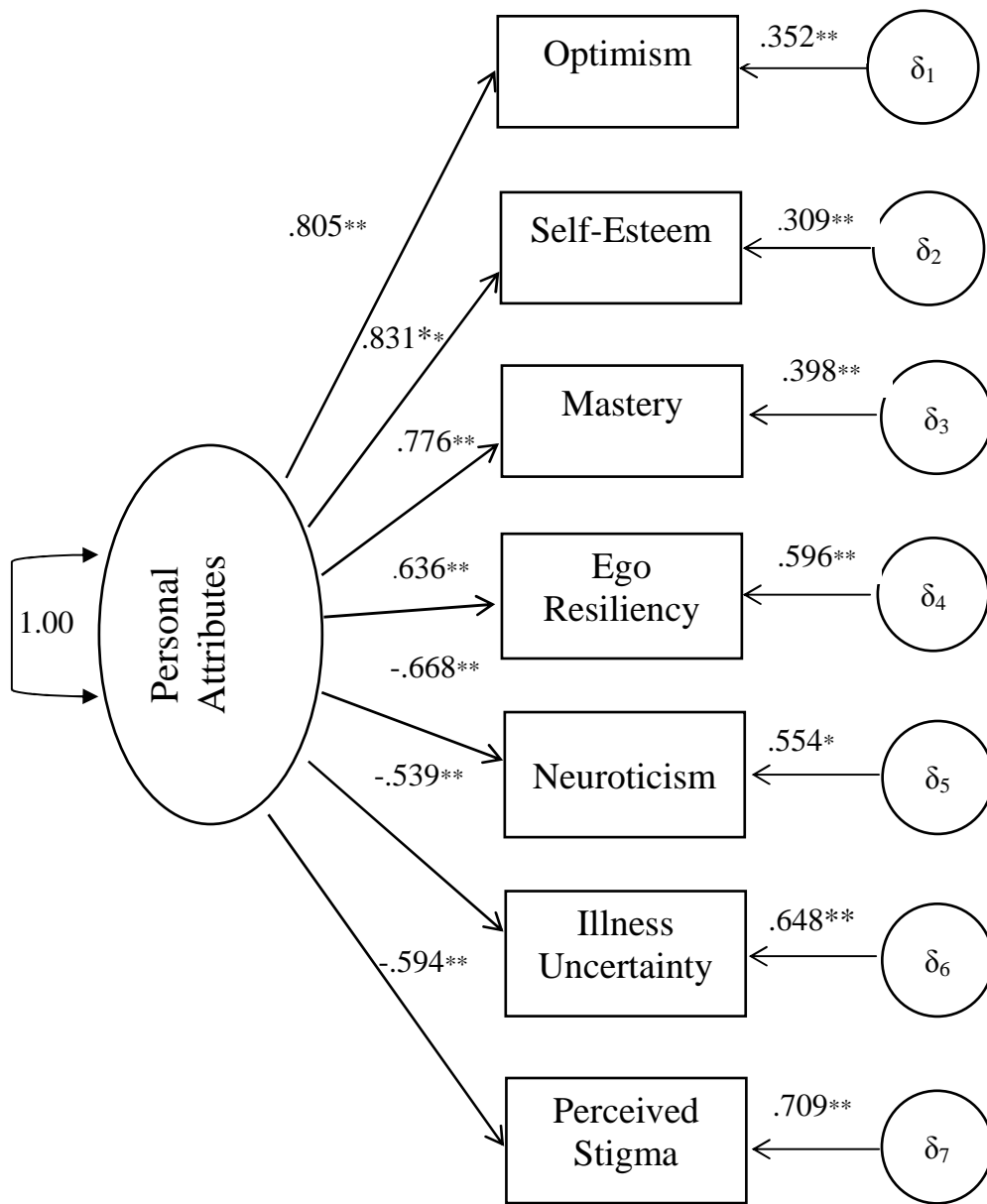
$\chi^2 (14) = 21.23$
p =ns
CFI = .975
RMSEA =.071 (90% CI: .00-.13)
SRMR = .044

Figure 7. Standardized two factor coping solution: Hypothesis B.
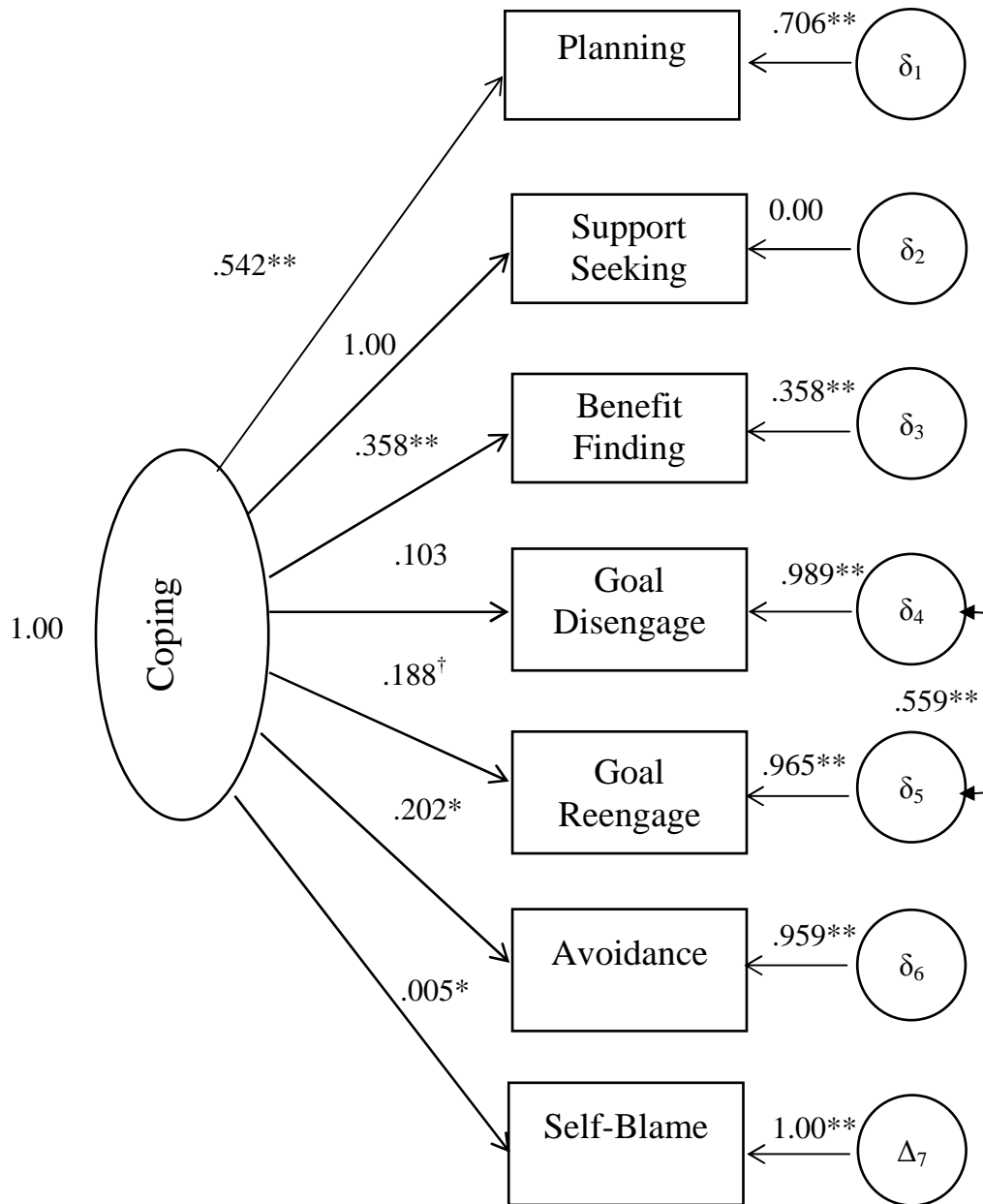**†** *p*<.08 * *p*<.05 **p*<.01

Adaptive Coping B

.033 → Goal Disengage

.294* → Goal Reengage

.759** → Benefit Finding

.999** — δ₁

.582** — δ₂

.913** — δ₂

.424 — δ₃

.531*

Maladpative Coping B

.219† → Avoidance

.050 → Self Blame

.620** → Planning

.879** → Support Seeking

.952** — δ₄

.997** — δ₅

.615** — δ₆

.228 — δ₇

$\chi^2 (12) = 34.830$
p <.001
CFI = .767
RMSEA =.149 (90% CI: .09-.21)
SRMR = .116

Figure 8. Standardized one Factor coping solution (7 indicators).
† *p*.08 **p<.05 **p<.001*

χ^2 (14) =38.54
p < .001
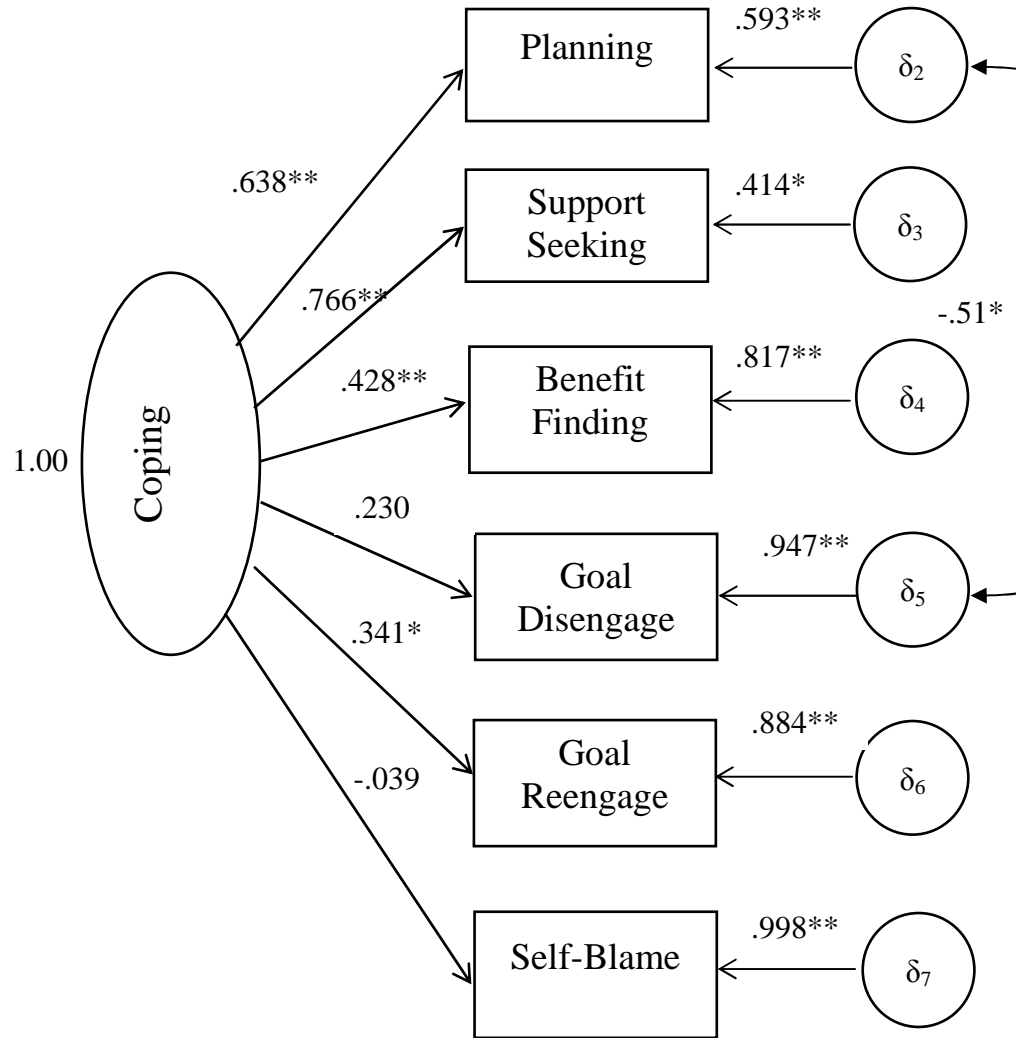CFI = .749
RMSEA =.143 (90% CI: .09-.20)
SRMR = .146

Figure 9. Standardized two factor empirical coping solution.
* *p*<.01 **p<.001
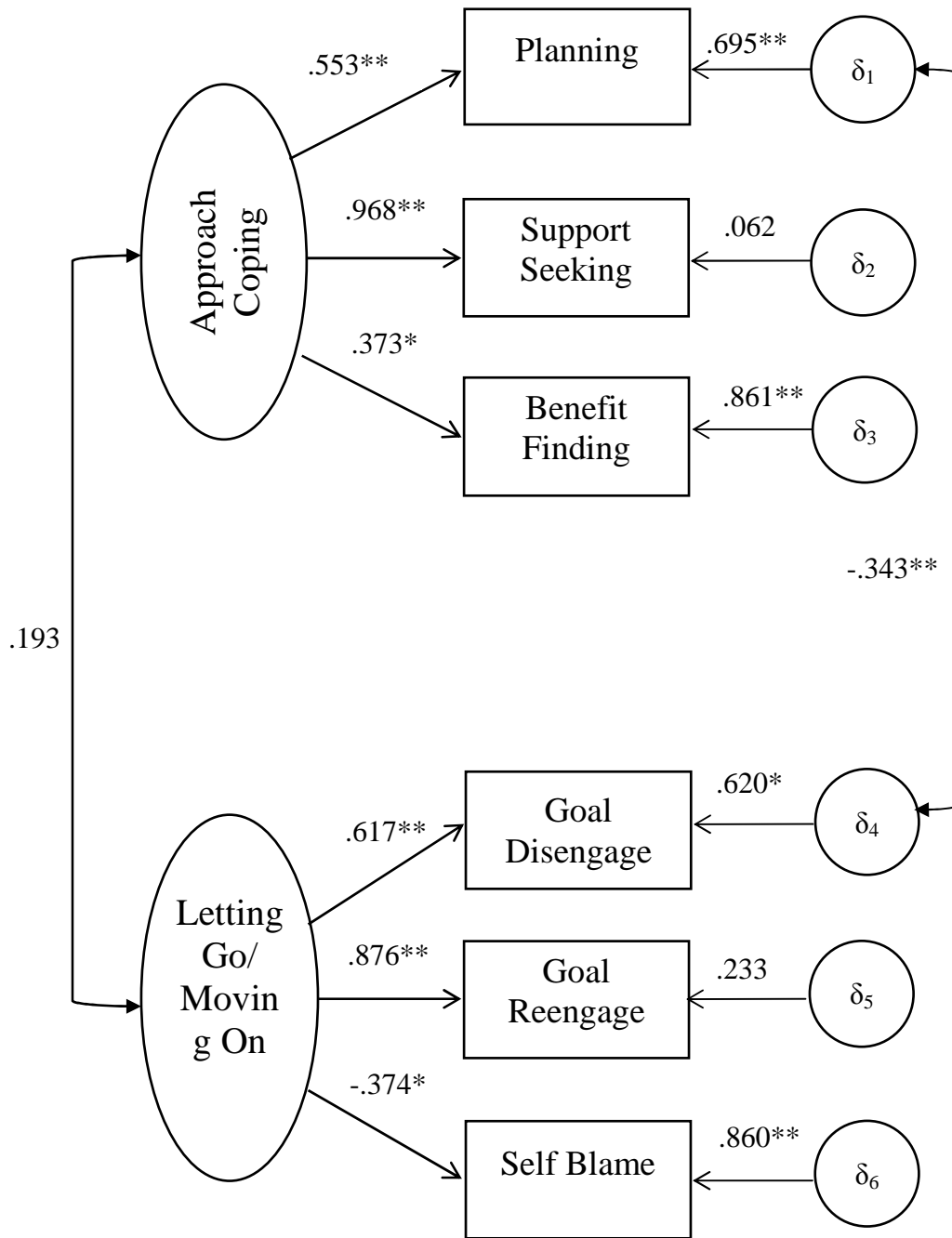
$\chi^2 (7) = 11.105$
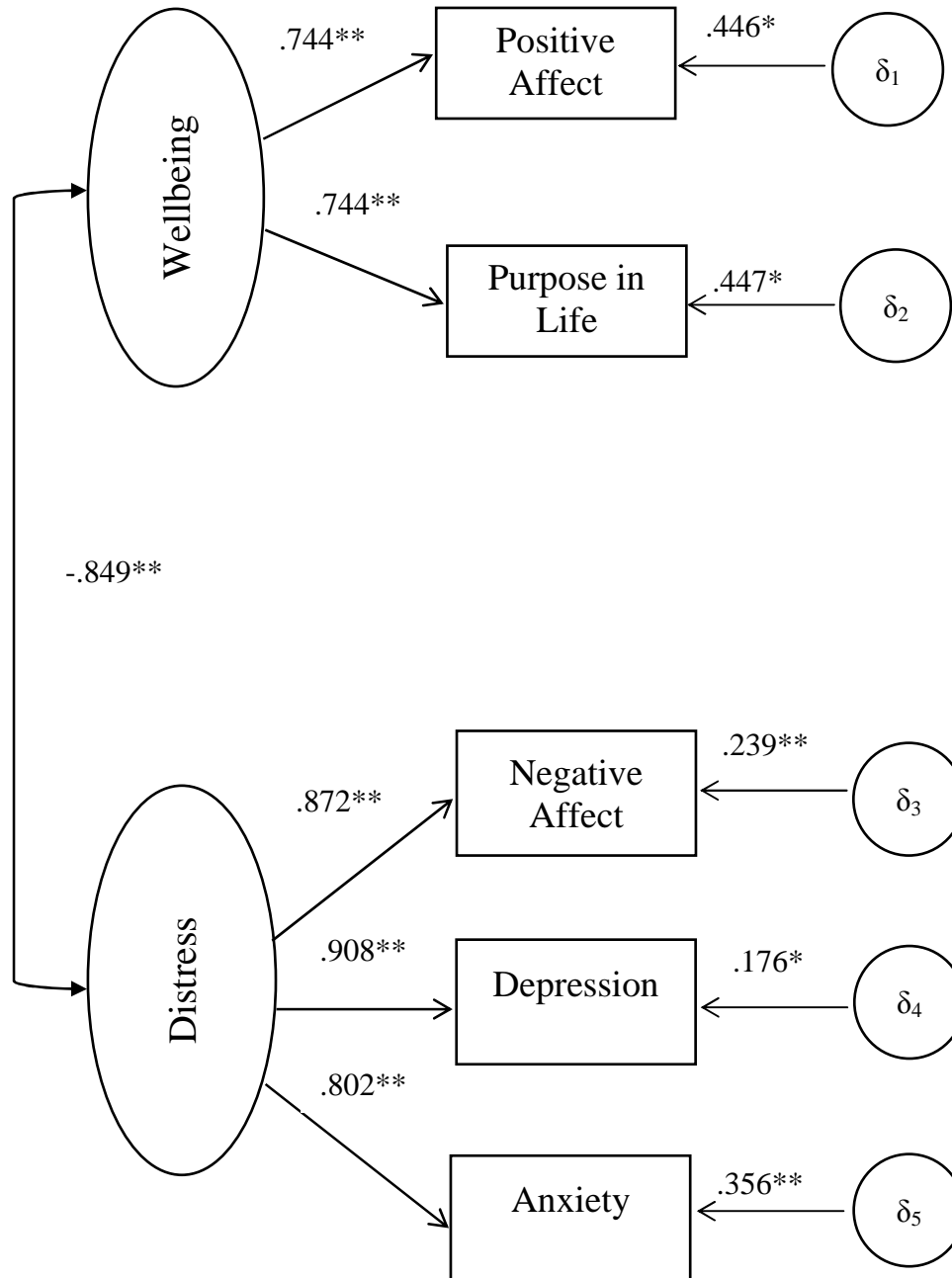*p* = ns
CFI = .955
RMSEA =.083 (90% CI: .00-.17)
SRMR = .069

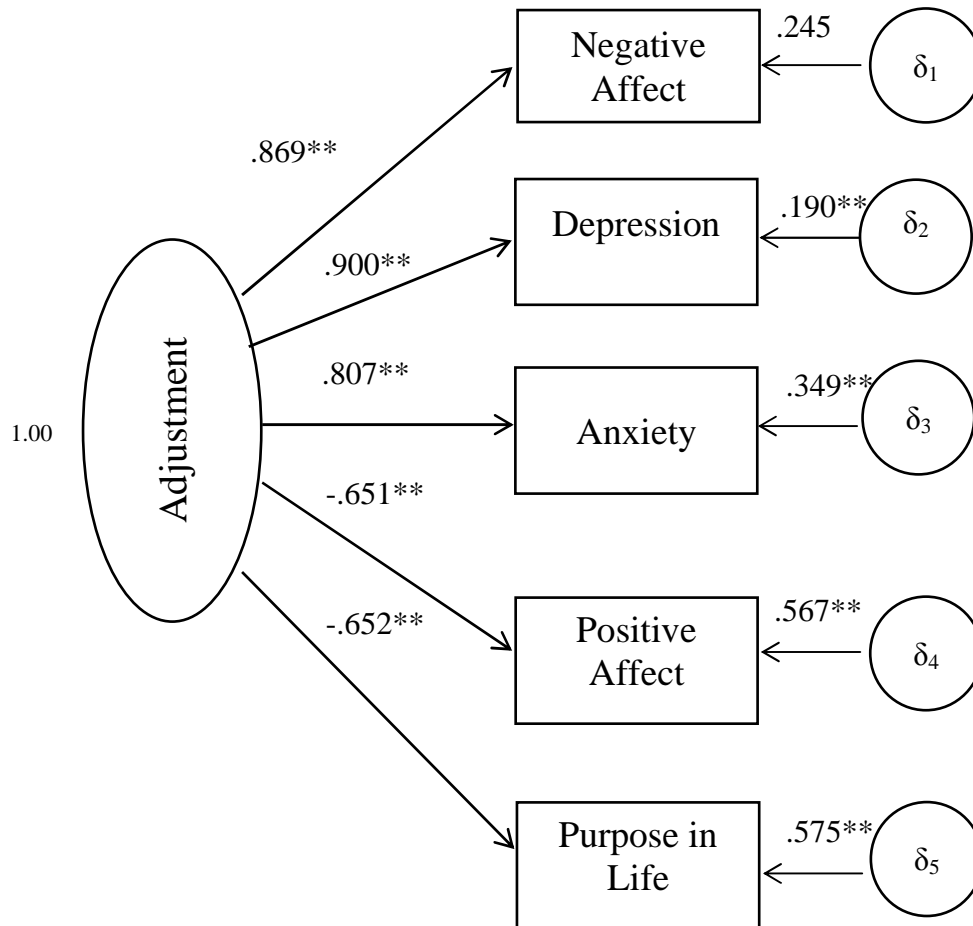*Figure 10.* Standardized one factor coping solution (6 indicators).
p<.05 **p*<.001

χ^2 (8) =48.128
p < .001
CFI = .563
RMSEA =.242 (90% CI: .18-.31)
SRMR = .146

Figure 11. Standardized two factor outcome solution.
*p<.01 **p<.001

$\chi^2(4) = 6.656$
p = ns
CFI = .988
RMSEA = .091 (90% CI: 0-.21)
SRMR = .024

Figure 12. Standardized one factor outcome solution.
**p<.001

$\chi^2(4) = 11.449$
p = ns
CFI = .971
RMSEA = .127 (90% CI: .02-23)
SRMR = .037

Figure 13. Mediational model of the association between resilient resources and wellbeing with letting go/moving on as the mediator.
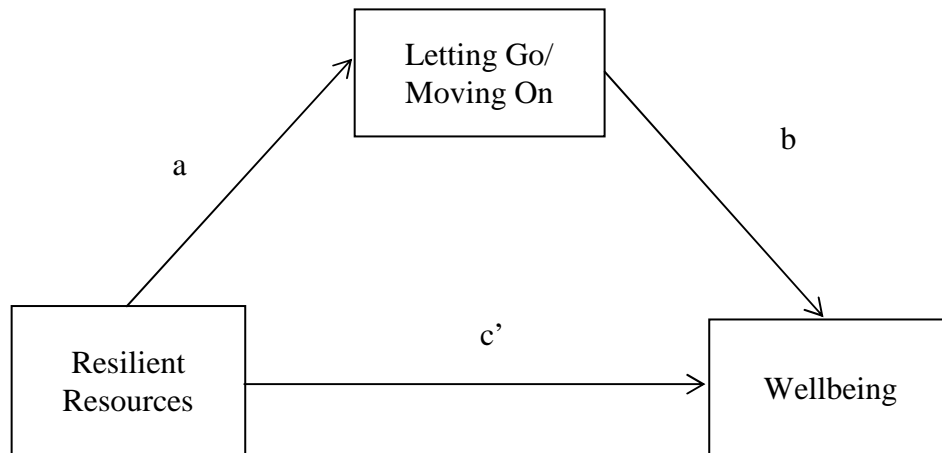
Figure 14. Mediational model of association between vulnerability and distress

with avoidance as a mediator.
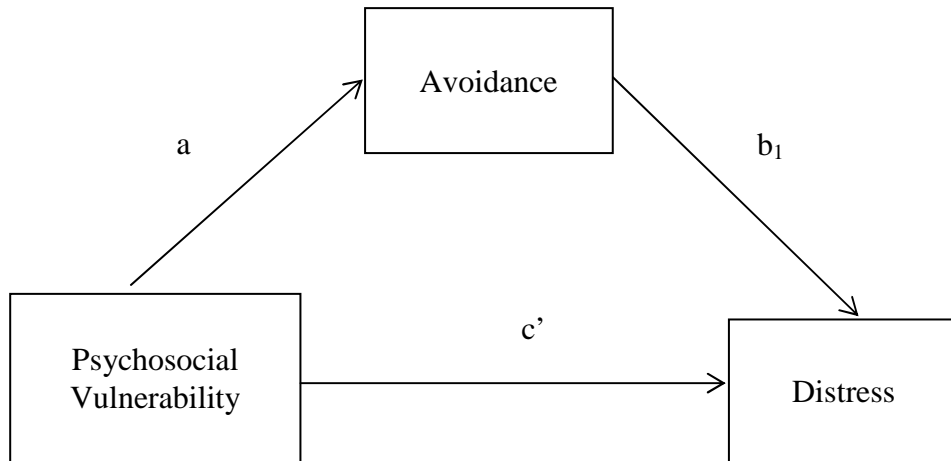
Figure 15. Finalized model depicting the association between resilient resources and wellbeing mediated by letting go/moving on. Unstandardized paths are shown.* p < .05 **p < .01; Dashed lines denote non-significant paths; solid lines denote significance; double-headed arrows represent significant correlations

Indirect effect (ab) = .04(.03)
95% CI (-.006 - .120)
Just identified Model

-.05(.14)

Letting
Go/Moving On
(4 months)

.15(.12)

.24(.11)

Resilient
Resources
(Baseline)

.26(.10)**

Wellbeing
(12 months)

Psychosocial
Vulnerability
(Control)

.04(.11)

Figure 16. Preliminary model depicting the association between psychosocial vulnerability and distress mediated by avoidance. Unstandardized paths are shown. p < [*].05 **p<.01; Dashed lines denote non-significant pathways; solid lines denote significant pathways; double-headed arrows represent significant correlations.

.05(06)

Avoidance
(4 months)

Indirect effect (ab) =
.16(.07) 95% CI (.06-.35)
Model is just identified

.17(.06)**

.90(.28)**

Psychosocial
Vulnerability
(Baseline)

.00(.17)

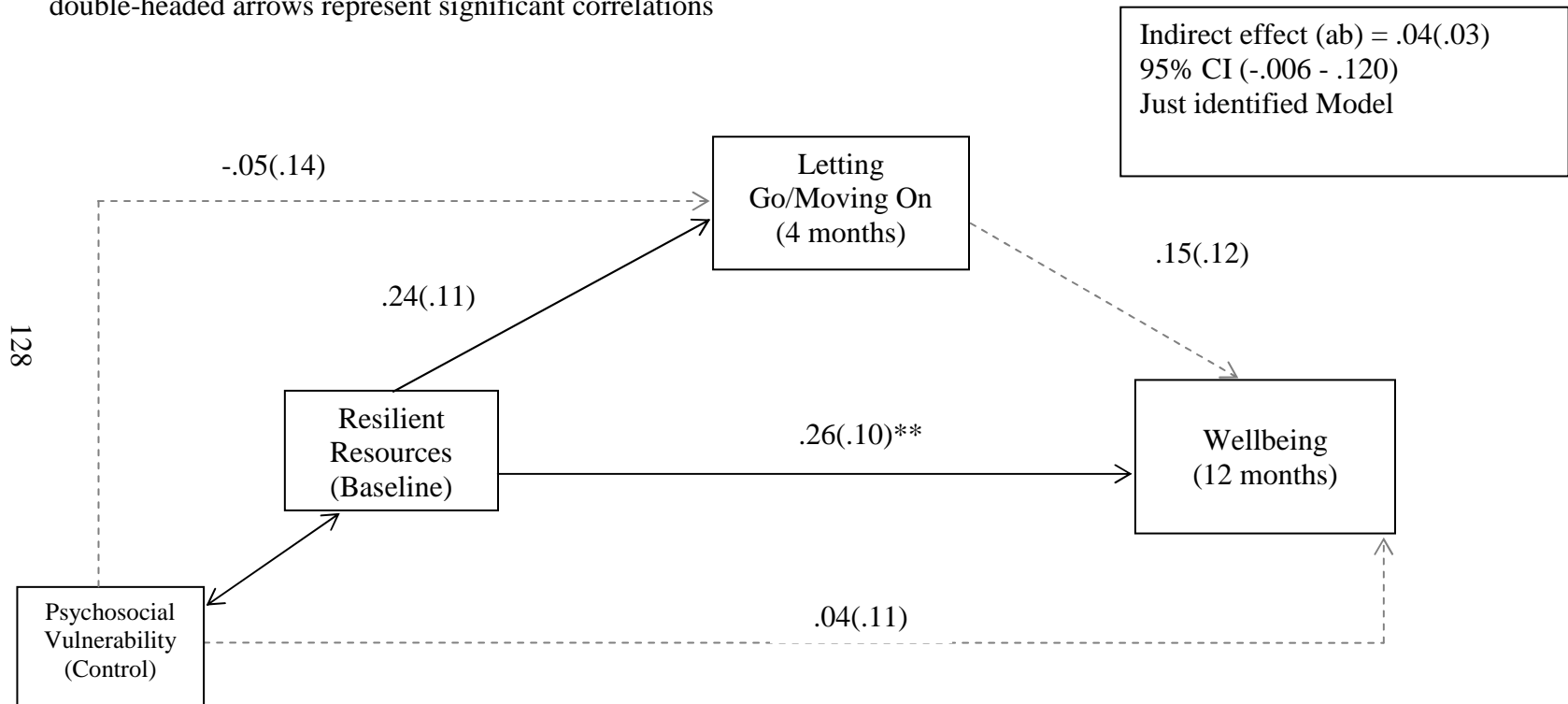Distress
(12 months)

Resilient
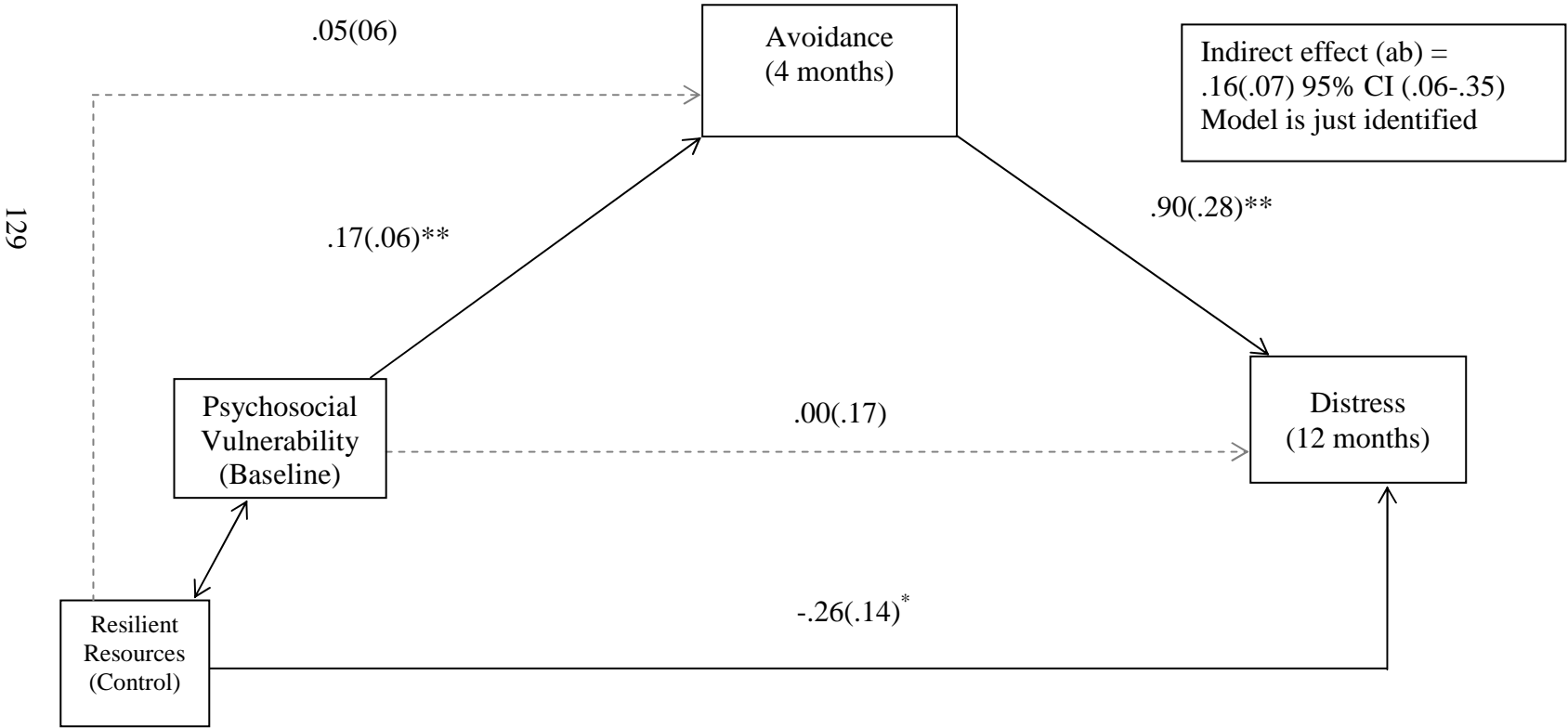Resources
(Control)

-.26(.14)[*]

Figure 17. Finalized model depicting the association between psychosocial vulnerability and distress mediated by avoidance. Unstandardized paths are shown. [†].08 **p<.01; Dashed lines denote non-significant pathways; solid lines denote significant pathways; double-headed arrows represent significant correlations

Income
(Control)

Indirect effect (ab) =
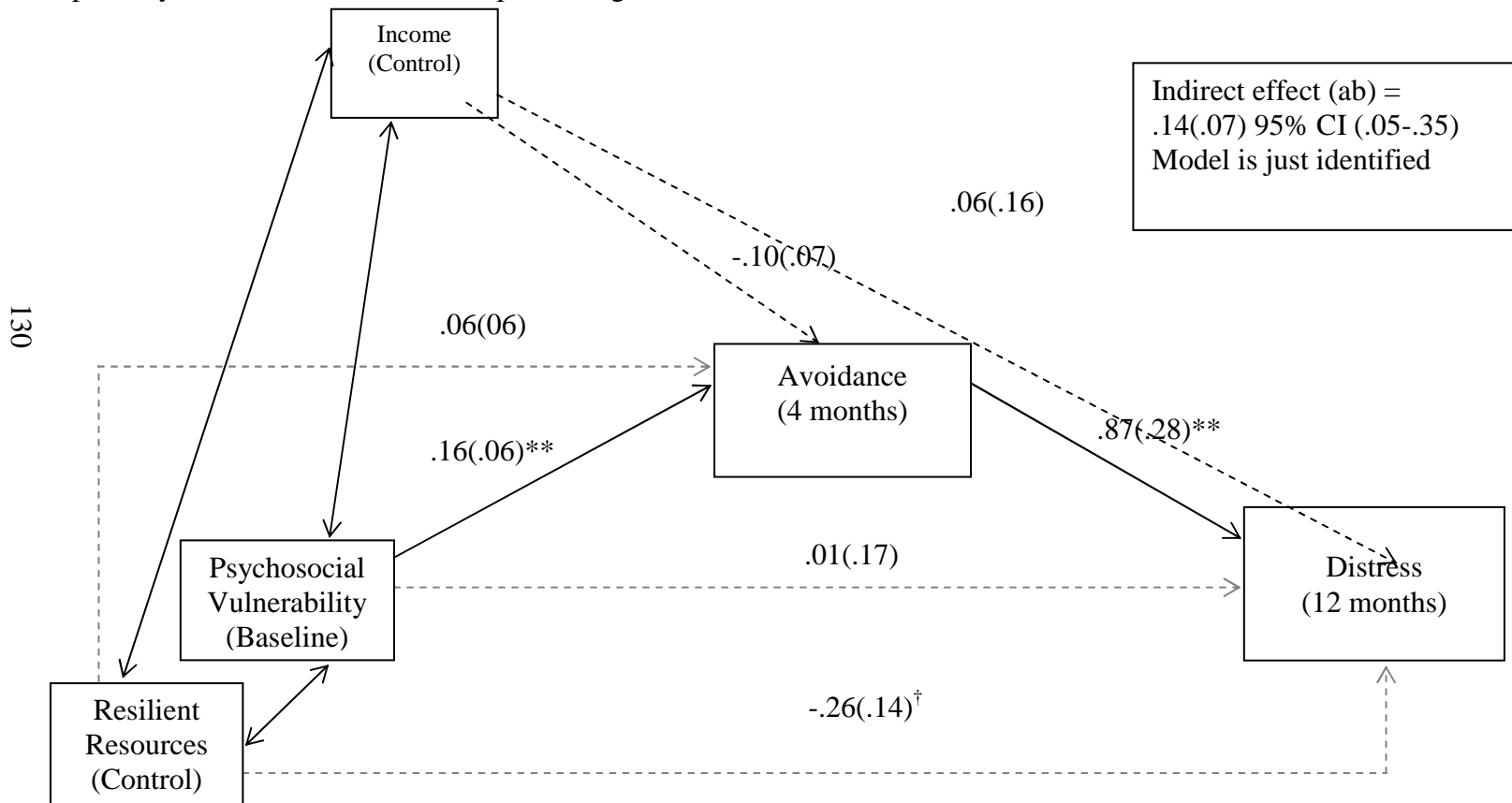.14(.07) 95% CI (.05-.35)
Model is just identified

.06(.16)

-.10(.07)

.06(06)

Avoidance
(4 months)

.16(.06)**

.87(.28)**

.01(.17)

Psychosocial
Vulnerability
(Baseline)

Distress
(12 months)

Resilient
Resources
(Control)

-.26(.14)[†]

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APPENDIX A

TIME 1 MEASURES

Optimism: LOT-R (Scheier, Carver, Burgess, 1994)

Please circle the appropriate number for each statement

1	2	3	4	5
Disagree Strongly	Disagree A Little	Neither Agree Nor Disagree	Agree a Little	Agree Strongly

1. In uncertain times, I usually expect the best.
2. If something can go wrong for me, it will (Reverse)
3. I'm always optimistic about my future.
4. I hardly ever expect things to go my way (Reverse)
5. I rarely count on good things happening to me (Reverse)
6. Overall, I expect more good things to happen to me than bad (Reverse)

Self-Esteem (Rosenberg, 1989)

Please indicate how much you agree or disagree currently with each statement below.

1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

1. Feel that I am a person of worth, at least on equal plane with others
2. I feel that I have a number of good qualities
3. All in all, I am inclined to feel that I am failure (Reverse)
4. I am able to do things as well as most people
5. I feel that I do not have much to be proud of (Reverse)
6. I take a positive attitude toward myself
7. On the whole, I am satisfied with myself
8. I wish I could have more respect for myself
9. I certainly feel useless at times (Reverse)
10. At times I think I am no good at all (Reverse)

Perceived Mastery (Pearlin & Schooler, 1978)

Below are seven (7) statements that reflect some of the ways people feel at times. How much does each statement reflect the way you've been feeling currently?

1	2	3	4
Not at All	A Little	Somewhat	Very Much

1. There is really no way I can solve some of the problems I have (Reverse)
2. Sometimes I feel I'm being pushed around in life (Reverse)
3. I have little control over the things that happen to me (Reverse)
4. I can do just about anything I set my mind to
5. I often feel helpless in dealing with the problems of life (Reverse)
6. What happens to me in the future mostly depends on me
7. There is little I can do to change many of the important things in my life (Reverse)

Ego Resiliency (Block & Kremen,1996)

Please rate how truthfully the following characteristics apply to you, generally

1	2	3	4
Does not Apply at All	Applies Slightly	Applies Somewhat	Applies Very Strongly

1. I am generous with my friends
2. I quickly get over and recover from being startled
3. I enjoy dealing with new and unusual situations
4. I usually succeed in making a favorable impression on people
5. I enjoy trying new foods I have never tasted before
6. I am regarded as a very energetic person
7. I like to take a different route to familiar places
8. I am more curious than most people
9. Most of the people I meet are likable
10. I usually think carefully about something before acting
11. I like to do new and different things
12. My daily life is full of things that keep me interested
13. I would be willing to describe myself as a pretty strong personality
14. I get over my anger at somebody reasonably quickly

Neuroticism (John, 1990)

I see myself as someone who. . .

1	2	3	4	5
Disagree Strongly	Disagree A Little	Neither Agree Nor Disagree	Agree a Little	Agree Strongly

1. Is depressed, blue
2. Is relaxed, handles stress well
3. Can be tense
4. Worries a lot
5. Is emotionally stable, not easily upset
6. Can be moody
7. Remains calm in tense situations
8. Gets nervous easily

Illness Uncertainty (Mischel, 1981)

Select the statement that reflects the way you've been currently feeling about your POI. . .

1	2	3	4	5
Disagree Strongly	Disagree A Little	Neither Agree Nor Disagree	Agree a Little	Agree Strongly

1. I don't know what is wrong with me
2. I have a lot of questions without answers
3. I am unsure if my condition is getting better or worse
4. The explanations they give about my condition seem hazy
5. I have been given many differing opinions about what is wrong with me
6. The doctors say things to me that could have many meanings
7. Because of the unpredictability of my condition, I cannot plan for the future
8. It is not clear what is going to happen to me
9. I understand everything explained to me (Reverse)
10. The results of my tests are inconsistent
11. The doctors and nurses use everyday language so I can understand what they are saying
(Reverse)
12. I'm certain they will not find anything else wrong with me (Reverse)
13. They have not given me a specific diagnosis
14. The effectiveness of the treatment is undetermined

Perceived Stigma (Lennon, et al. 1989)

Now that I have been diagnosed with POI. . .

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

1. There is a part of me that only other people who have experienced this medical condition can understand
2. I have sometimes wished that people could see my medical condition
3. Having this medical condition has made me feel very different from other people
4. Most people have no idea what it is like to have this medical condition
5. I often feel totally alone with my medical condition

Need for Parenthood (Newton, et al. 1999)

Please complete the following section if you currently have a partner and would like to become pregnant. Otherwise, please leave it blank. If you have a child, please answer the way you feel right now, after having a child.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

1. It's hard to feel like a true adult until you have a child
2. Pregnancy and childbirth are the two most important events in a couple's relationship
3. My marriage needs a child
4. For me, being a parent is a more important goal than having a satisfying career
5. A future without a child would frighten me
6. I feel empty because of our fertility problem
7. Having a child is not the major focus of my life (Reverse)
8. I have often felt that I was born to be a parent
9. As long as I can remember, I have wanted to be a parent
10. I will do just about anything to have a child

APPENDIX B

TIME 2 MEASURES

Goal Flexibility: Disengagement & Reengagement (Wrosch, et al. 2003)

Please indicate how much you agree with the following statements. If I have to stop pursuing my goal of pregnancy. . .

0	1	2	3	4
Not True at All	Rarely True	Sometimes True	Often True	True Nearly All the Time

Disengagement Statements
1. It's easy for me to reduce my effort toward the goal (Reverse)
2. I find it difficult to stop trying to achieve the goal
3. I stay committed to the goal for a long time; I can't let it go (Reverse)
4. It's easy for me to stop thinking about the goal and let it go (Reverse)

Reengagement Statements
1. I put effort toward other meaningful goals
2. I convince myself that I have other meaningful goals to pursue
3. I start working on other new goals
4. I tell myself that I have a number of other new goals to draw on
5. I think about other new goals to pursue
6. I seek other meaningful goals

Benefit Finding (Antoni, et al. 2001)

Having been diagnosed with POI. . .

1	2	3	4	5
Not at All	A little	Moderately	Quite a Bit	Extremely

1. Has led me to be more accepting of things
2. Has taught me how to adjust to things I cannot change
3. Has helped me take things as they come
4. Has brought my family closer together
5. Has made me more sensitive to family issues
6. Has taught me that everyone has a purpose in life
7. Has shown me that all people need to be loved
8. Has made me more aware of and concerned for the future of all human beings
9. Has taught me to be more patient
10. Has led me to deal better with stress and problems
11. Has led me to meet people who have become some of my best friends

12. Has contributed to my overall emotional and spiritual growth
13. Has helped me become more aware of the love and support available from other people
14. Has helped me realize who my real friends are
15. Has helped me become more focused on priorities, with a deeper sense of purpose in life
16. Has helped me become a stronger person, more able to cope effectively with future life challenges

Brief COPE: Active, Support Seeking, Substance Use, Avoidance, Self-Blame (Carver & Scheier, 1989)

These items deal with ways you've been coping with the stress in your life since you were diagnosed with POI. There are many ways to deal with this situation. These items ask what you've been doing to deal with this one.

0	1	2	3
Not at All	A little bit	A Medium Amount	A lot

Active
1. I've been concentrating my efforts on doing something about the situation I'm in
2. I've been taking action to try to make the situation better
3. I've been trying to come up with a strategy about what to do
4. I've been thinking hard about what steps to take

Support Seeking (Instrumental and Emotional)
1. I try to get emotional support from friends or relatives
2. I try to get advice from someone about what to do
3. I discuss my feelings with someone
4. I talk to someone to find out more about the situation
5. I get sympathy and understanding from someone
6. I ask people who have had similar experiences what they did
7. I talk to someone about how I feel

Avoidance
1. I've been saying to myself, "this isn't real."
2. I've been refusing to believe that it has happened

Self-Blame
1. I've been criticizing myself
2. I've been blaming myself for things that happened

Substance Use

1. I use alcohol or drugs to help me get through it
2. I try to lose myself for awhile by drinking alcohol or taking drugs
3. I use drugs or alcohol to make myself feel better
4. I drink alcohol or take drugs in order to think about it less

APPENDIX C

TIME 3 MEASURES

CESD: Depression (Radloff, 1977)

Below is a list of the ways you may have felt or behaved. Please indicate how often you have felt this way during the past week.

0	1	2	3
Rarely or None of the time	Some of the time	Occasionally	Most or all of the time

1. I was bothered by things that don't usually bother me
2. I did not feel like eating, my appetite was poor
3. I felt that I could not shake off the blues even with help from my family or friends
4. I felt I was just as good as other people (Reverse)
5. I had trouble keeping my mind on what I was doing
6. I felt depressed
7. I felt that everything I did was an effort
8. I felt hopeful about the future (Reverse)
9. I thought my life had been a failure
10. I felt fearful
11. My sleep was restless
12. I was happy (Reverse)
13. I talked less than usual
14. I felt lonely
15. People were unfriendly
16. I enjoyed life (Reverse)
17. I had crying spells
18. I felt sad
19. I felt that people dislike me
20. I felt like I could not get going

STAI: Anxiety (Spielberger, 1983)

A number of statements which people have used to describe themselves are given below. Read each statement and then select the appropriate one to indicate how you feel right now, that is, at this moment.

0	1	2	3
Not at All	Somewhat	Moderately So	Very Much So

1. I feel calm (Reverse)

2. I feel secure (Reverse)
3. I am tense
4. I am regretful
5. I feel at ease (Reverse)
6. I feel upset
7. I am presently worrying over potential misfortunes
8. I feel rested (Reverse)
9. I feel anxious
10. I feel comfortable (Reverse)
11. I feel self-confident (Reverse)
12. I feel nervous
13. I am jittery
14. I feel "high strung"
15. I am relaxed (Reverse)
16. I feel content (Reverse)
17. I am worried
18. I feel overexcited and rattled
19. I feel joyful
20. I feel pleasant

PANAS: Positive and Negative Affect (Watson, Clark & Tellegen, 1996)

The following words describe different feelings and emotions. How much have you felt this way during the past month?

1	2	3	4	5
Very Slightly Not at All	A Little	Moderately	Quite	Extremely

Negative Affect (NAFF)
1. Distressed
2. Upset
3. Nervous
4. Scared
5. Hostile
6. Irritable
7. Ashamed
8. Jittery
9. Guilty
10. Afraid

Positive Affect (PAFF)
1. Interested
2. Excited
3. Strong
4. Inspired
5. Attentive
6. Enthusiastic
7. Proud
8. Alert
9. Active
10. Determined

Purpose in Life (Ryff & Keyes, 1995)

Please indicate to what extent you agree or disagree with the following list of statements.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

1. I live one day at a time and don't really think about the future (Reverse)
2. I tend to focus on the present because the future nearly always brings me problems (Reverse)
3. My daily activities often seem trivial and unimportant to me (Reverse)
4. I don't have a good sense of what I am trying to accomplish in life (Reverse)
5. I used to set goals for myself, but now that seems like a waste of time (Reverse)
6. I enjoy making plans for the future and working to make them a reality
7. I am an active person in carrying out the plans I set for myself
8. Some people wander aimlessly through life, but I am not one of them
9. I sometimes feel I've done all there is to do in life (Reverse)