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FERTILITY TREATMENT RESPONSE: IS IT BETTER TO BE MORE OPTIMISTIC OR LESS PESSIMISTIC?

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Abstract

Objective—To evaluate the prospective relation between dispositional traits of optimism and pessimism and IVF treatment failure among women seeking medical intervention for infertility.

Methods—Among 198 women (ages 24-45, M=35.1[4.1]; 77% white), the outcome of each participant's first IVF treatment cycle was examined. Treatment outcome was classified as being successful (vs. failed) if the woman either delivered a baby or was pregnant as a result of the cycle by the end of the 18-month study period. At baseline, optimism and pessimism were measured as a single bipolar dimension and as separate unipolar dimensions according to the Life Orientation Test (LOT) total score and the optimism and pessimism subscale scores, respectively.

Results—Optimism/pessimism, measured as a single bipolar dimension, predicted IVF treatment failure initially (B = -.09; p = .02; OR = 0.917; 95% CI = 0.851 – 0.988), but this association attenuated following statistical control for trait negative affect (B = -.06; p = .13; OR = 0.938; 95% CI = 0.863 – 1.020). When examined as separate unipolar dimensions, pessimism (B = .14; p = .04; OR = 1.146; 95% CI = 1.008 – 1.303), but not optimism (B = -.09; p = .12; OR = 0.912; 95% CI = 0.813 – 1.023), predicted IVF treatment failure independently of risk factors for poor IVF treatment response as well as trait negative affect.

Conclusions—Being pessimistic may be a risk factor for IVF treatment failure. Future research should attempt to delineate the biological and behavioral mechanisms by which pessimism may negatively affect treatment outcomes.

Keywords

optimism; pessimism; trait negative affect; infertility; in vitro fertilization

Use of Assisted Reproductive Technologies (ART) such as in vitro fertilization (IVF) is becoming increasingly common among infertile couples seeking parenthood. Although women who undergo IVF treatment report experiencing significant emotional distress (1-2), whether their psychological status affects their chances of conception remains controversial (3-4). Two recent meta-analytic reviews have examined psychological factors in relation to ART outcomes. In Boivin et al. (2011), review of 14 studies showed pre-treatment

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psychological distress (i.e., depression and anxiety) did not predict ART outcome (5). In contrast, in Matthiesen et al. (2011), when psychological factors were defined more broadly to include indicators of psychological distress as well as stress, review of 31 studies showed a small but significant effect of stress, state anxiety, and trait anxiety on ART outcome (6). Taken together, findings suggest that psychological effects on pregnancy rates in ART may be minimal, however, neither review focused specifically on the role of personality factors in ART. Personality factors have generally been understudied in relation to ART outcomes, despite substantial evidence showing personality traits to relate to diverse areas of physical health and disease (e.g., 7-10).

Dispositional optimism and pessimism, defined as the degree to which an individual expects to experience positive versus negative outcomes in life (11), has been linked to diverse health outcomes (12), including all-cause mortality (13-14), cardiovascular and cancer mortality (15-16), progression of atherosclerosis (17), indicators of post-surgical recovery (18-19), treatment adherence (20-21), health behaviors (22-24), health behavior change (25), and subjective reports of physical symptoms (e.g., pain) (26-27). With few exceptions (16, 21, 24), these investigations have examined traits of optimism and pessimism as the bipolar ends of a single continuum, finding that greater optimism (or the absence of pessimism) relates to better health. This conceptual and methodological framework may be limited, however, in light of a body of evidence showing these traits to be separate and independent dimensions, e.g. (16, 21, 27-31). That is, being optimistic does not necessarily indicate the absence of pessimism and, in fact, it is not uncommon for individuals to embody traits of both optimism and pessimism concurrently.

Several lines of evidence support the observation that dimensions of optimism and pessimism are independent. In behavioral genetics analyses of twin/adoption samples, optimism and pessimism appear to each reflect a unique set of genetic and environmental influences (28-29). In structural data analyses, results indicate a two-factor rather than a single-factor structure to underlie responses on individual optimism and pessimism questionnaire items (11, 27, 30); moreover, correlations between these factors are variable in size (e.g., -.37, -.64) (11, 32) and, in some cases, are not significantly different from zero (e.g., -.02) (28). Lastly, in studies in which optimism and pessimism have been evaluated as separate unipolar dimensions, optimism and pessimism have been found to relate to different health outcomes (16, 21, 31). For example, in a longitudinal study of HIV positive persons, greater pessimism at baseline predicted greater increases in viral load at the study follow-up (~18 months), while moderate levels of optimism at baseline predicted greater increases in CD4 counts over the same study period (21). The curvilinear association between optimism and CD4 counts found in this study also highlights that high optimism is not always health-promoting as has been found in several other studies reporting that in some contexts high optimism can actually have deleterious effects on health (33-35).

A second primary issue in the literature concerns the possibility that optimism and pessimism (defined either as a single bipolar dimension or as two separate unipolar dimensions) may only relate to health outcomes because of the variance these dimensions share with trait negative affect which is itself a risk factor for poor health (36-37). This assertion is supported by studies showing relations between optimism/pessimism, typically measured as a single bipolar dimension, and self-reported or *subjective* indicators of health to attenuate when trait negative affect is controlled statistically (38). However, in studies of *objective*, rather than *subjective* health outcomes, findings are more mixed with respect to whether trait negative affect may also confound effects of optimism/pessimism on health. For example, in Schulz et al. (16), pessimism (measured as a separate unipolar dimension) continued to predict cancer mortality following adjustment for depression, while, in Lancastle & Boivin (39), the relation between optimism/pessimism (measured as a single

bipolar dimension) and ovarian response to IVF attenuated when trait anxiety was controlled. Taken together, the role of trait negative affect is not fully understood, especially in relation to objective health outcomes. Moreover, whether trait negative affect may confound relations between optimism/pessimism and health when optimism and pessimism are evaluated as separate unipolar dimensions, rather than as a single bipolar dimension, is not known.

To date, only one study has specifically focused on optimism/pessimism in the context of ART by examining optimism/pessimism in relation to ovarian response (but not pregnancy outcome) to IVF. Results showed effects of optimism/pessimism (measured as a single bipolar dimension) attenuated when trait anxiety was controlled statistically, supporting the possibility that effects of optimism/pessimism on ovarian response to IVF are not unique (39). This study, however, did not examine optimism and pessimism as separate unipolar dimensions and did not examine IVF treatment outcomes in terms of pregnancy rates but rather measured a woman's 'biological response' to IVF treatment as indicated by a composite of peak estradiol, number of oocytes retrieved, and antral follicle count. Thus, whether personality factors such as optimism/pessimism relate to pregnancy rates in IVF and, more specifically, whether effects are observed when optimism and pessimism are measured separately as well as whether effects are independent of trait negative affect remain important yet unanswered questions.

In the current study, we examined the prospective relation between dispositional traits of optimism/pessimism, measured both as a single bipolar dimension and as separate unipolar dimensions, and the outcome of a woman's first IVF treatment cycle among couples seeking medical intervention for infertility. IVF treatment *success* was defined by a live birth or a pregnancy by the end of the 18-month study and IVF treatment *failure* was defined by an inability to complete the IVF cycle, to conceive, or to carry the pregnancy by the end of the 18-month study. Additionally, analyses in the current study included statistical control for the trait dimension of neuroticism to determine whether relations between optimism/pessimism and IVF treatment failure (if observed) were independent of the effects of trait negative affect.

METHODS

Participants

The sample was derived from the Fertility Experiences Project (FEP), an investigation of the psychological, interpersonal, and financial experiences of women and their partners seeking medical treatment for infertility. Between October 2000 and January 2003, women were recruited from 5 reproductive endocrinology practices over 8 locations in the greater San Francisco Bay Area. Eligibility criteria included (1) first visit to the fertility clinic, (2) no previous in vitro fertilization (IVF) or IVF in progress, (3) no previous hysterectomy or elective sterilization, (4) not seeking treatment for recurrent miscarriage, (5) currently trying to get pregnant with a male partner, and (6) English-speaking. As a part of the FEP protocol, interview and questionnaire-based assessments were performed at baseline, 4-, 10-, and 18-months. A total of 449 women participated in the baseline assessment; 96% were retained at the 4-month follow-up, 93% were retained at the 10-month follow-up, and 89% were retained at the 18-month follow-up. The study protocol was approved by the Institutional Review Board of the University of California San Francisco and informed, written consent was obtained from each study participant.

The present analysis included a subset of 204 study participants from the FEP who had at least one IVF treatment cycle during the 18-month study period and who were not using donor eggs. Among these women, optimism/pessimism assessed by a self-report

questionnaire at baseline was examined in relation to the outcome of their first IVF treatment cycle which occurred on average 4.0 months (SD = 4.5; range = 0-18) later. The treatment outcome was considered *successful* if, by the 18-month follow-up, the woman either delivered a baby or was pregnant as a result of the cycle. Alternatively, the treatment outcome was considered *failed*, if by the 18-month follow-up, the woman did not get pregnant as a result of the cycle, became pregnant but subsequently miscarried, could not complete the cycle due to an insufficient treatment response (e.g., too few oocytes retrieved), or terminated the pregnancy as the result of a medical complication. Six women were excluded whose first IVF treatment cycles were in progress at the 18-month follow-up, leaving 198 women in the final sample. Retentions rates were similarly high among the subset of 198 women with 100% of women retained at the 4-month follow-up, 98.5% of women retained at the 10-month follow-up, and 94.9% of women retained at the 18-month follow-up.

Psychometric Measures

Dispositional Optimism / Pessimism—Dimensions of optimism and pessimism were evaluated using the 12-item Life Orientation Test (LOT) (11), a self-report questionnaire assessing an individual's tendency to expect positive compared to negative outcomes. Items are scored on a 5-point scale (0=strongly disagree, 1=disagree, 2=neither agree nor disagree, 3=agree, and 4=strongly agree) and summed to produce a total score as well as separate optimism and pessimism subscale scores. The LOT total score consists of 8 items and reflects a single bipolar dimension in which higher scores indicate greater optimism or less pessimism. Conversely, the LOT optimism and pessimism subscale scores reflect separate unipolar dimensions. Specifically, the optimism subscale consists of 4 positively-worded items, including e.g., "In uncertain times, I usually expect the best". The pessimism subscale consists of 4 negatively-worded items, including e.g., "If something can go wrong for me, it will". Higher scores indicate greater optimism and pessimism, respectively. In the present sample, internal consistency reliability was high for the total scale and each subscale according to Cronbach's coefficient alphas: total ($\alpha = .87$); optimism ($\alpha = .85$); and pessimism ($\alpha = .84$). Additionally, results of principal axis factoring (using direct oblimin rotation) confirmed the presence of two factors accounting for 58.3% of the total variability in the individual questionnaire items; loadings for the optimism and pessimism factors ranged between .638 -.862 and .679 - .824, respectively. The Pearson correlation coefficient between the two subscales was sizable ($r = -.57$, $p < .001$).

Trait Negative Affect—Trait negative affect was evaluated using the 23-item neuroticism subscale of the Eysenck Personality Questionnaire (EPQ) (36), a self-report questionnaire assessing an individual's tendency to experience negative emotions. Items are scored on a 2-point scale (yes=0, no=1) and summed to create a single neuroticism scale score, ranging between 0-23. An example item is "Do you ever feel 'just miserable' for no reason?" Higher scores indicate greater neuroticism. Among women, test-retest reliability has been shown to be high ($r = 0.81$) (36). In the present sample, internal consistency reliability was high according to Cronbach's coefficient alpha ($\alpha = .86$).

Data Analysis

Logistic regression analyses were performed to assess the prospective relation between dispositional optimism/pessimism and IVF treatment failure. The following risk factors for poor fertility treatment response were entered simultaneously as covariates on the first step of each regression equation: age (in years), socioeconomic status (SES) (calculated by standardizing and summing education [1 = 8^{th} grade or less, 2 = some high school, 3 = high school graduate, 4 = some college or technical school, 5 = college graduate, 6 = advanced degree] and income [family income divided by the number of family members dependent on

the income]), parity (1 = 1+ live births, 2 = no live births), duration of attempted pregnancy (1 = 0-12 months, 2 = 12-24 months, 3 = 24+ months), history of oral medication use (1 = no, 2=yes), history of injectable medication use (1 = no, 2 = yes), history of intrauterine insemination (IUI) (1 = no, 2 = yes), and number of infertility-related diagnoses. Next, on the second step of separate regression equations, the LOT total score, LOT optimism subscale score, and LOT pessimism subscale score were entered individually. All analyses were repeated while controlling for trait negative affect, measured by the neuroticism subscale score of the EPQ, to determine whether effects (if observed) of optimism/pessimism on IVF treatment failure were independent of the generalized tendency to experience negative emotions. In these analyses, the same covariates were entered simultaneously on the first step, trait negative affect on the second step, and the LOT total score, LOT optimism subscale score, or LOT pessimism subscale score on the third step. Odds ratios were calculated to determine the likelihood of experiencing a failed IVF treatment outcome based on one's LOT total score, LOT optimism subscale score, and LOT pessimism subscale score. Regression coefficients (B) reflecting the strength of association between the independent variables and treatment failure were considered significant at the $p < .05$ level.

RESULTS

Sample Characteristics

Descriptive information pertaining to the sociodemographic, fertility, and psychological characteristics of women in the full sample ($N = 198$) as well as women classified as treatment failures ($N = 143$) and treatment successes ($N = 55$) is reported in Table 1. In the full sample (77.0% white; ages 24-45, M = 35.1 ± 4.1), 79.6% of women held a college degree or greater and 76.5% had an annual family income of $100,000+. Additionally, 48.0% experienced infertility for 24 months or greater, 86.4% were nulliparous, 69.2% reported previous use of oral medications, 32.3% reported previous use of injectable medications, and 46.4% had at least one previous intrauterine insemination (IUI) cycle. Comparisons of treatment failures and treatment successes showed women in the failed group were older ($t_{196} = 2.19$, $p = .03$) and more educated ($\chi^2 = 3.90$, $p = .048$) on average than women in the success group. With respect to the psychological factors of interest, women in the failed group reported less optimism/more pessimism on the LOT total score ($t_{196} = -2.04$, $p = .04$), more pessimism on the LOT pessimism subscale score ($t_{196} = 2.58$, $p = .01$), and marginally more trait negative affect ($t_{196} = 1.78$, $p = .08$) than women in the success group. Examination of the statistically significant differences between women in the failed and success groups, showed effect sizes were in the small to medium range for age ($d = 0.34$), optimism/pessimism ($d = 0.34$), and pessimism ($d = 0.33$). In addition, greater education was related to an increased probability of treatment failure (OR = 2.07). Among the 143 women classified as treatment failures, 83 did not become pregnant, 24 became pregnant but miscarried, 3 terminated their pregnancies, and 33 could not complete the treatment cycle.

Bivariate correlations between the risk factors for poor IVF treatment response, included as covariates in regression analyses, and the psychological factors of interest are reported in Table 2. Greater female age related significantly to lower pessimism ($r = -.15$, $p = .04$) and lower trait negative affect ($r = -.14$, $p = .046$). Greater length of attempted pregnancy related significantly to higher trait negative affect ($r = .23$, $p = .001$). As expected, significant associations were also found among the psychological variables (all p's $< .001$). Optimism and pessimism subscale scores were correlated ($r = -.57$, $p < .001$); optimism and trait negative affect were correlated ($r = -.46$, $p < .001$); and pessimism and trait negative affect were correlated ($r = .43$, $p < .001$).

Logistic Regression

As reported in Table 3, in logistic regression analyses, greater optimism/less pessimism at baseline, measured as a single bipolar dimension using the LOT total score, predicted a reduced probability of IVF treatment failure (B = -.09; p = .02; OR = 0.917; 95% CI = 0.851 – 0.988) although this association became non-significant when adjusted for trait negative affect (B = -.06; p = .13; OR = 0.938; 95% CI = 0.863 – 1.020). In logistic regression analyses in which optimism and pessimism were examined as separate unipolar dimensions using the LOT optimism and pessimism subscale scores, respectively, optimism at baseline was not related to subsequent IVF treatment failure (B = -.09; p = .12; OR = 0.912; 95% CI = 0.813 – 1.023) while greater pessimism at baseline predicted an increased probability of IVF treatment failure (B = .16; p = .007; OR = 1.178; 95% CI = 1.046 – 1.328) and this association persisted when adjusted for trait negative affect (B = .14; p = .04; OR = 1.146; 95% CI = 1.008 – 1.303).

The association of pessimism and IVF treatment failure was independent of trait negative affect as well as risk factors for poor fertility treatment response, including female age, SES, parity, duration of attempted pregnancy, history of oral medication use, history of injectable medication use, history of IUI, and number of infertility-related diagnoses. The odds ratio indicated that for every 1-unit increase in pessimism the likelihood of subsequently experiencing an IVF treatment failure was increased by 17.8%. Moreover, in analyses in which pessimism was entered into the regression equation as a standardized variable, results showed that a 1 SD increase in pessimism was associated with a 66.0% increased odds of failing the IVF treatment cycle.

DISCUSSION

An abundant literature shows trait dimensions of optimism and pessimism are related to diverse health outcomes. To date, however, no study has examined these traits in relation to pregnancy outcome in IVF treatment among women seeking medical intervention for infertility. Additionally, two general issues remain outstanding in the literature. One is whether optimism and pessimism are independent dimensions with differing effects on health and the second concerns the role of trait negative affect as a potential confounder of the effects of optimism/pessimism on health. The latter may depend on whether optimism and pessimism are evaluated separately as well as whether the health outcome of interest is objective or subjective in nature. Results from the current investigation showed that women who endorsed greater pessimism, measured as a separate unipolar dimension, at baseline assessment were more likely to experience treatment failure following their first IVF treatment cycle, occurring at any time over the 18-month study period. This relation was independent of risk factors for poor fertility treatment response (e.g., female age) as well as trait negative affect. In contrast, greater optimism/less pessimism, measured as a single bipolar dimension, was associated with a reduced probability of experiencing IVF treatment failure but this relation did not persist independently of statistical control for trait negative affect. Optimism, measured as a separate unipolar dimension, was unrelated to the outcome of the IVF cycle.

In considering why pessimism predicts failure among women undergoing IVF treatment, it is possible that the findings are due to reverse causal mechanisms. That is, women with poorer prognoses may be able to accurately appraise their fertility status and as a result report greater pessimism. Although plausible, there are several counterpoints to this explanation. First, pessimism was evaluated as a trait dimension in reference to a woman's global outlook on her life rather than to her specific expectations about the outcome of the IVF treatment cycle. Secondly, the study findings persisted after controlling for the primary parameters that would indicate one's fertility status, including female age, socioeconomic

status, parity, duration of attempted pregnancy, prior history of infertility treatment, and number of infertility-related diagnoses. In zero-order association, older female age, the most reliable predictor of IVF treatment outcome, was actually related to less pessimism. Additionally, all of the women in the current study were naïve to IVF treatment, limiting the possibility that prior experiences with IVF treatment that would reflect their current chances of success could have influenced their self-reports of pessimism at the baseline assessment. Nonetheless, it remains possible that third variables unmeasured in the current study (e.g., BMI) which may covary with pessimism and IVF treatment prognosis could be driving this association.

The mechanisms by which pessimism relates to IVF treatment failure are unknown. Previous studies have proposed that greater optimism (or lower pessimism when optimism and pessimism are measured as a single bipolar dimension) may buffer psychological stress and/or enhance neuroendocrine regulation of the stress response, thereby, diminishing stress effects on susceptible health outcomes (35, 40-41). Conversely, greater pessimism when measured as a single unipolar dimension may amplify stress responsivity and neuroendocrine dysregulation. Connections between optimism and pessimism and the immune system have also been made (33-35, 40, 42), although whether these dimensions promote or reduce immune system function in the face of psychological stress may depend on contextual factors (33-35). Previous studies have also examined behavioral pathways, demonstrating that greater optimism relates to positive health behaviors such as improved nutrition, increased physical activity, non-smoking, and treatment adherence (22-24, 43-46). Many of these same behavioral factors (e.g., overweight/obesity, diet, and smoking) have been related to infertility as well as IVF outcomes (e.g., (47-52).

The relevance of the above-mentioned biological and behavioral pathways in the current study remains speculative, although it is plausible that these same mechanisms may operate by affecting intermediate processes critical to IVF outcomes such as suppression of ovarian function or interference with embryo implantation. With respect to a possible hormonal mechanism, it is not known whether stress hormones typically implicated in explaining links between stress and health (e.g., cortisol) may promote stress-related neuroendocrine effects on IVF treatment response, especially in the context of the superphysiologic doses of gonadotropins administered in IVF treatment protocols. Additionally, with respect to a possible behavioral mechanism, women seeking fertility treatments are relatively young and typically in good health which likely constrains variability in relevant health behaviors. For example, in the current study, no woman reported cigarette smoking which has known effects on fertility. Thus, it remains the work of future research to delineate the candidate mechanisms by which pessimism, either through a hormonal, behavioral, or some other yet unidentified mechanism, confers risk for IVF treatment failure.

Recommendations for intervention on the basis of findings from the current study alone would be premature, however, it is notable that although pessimism is considered a stable disposition (15), empirical evidence suggests such personality traits are amenable to change. For example, in a study of breast and colorectal cancer patients, a meaning-making intervention to improve psychological adjustment to the cancer diagnosis was found to increase optimism (53). Similarly, in a study of patients awaiting lung transplantation, coping skills training promoted greater increases in optimism in the treatment versus usual care group (54). Evidence also supports the malleability of pessimism. Cognitive-behavioral therapeutic approaches, which have been shown to be effective treatments for numerous psychiatric conditions (55), operate by addressing patterns of negative or pessimistic thinking which are hypothesized to drive negative mood states and maladaptive behaviors (56). Thus, evidence supports the plausibility of affecting change on a trait dimension such as pessimism should such an intervention strategy appear warranted in this population.

Strengths of the current study are a large sample size relative to similar studies in the literature and a longitudinal study design which enables stronger conclusions regarding the direction of effects. Limitations of the current study are the self-reported nature of the psychological factors of interest and the absence of the measurement of possible biological or behavioral mechanisms by which pessimism and IVF treatment outcomes may be related. Additionally, women in the sample represented a broad range of infertility diagnoses including but not limited to fallopian tube damage or blockage, endometriosis, ovulation disorders, and male factor infertility. This variability in women's experiences precludes assessment of how pessimism and its effects on IVF treatment outcome might manifest differently in different patient groups. To address this, future investigations should either include samples of large enough size to enable statistical analyses stratified by infertility diagnosis or include only women with one particular diagnosis.

In summary, the current study is the first investigation of the prospective relation between traits of optimism and pessimism and pregnancy outcome in IVF treatment among women seeking medical intervention for infertility. Results suggest that pessimism (measured as a separate unipolar dimension) may confer risk for IVF treatment failure independently of other predictors of poor treatment response as well as trait negative affect. In contrast, the examination of optimism/pessimism as a single bipolar dimension was not independently related to IVF treatment outcome and optimism (measured as a separate unipolar dimension) was unrelated to IVF treatment outcome. Findings highlight that optimism and pessimism are independent dimensions with differing impacts on health outcomes and that the role of trait negative affect as a potential confounder of links between optimism/pessimism and health may be minimized when examining objective rather than subjective indicators of health.

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Abbreviations

IVF	in vitro fertilization
LOT	Life Orientation Test
SES	socioeconomic status

TABLE 1

Sociodemographic, fertility, and psychological factors among all women and among women who were successful and failed.

	Total (*N* = 198)	Successful (*N* = 55)	Failed (*N* = 143)	Statistic	*p*
Sociodemographic Factors:					
Age (mean [SD])	35.1 (4.1)	34.1 (3.9)	35.5 (4.2)	$t_{196} = 2.188$	.03
Marital Status (% married)	94.4	96.3	93.6	$\chi^2 = 0.527$	.47
Race (% white)	77.0	83.3	74.6	$\chi^2 = 1.669$	.20
Education (% college grad+)	79.6	70.4	83.1	$\chi^2 = 3.902$	.048
Family Income (% $100,000+)	76.5	70.4	78.9	$\chi^2 = 1.570$	.21
Fertility Factors:					
Duration of Attempted Pregnancy (% 24+ months)	48.0	43.6	49.6	$\chi^2 = 0.572$	.45
Parity (% no live birth)	86.4	87.3	86.0	$\chi^2 = 0.052$	.82
Treatment History					
% Previous Oral Medication Use	69.2	65.5	70.6	$\chi^2 = 0.499$	.48
% Previous Injectable Medication Use	32.3	32.7	32.2	$\chi^2 = 0.006$	.94
% Previous IUI	46.4	49.1	45.3	$\chi^2 = 0.215$	.64
No. of Infertility-Related Diagnoses (mean [SD])	1.5 (0.8)	1.4 (0.8)	1.6 (0.8)	$t_{196} = 1.443$	.15
Psychological Factors:					
Trait Negative Affect (mean [SD])	9.3 (5.1)	8.3 (5.0)	9.7 (5.1)	$t_{196} = 1.775$	.08
Optimism (LOT subscale score) (mean [SD])	10.1 (3.0)	10.5 (2.8)	9.9 (3.1)	$t_{196} = -1.236$	.22
Pessimism (LOT subscale score) (mean [SD])	5.2 (3.1)	4.5 (2.2)	5.5 (3.3)	$t_{196} = 2.579$	.01
Optimism/Pess (LOT total score) (mean [SD])	18.3 (4.8)	19.3 (3.8)	17.9 (5.1)	$t_{196} = -2.044$	.04

TABLE 2

Correlations between risk factors for poor IVF treatment response and psychological factors.

	Opt/Pess (LOT total)	Optimism (LOT subscale)	Pessimism (LOT subscale)	Trait Negative Affect
Age	.073	-.022	-.147*	-.142*
SES	.017	-.078	-.084	-.043
Parity	.055	.035	-.026	.043
Duration of attempted pregnancy	-.108	-.024	.134	.228**
Hx of oral medication use	-.016	-.001	.018	-.002
Hx of injectable medication use	-.080	-.081	.067	.112
Hx of IUI	-.096	-.085	.087	.097
No of infertility-related diagnoses	.000	.019	.034	.047

* $p < .05$,

** $p < .01$,

*** $p < .001$;

Age (in years); SES (sum of standardized education and family income variables); parity (1=1+ live births, 2=no live births); duration of attempted pregnancy (1=0-12 months, 2=12-24 months, 3=24+ months); hx of oral medication use (1=no, 2=yes); hx of injectable medication use (1=no, 2=yes); and hx of IUI (1=no, 2=yes).

TABLE 3

Probability that dimensions of optimism and pessimism predict IVF treatment failure (N = 198).

Logistic Regression	Odds Ratio	95% Confidence Interval
DV: Treatment Failure (1=success, 2=failed)		
1. Equation[a]		
Age	1.083	(0.999 – 1.175)
SES	1.164	(0.929 – 1.458)
Parity	0.881	(0.317 – 2.453)
Duration of attempted pregnancy	1.110	(0.688 – 1.792)
History of oral medication use	1.306	(0.582 – 2.930)
History of injectable medication use	0.921	(0.399 – 2.130)
History of IUI	0.710	(0.307 – 1.643)
No of infertility-related diagnoses	1.296	(0.829 – 2.028)
Opt/Pess (LOT total score)	0.917*	(0.851 – 0.988)
2. Equation[b]		
Age	1.091*	(1.004 – 1.186)
SES	1.167	(0.932 – 1.463)
Parity	0.834	(0.295 – 2.359)
Duration of attempted pregnancy	1.060	(0.652 – 1.724)
History of oral medication use	1.292	(0.573 – 2.916)
History of injectable medication use	0.910	(0.391 – 2.117)
History of IUI	0.704	(0.303 – 1.632)
No of infertility-related diagnoses	1.270	(0.809 – 1.993)
Trait Negative Affect	1.048	(0.969 – 1.135)
Opt/Pess (LOT total score)	0.938	(0.863 – 1.020)
3. Equation[a]		
Age	1.073	(0.990 – 1.162)
SES	1.148	(0.919 – 1.435)
Parity	0.841	(0.304 – 2.327)
Duration of attempted pregnancy	1.171	(0.731 – 1.875)
History of oral medication use	1.278	(0.572 – 2.855)
History of injectable medication use	0.922	(0.403 – 2.110)
History of IUI	0.735	(0.320 – 1.687)
No of infertility-related diagnoses	1.305	(0.837 – 2.034)
Optimism (LOT subscale score)	0.912	(0.813 – 1.023)
4. Equation[a]		
Age	1.094*	(1.007 – 1.189)
SES	1.193	(0.949 – 1.500)
Parity	0.871	(0.313 – 2.423)
Duration of attempted pregnancy	1.088	(0.671 – 1.765)
History of oral medication use	1.318	(0.584 – 2.972)

Logistic Regression	Odds Ratio	95% Confidence Interval
History of injectable medication use	0.913	(0.391 – 2.133)
History of IUI	0.705	(0.302 – 1.650)
No of infertility-related diagnoses	1.283	(0.816 – 2.018)
Pessimism (LOT subscale score)	1.178**	(1.046 – 1.328)
5. Equation[b]		
Age	1.099*	(1.011 – 1.196)
SES	1.192	(0.948 – 1.499)
Parity	0.829	(0.293 – 2.342)
Duration of attempted pregnancy	1.040	(0.636 – 1.700)
History of oral medication use	1.309	(0.578 – 2.965)
History of injectable medication use	0.902	(0.384 – 2.118)
History of IUI	0.695	(0.297 – 1.627)
No of infertility-related diagnoses	1.261	(0.800 – 1.989)
Trait Negative Affect	1.044	(0.966 – 1.128)
Pessimism (LOT subscale score)	1.146*	(1.008 – 1.303)

* $p < .05$,

** $p < .01$,

*** $p < .001$;

[a] Covariates were entered on the 1st step of the regression equation;

[b] Covariates were entered on the 1st step of the regression equation and trait negative affect was entered on the 2nd step of the regression equation.

Age (in years); SES (sum of standardized education and family income variables); parity (1=1+ live births, 2=no live births); duration of attempted pregnancy (1=0-12 months, 2=12-24 months, 3=24+ months); hx of oral medication use (1=no, 2=yes); hx of injectable medication use (1=no, 2=yes); and hx of IUI (1=no, 2=yes).