Title: Psychological coping strategies associated with improved mental health in the context of infertility

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Abstract

Purpose: To examine the use of psychological coping strategies across the menstrual cycle in relation to within-person changes in depressed mood, anxious mood, and infertility-related distress, in a sample of women struggling to conceive.

Methods: 65 women from Canada and the United States (aged 19-43 years) trying to conceive naturally for ≥12 months were recruited via social media. On the first day of each participant's menstrual period, and every three days until the end of their cycle, participants completed questionnaires assessing depressed and anxious mood, and infertility-related distress. In addition, participants completed a 13-item coping questionnaire assessing four general coping strategies: emotional suppression, active coping, engagement in activities unrelated to trying to conceive, and downplaying the importance of biological children. The within-person effect of daily coping strategies on person-centered mood and infertility-related distress were examined.

Results: Day-to-day use of behavioural engagement was associated with lower person-centred depression scores, $\beta(SEM)$ = -3.25(.51), $p < .0001$, anxiety scores, $\beta(SEM)$ = -2.07(.36), $p < .0001$, and infertility-related daily distress, $\beta(SEM)$ = -.64(.22), $p = .005$. Downplaying the importance of biological children was also associated with person-centred depression scores, $\beta(SEM)$ = 1.14(.47), $p = .016$. Neither active coping nor emotional suppression were related to depression, anxiety, or distress (ps > .0125).

Conclusion: These findings point to promising targets of future intervention studies, including promoting increased engagement in behaviours unrelated to conceiving and promoting acceptance, rather than denial and resistance, of feelings throughout the infertility journey.

Keywords: Infertility, Natural cycle, Coping strategies, Menstrual cycle, Reproductive health.

Infertility, defined as the inability to achieve pregnancy despite ≥12 months of concerted attempts, affects 16% of reproductive-aged couples (Bushnik et al. 2012). Despite equal prevalence of male- and female-factor infertility, women tend to experience the majority of the associated physical and psychosocial burden (Bushnik et al. 2012; Bromham et al. 1989), with infertile women reporting greater distress, including more anxiety and depression, and lower self-esteem and life satisfaction, than their male partners (Bushnik et al. 2012). In fact, half of infertile women, versus only 15% of infertile men, report infertility to be the most upsetting event of their lives (Freeman et al. 1985). Rates of significant distress among both infertile women in tertiary care (Chen et al. 2004; Kee et al. 2000; Nelson et al. 2008; Volgsten et al. 2008), and in the community (Jacob 2006; Sbaragli et al. 2008), have been found to range between 27 and 40%, comparable in severity with individuals undergoing treatments for cancer, HIV, and hypertension (Domar et al. 1993).

Despite the considerable emotional burden associated with infertility, there is a lack of consensus regarding which psychological coping strategies are beneficial for women who are struggling to conceive. Coping strategies that are commonly used in response to stressful life events typically fall into three broad categories: 1) problem-focused coping, aimed at directly addressing the problem; 2) avoidant coping, which aims to avoid thoughts and feelings about the problem; and 3) emotion-focused coping, which includes attempts to manage unpleasant emotions, such as engaging in relaxing activities or seeking social support (Folkman & Lazarus, 1990). Each has been examined in the context of infertility, but with unclear conclusions. For example, mixed results have been found regarding the psychological benefits of active, problem-focused strategies, which include planning, information seeking, and taking action (Penley, 2002). While problem-focused strategies are typically considered to be adaptive responses to

many stressful events, such as facing academic pressure or navigating difficult social situations (Tamannaeifar and Shahmirzaei 2019; Nevill and Havercamp 2019), there is some evidence that such strategies may not be as helpful in the case of infertility. Indeed, studies by Benyamini et al. (2004) and Sweeney et al. (2015) have found problem-focused strategies to be associated with increased distress (Benyamini et al. 2004), anxiety, and rumination (Sweeny et al. 2015) among women trying to conceive, suggesting that these strategies may be less helpful in the context of the largely uncontrollable and unpredictable journey of infertility. In contrast, other studies have found that women who endorse a general active coping style response to stressful situations tend to report less distress in the context of infertility (Aflakseir & Zarei, 2013; Klonoff-Cohen et al. 2001; Sexton et al. 2010; Van Den Broeck et al. 2010). Further research is therefore needed to clarify this issue.

The literature on avoidance-oriented coping strategies, which typically include a tendency to avoid thoughts and feelings that are uncomfortable, is somewhat more consistent, with several cross-sectional studies finding that women who endorse an avoidant coping style report greater distress in the context of infertility (Driscoll et al. 2016; Hynes et al. 1992; Peterson et al. 2006; Van Den Broeck et al. 2010; Yu et al. 2014). However, there is some inconsistency regarding the adaptiveness of distracting oneself from one's infertility struggles, specifically. Though distraction is most often classified as an "avoidant" strategy to coping with distress, a study by Benyamini et al. (2004) considered "keeping busy" to be a self-nurturing strategy that was associated with less distress ($r = -.35$) in 310 women undergoing, or preparing to undergo, fertility treatments. Somewhat in line with this conclusion is another finding by Benyamini et al. (2017) of 180 women undergoing fertility treatments that "normalization" – that is, the maintenance of regular life routines despite infertility – is associated with improved

quality of life. The extent to which distraction is a beneficial coping strategy for infertility-related distress therefore remains unclear.

The emotional benefits of seeking social support in the context of infertility are somewhat clearer in the literature (Driscoll et al. 2016; Jordan and Revenson 1999; Lechner et al. 2006; Martins et al. 2011; Yu et al. 2014). However, disclosure can be a double-edged sword as it carries the risk of receiving unsupportive interactions (Miall, 1986), which have been found to be predictive of greater infertility-related distress over time (Mindes et al., 2003). This may help explain why Schmidt et al. (2005) actually found that keeping one's infertility struggles a secret did not predict infertility-related distress, as non-disclosure may limit opportunities for receiving unsupportive comments from others even if it also limits opportunities for positive interactions.

It therefore remains difficult for clinicians to confidently endorse any particular set of emotional coping strategies in the context of infertility. To what extent should women be encouraged to take charge of their infertility – research their condition, make a plan of attack, and focus on optimising their chances of getting pregnant? Conversely, to what extent should they be encouraged to steer their attention away from their infertility – focus on other goals or keep busy with work or hobbies? Should seeking of social support be encouraged in a woman who would prefer to not to disclose her diagnosis to her loved ones? The answers to these questions remain unclear based on the current literature.

In addition to the above inconsistencies in the current literature, there are several limitations associated with the current available research that limit the confidence with which current findings can be translated into concrete recommendations for patients. First, the majority of the above-mentioned studies have relied on a cross-sectional design and none have been equipped to examine the effect of within-person effects of coping strategies on mood. In other

words, studies have examined whether women who endorse using a particular coping strategy exhibit more or less distress overall than those who don't but none have examined how an individual woman's mood shifts as she engages in a particular coping strategy to a greater or lesser extent. Second, there are also several coping strategies that have been identified as being commonly used in the context of waiting for an uncertain outcome, including bracing oneself for the worst, mitigating the consequences of a negative outcome or even finding benefits of a negative outcome (Boivin and Lancastle 2010; Sweeny et al. 2015a; Sweeny and Falkenstein 2015; Sweeny et al. 2015b), that are excluded from questionnaires that are typically used in the research examining coping strategies in the context of infertility.

One final disadvantage of the current research is its almost exclusive focus on women who are undergoing assisted reproductive technologies (ART). Indeed, women who undergo ART represent a small percentage (22%) of all women who meet the World Health Organization's (WHO) criteria for "infertility" (Boivin, Bunting, Collins, & Nygren, 2007). Given the high financial cost of ART, this small percentage is likely to be of above-average socioeconomic status and thus not representative of the infertile population as a whole. Furthermore, even among those women who eventually seek ART, many months of 'natural' cycles typically precede treatment. Thus, there is a need to better understand the experiences of women struggling with infertility outside the context of ART, including an examination of the efficacy of coping strategies across different phases of the menstrual cycle. Indeed, given that one's sense of control over the process and outcome is likely to be higher in natural cycles as opposed to medically assisted ones, it seems plausible that coping strategies found to be most effective in reducing distress may be different in either context.

With these limitations in mind, the current study aimed to improve upon the existing literature by using a prospective design to examine coping strategies in relation to mood, including multiple assessments over the course of one menstrual cycle and following a pregnancy test outcome. This prospective design would allow us to explore whether different coping strategies are effective at different times of the cycle. Furthermore, we used a coping questionnaire that was more inclusive in the strategies assessed.

Methods

Participants

Reproductive aged women (18 to 45 years) from across Canada and the United States were recruited to participate in the current online study via advertising on social media. To qualify, women must have reported having difficulty achieving pregnancy over the past 12 or more months, despite active attempts to conceive. They were also required to be planning to actively attempt to conceive during their next menstrual cycle. Although menstrual irregularity was not exclusionary, women were required to report having a menstrual period at least every 60 days as women with no semblance of a menstrual cycle may not experience the same emotional roller coaster as women who are presumed to be ovulating at least periodically. The only exclusion criterion was current use of assisted reproductive technology, including in vitro fertilization, intrauterine insemination, and use of ovulation-enhancing medications. Individuals were compensated $30.00 worth of Amazon e-gift cards for their participation. All participants provided informed consent and the study was reviewed and approved by the University of Regina Research Ethics Board.

Procedure

Baseline Assessment. An eligibility screening questionnaire was administered online using Qualtrics survey software, which interested individuals could access through a Facebook ad link. If eligible, participants were emailed a second survey containing an electronic version of the consent form and questionnaires assessing demographic and psychological variables. Baseline psychological symptoms were measured via the Patient Health Questionnaire (PHQ-9) for depressive symptoms, State-Trait Anxiety Inventory (STAI) for trait anxiety, our infertility coping assessment (tailored for baseline administration) for coping, and Fertility Quality of Life Questionnaire (FertiQoL) for infertility-specific distress. Participants were asked to complete the survey in the next seven days. If participants completed the baseline assessment, they were invited to engage in the longitudinal assessment.

Longitudinal Assessment across the Menstrual Cycle. Beginning on the first day of their next menstrual period, and every three days afterward until their next period, participants completed the brief online survey assessing day-to-day coping, fertility-related distress using the emotional subscale of the Fertility Quality of Life Questionnaire, and anxious and depressed mood using the Immediate Mood Scaler-12. Participants were also asked to indicate which menstrual cycle phase they believed they were in (menstruation, follicular, ovulatory, or luteal) and were asked to abstain from taking a pregnancy test until the day of their expected period.

Post-Pregnancy Test Assessment. On the first day of their expected period, and again two and five days later, participants were asked to indicate whether or not they are pregnant (as determined by a home pregnancy test). In the event of a negative outcome, they were asked to rate, on a scale from 1 (not at all) to 10 (extremely), how surprised, devastated, and hopeful they were.

Data Analysis. Descriptive statistics were conducted to examine mean baseline infertility-related distress as well as the percentage of participants employing each coping strategy. To avoid an extensive number of analyses examining each of the 13 coping strategies assessed, we opted to conduct an exploratory factor analysis using PROC FACTOR to identify strategies that tended to co-occur. The Scree test (Cattell, 1966) plotting the eigenvalues associated with each factor was used to decide the number of factors to be retained. A factor loading of 0.40 or above was used to decide to which factor an item belonged (Hatcher, 1994). For each factor identified, the mean score across all items loading on that factor was calculated.

PROC MIXED in SAS 9.4 was used to examine a multilevel regression model (repeated daily distress and mood nested within menstrual phase and menstrual phase nested within women) testing the effect of menstrual cycle phase (menstrual, follicular, ovulatory, luteal) on daily distress and mood. All three psychological outcomes – infertility-related distress, anxious mood, and depressed mood - were person-centered to allow for the examination of coping effects on within-person changes in psychological outcomes over the menstrual cycle; that is, each individual's mean value of that outcome was subtracted from each individual data point such that a negative person-centered value indicated a lower value than average and a positive person-centered value indicated a higher value than average for that individual. In other words, the person-centered outcome reflected how much an individual varied from their average mood on a particular day. Next, statistically adjusting for menstrual cycle phase, the coping strategy factors were included in the same model as predictors of day-to-day infertility-related distress, as well as depression and anxiety scores. Only if a factor was found to be a predictor of a particular outcome were the individual items from that factor examined (again all in the same model) as predictors of the psychological outcomes. Applying a Bonferroni correction to limit the

familywise error rate given the three psychological outcomes, a p-value of 0.017 was considered statistically significant in all cases.

Power analyses were carried out as sensitivity analyses. As such, for each psychological outcome, the observed intraclass correlation in the sample was used to estimate the smallest detectible effect size f^2 (Snijders & Bosker, 1999). For daily infertility-related distress, the smallest detectible effect size was calculated to be f^2 =.060; for depressive mood, it was f^2 =.038; for anxious mood, it was f^2 =.036. In an article by Murphy and Myors (2004), the following local effect size conventions for multilevel regression coefficients (or functional sets of coefficients) are provided: .02 = small effect, .15 = medium effect, and .35 = large effect. Therefore, this study was powered to detect conventionally small effects of coping strategies on psychological outcomes.

Materials

Baseline Questionnaires

Patient Health Questionnaire-9 (PHQ-9). The PHQ-9 consists of 9 items based on DSM-IV criteria for diagnosing depressive disorders, and is capable of determining both disorder presence and severity (34). Items are scored on a 4-point Likert scale ranging from 0 (*Not at all*) to 3 (*Nearly every day*), which indicates the degree participants have been bothered by the listed problems in the past 2 weeks (total scores ranging from 0-27) (Kroenke 2001). High internal consistency has been displayed in large samples of primary care and obstetrics-gynecology patients, Cronbach's alpha (α) = 0.86-0.89 (Kroenke 2001). Test-retest reliability (r = 0.84), criterion, construct, and external validity have also been demonstrated (Kroenke 2001). In the current study, internal consistency was found to be α = .90.

State-Trait Anxiety Inventory (STAI). The T-scale of the STAI, designed to measure trait anxiety, was utilized in the current study (Spielberger et al. 1983). Twenty items, measured on a 4-point Likert scale ranging from 1 (*Almost Never*) to 4 (*Almost Always*), assessed how the participants felt generally (total scores ranging from 20-80) (Spielberger et al. 1983). High internal consistency has been found for different populations (e.g. $\alpha = 0.86$ for high school students and $\alpha = 0.95$ for military recruits), although test-retest reliability has been shown to range from $r = 0.31$ to $r = 0.86$ over various time intervals (Spielberger 1983). In the current sample, internal consistency was found to be $\alpha = .94$.

Fertility Quality of Life Questionnaire (FertiQoL). The core scales of the FertiQoL includes 24 items assessing multiple domains of the individual – emotional, mind-body, relational, and social (Boivin et al. 2011) (Boivin et al. 2011). Items 1-4 range from 0 (*Completely*) to 4 (*Not At All*), items 5 and 6 range from 0 (*Always*) to 4 (*Very Satisfied*), items 7-14 range from 0 (*Always*) to 4 (*Never*), and items 15-24 range from 0 (*An Extreme Amount*) to 4 (*Not At All*). Items 4, 11, 14, 15, and 21 are reverse-scored. Finally, to improve comparability with other quality of life scales, the total score was converted to have a range of 0-100. The optional treatment scale was not used in the current study as it is only intended for women pursuing fertility treatments. The internal consistency for core subscales was high in a sample of more than 2000 clinical and online participants struggling with infertility (Boivin et al. 2011). In the current study, the internal consistency was found to be $\alpha = 0.88$.

Questionnaires Administered Repeatedly Throughout the Menstrual Cycle

Daily Infertility-Related Distress. The 6 items from the emotional subscale of the FertiQoL were administered to specifically assess preoccupation with, and distress about, one's struggles to conceive day-to-day: ability to cope, feelings of jealousy and resentment, feelings of

grief and loss, fluctuation between hope and despair, sadness and depression about fertility problems, anger about fertility problems. However, scores were inverted such that a higher score indicated more distress. Total scores could range from 0 to 24. In the current study, the internal consistency for this scale was found to be $\alpha = .89$.

Immediate Mood Scaler-12 (IMS-12). The IMS-12 is a 12-item short version of the Immediate Mood Scaler (IMS) that provides an ecologically valid means of assessing current mood symptoms using a seven-point scaler, with adjectives on either end of the scale (e.g. Worthless at one end vs. Valuable on the other; Pessimistic vs. Optimistic) with the following instructions: "Using the scales below, rate how you feel now" (Nahum et al. 2017). Its two subscales, measuring anxiety (scores ranging from 5-25) and depression (scores ranging from 5-35), show high correlations with psychometrically sound measures of anxiety and depression (e.g. PHQ-9 and GAD-7; Nahum et al. 2017). The IMS-12 has also been shown to aid in prediction of anxiety and depression (Nahum et al. 2017). In the current study, the internal consistency for this scale was found to be $\alpha = .97$.

Daily coping assessment. As we felt that no adequate means of assessing daily infertility-related coping existed, a novel questionnaire was created for this study. Participants were asked to respond to 13 questions indicating the extent to which they engaged in the listed behaviours in the past two days of trying to conceive. These items were measured on a 5-point Likert scale with response options ranging from 1 (*not at all*) to 5 (*very much*), or in the case of downplaying, from 1 (*strongly disagree*) to 5 (*strongly agree*). Suppression, pre-emptive action, pre-emptive emotion management, expectation management, optimism, distraction, seeking information, and downplaying the importance of biological children were included due to their alignment with Sweeny, Andrews, Nelson, and Robbins's uncertainty navigation model in the

context of trying to conceive (Sweeny et al. 2015). We additionally included hiding emotions, seeking social support, seeking spiritual support, and trying to relax as coping techniques that have been used in previous measures of daily coping (e.g. Stone and Neale 1984). In the current study, the internal consistency for this scale was found to be $\alpha = .74$.

Results

Baseline Characteristics

The flow of participant through the study is depicted in Figure 1. 131 women agreed to complete the baseline survey and 65 of these women agree to participate in the longitudinal portion of the study. Women who accepted to continue in the study did not significantly differ from those who did not with regards to any of the baseline characteristics listed in Table 1 (ps > .05).

Table 1 reports the demographic and reproductive health characteristics of these 65 women. Participant ages ranged from 19 to 43 years and number of years spent trying to conceive ranged from 1.0 to 13.0 years. Nearly half of the participants had a diagnosis of polycystic ovarian syndrome or endorsed symptoms that were indicative of the diagnosis (acne and irregular menstruation). 14% of women had received a diagnosis of endometriosis. 22% of the participants were aged 35 or older. The mean number of surveys completed as part of the longitudinal part of the study, per participant, was 8 (SD = 3.9).

Psychometric Properties of Coping Questionnaire

Exploratory factor analysis revealed four distinct factors related to the coping strategies measured (Table 2), which we have labelled as follows: 1) suppression of negative emotions (items 1-3), 2) active coping (items 4-7), 3) behavioural engagement (items 8-11), and 4) downplaying the importance of having biological children (items 12-13).

Participant Characteristics Associated with Coping Strategies

In examining the correlation between the four coping factors identified and the variables listed in Table 1, endorsement of behavioural engagement (factor 3) was positively correlated with baseline Fertility Quality of Life (r (54) = 0.38, p = .004), negatively correlated with baseline STAI score (r (57) = -.27, p = .046) and tended towards being negatively correlated with baseline PHQ-9 score (r (57) = -.25, p = .057). The three other coping factors were not correlated with any baseline characteristics (*ps* > .017).

Similarly, examining the correlation between the four coping factors and mean anxiety, depression, and distress scores endorsed across the menstrual cycle, behavioural engagement was significantly negatively correlated with mean anxiety, r (57) = -.48, p < .001, mean depression, r (57) = -.49, p < .001, and mean distress, r (57) = -.37, p = .004 while the other three factors were not (*ps* > .017).

Effect of Cycle Phase on Daily Distress and Coping Techniques

A significant cycle phase effect was observed such that levels of anxiety, depression, and distress were higher during menstruation compared to the other phases (Figure 2; *ps < .017*). Use of the four coping factors did not differ by menstrual cycle phase, *ps* > .017.

Within-Person Effect of Coping Factors on Psychological Outcomes

Analyses examining the interaction between coping strategy use and cycle phase on psychological outcomes were not significant (ps > .017). However, several main effects of strategy use were identified. First, as depicted in Figure 3, day-to-day use of behavioural engagement was associated with lower person-centred depression scores, $\beta(SEM)$ = -3.25(.51), p < .0001, anxiety scores, $\beta(SEM)$ = -2.07(.36), p < .0001 and infertility-related daily distress, $\beta(SEM)$ = -.64(.22), p = .005. In examining which of the behavioural engagement factor items

were most strongly associated with psychological outcomes (Table 3), it was found that both distraction and attempting to relax were consistently associated with improved emotional wellbeing. Conversely, seeking social support was associated with more distress, but was unrelated to both anxiety, and depression. Finally, seeking spiritual support was associated with less anxiety but was unrelated to the other outcomes.

A significant relationship between downplaying the importance of biological children and person-centred depression scores, $\beta(SEM)$ = 1.14(.47), p = .016, was the only other significant effect of coping on outcomes. However, separately examining the two items loading on this factor – benefit finding and downplaying the importance of biological children – revealed that neither one alone was predictive of depression scores (ps > .017) (Table 3).

Since the current study included nulliparous, primiparous, and multiparous women, we conducted sensitivity analyses examining whether the effectiveness of the examined coping strategies was similar across these groups. These analyses revealed that the interaction between number of children and day-to-day use of each coping strategy on each psychological outcome was non-significant (ps > .017), suggesting that women benefit from similar coping strategies, regardless of number of children.

Predicting Psychological Response to Non-Pregnancy

Ten out of 65 participants became pregnant in the cycle under investigation, while the remaining women obtained negative test results. Adjusting for baseline fertility quality of life, women who reported higher mean infertility distress across the cycle also reported being more devastated, $\beta(SEM)$ = .32(.13), p = .015, and finding it harder to accept a negative outcome, $\beta(SEM)$ = .19(.06), p = .004. However, mean endorsement of the four coping strategy factors, mean anxiety across the cycle, and mean depression scores across the cycle were not predictive

of either outcome (ps > .05). Furthermore, no variable assessed throughout the cycle predicted level of hope for getting pregnant in the future (*ps* > .05).

Discussion

The current study sought to examine the daily experiences of women struggling to achieve pregnancy outside the context of ART. Furthermore, it sought to examine the association between the use of various psychological coping strategies and emotional wellbeing throughout the cycle. Four clusters of coping strategies emerging from the 13-item coping questionnaire – emotional suppression, active coping, behavioural engagement, and downplaying the importance of biological children – were examined in relation to day-to-day distress as well as depressive and anxious mood.

Between-person analysis revealed that women inclined to use behavioural engagement across the menstrual cycle also tended to be less anxious, less depressed, and have a better quality of life. Within-person effects were consistent with this finding such that women experienced less depression, anxiety, and infertility-related distress on days when they endorsed more behavioural engagement. In examining the individual items loading on this factor, distraction and engaging in activities with the intention of relaxing were most consistently associated with positive emotional outcomes. These findings are consistent with previous research by Benyamini, Gozlan, and Kokia (2004) on women undergoing, or preparing to undergo fertility treatments, whereby women who focused on self-fulfillment in other life areas experienced less psychological distress. Interestingly, seeking social support was associated with greater distress and was unrelated with depression and anxiety. While it is possible that this reflects a tendency for women to seek more social support on days when they are more distressed about their infertility, it is also possible that seeking emotional support from loved ones who may

respond in unhelpful ways could exacerbate distress. These findings suggest that interventions aimed at improving the quality of social support received, such as with the use of Interpersonal Psychotherapy (Koszycki et al. 2012), may be beneficial for this population. Indeed, research suggests that unsupportive social interactions are very commonly encountered by women struggling with infertility and that these interactions are predictive of greater depression and distress (Lund et al. 2009; Mial 1985; Mindes et al. 2003). Unfortunately, the current study did not record details of the nature or quality of social interactions – future research assessing these details may help explain this surprising finding.

Neither active coping, often considered an adaptive coping strategy to most stressors, nor emotional suppression, typically considered a maladaptive approach to handling stress, were significantly related to psychological outcomes, suggesting that the general coping literature may not necessarily generalize to infertility. However, downplaying the importance of having biological children was associated with more anxiety and depression, consistent with the old adage, coined by Carl Jung "what you resist, persists" and in line with acceptance-based therapies such as Acceptance and Commitment Therapy (ACT) and Mindfulness-Based Cognitive Therapy aimed at fostering non-judgmental acceptance of one's thoughts and feelings as they are (e.g. desire to have a biological child and the associated emotional pain) rather than trying to change or challenge them. This finding is also consistent with research suggesting that mindfulness-based therapies are modestly beneficial for reducing depression and infertility distress among women struggling with infertility (Galhardo et al. 2013; Peterson and Eifert 2011; Shargh et al. 2015).

Use of coping strategies throughout the cycle did not predict emotional responses to a negative pregnancy test. However, behavioural engagement was an effective strategy during the

menstrual phase (in response to a disappointing outcome from the previous cycle), suggesting that women should still be encouraged to engage in relaxing and distracting activities in the days following a negative outcome.

The current study had multiple strengths, including its repeated measures design, allowing for an examination of within-person effects of coping on emotional wellbeing, and its focus on an understudied population: women struggling with infertility outside the context of assisted reproductive technology. Furthermore, although its prospective design is an improvement over cross-sectional studies, the current study nonetheless employed an observational rather than experimental design, making it difficult to clarify the direction of the relationship between coping and mood. Indeed, it is possible that changes in mood may lead one to engage in certain coping strategies over others. Future studies experimentally manipulating individual coping strategies may be better equipped to clarify this issue. It is also the case that only 22% of women deemed eligible for this online study went on to participate in the longitudinal portion of the study – although no baseline differences were detected between women who only completed the baseline assessment versus those who completed the entire study, it is nonetheless possible that these two groups may have differed in terms of some unmeasured variable, potentially resulting in a biased sample. Furthermore, it is a limitation that we did not ask participants why they were not pursuing ART, although given the below-average mean household income of our sample, lack of financial means was likely an important factor for many. Finally, we used a new daily coping measure that had not yet been validated in a prior study. However, its adequate internal consistency, factor structure, and predictive validity in the current study suggest that it is worthy of further development as a coping measure.

In summary, the current study suggests that distracting oneself from efforts to get pregnant and engaging in activities intended to be relaxing are associated with improved mental health whereas trying to convince oneself that having biological children is unimportant is likely unhelpful. Active coping and emotional suppression were neither helpful nor harmful and seeking social support was associated with more infertility-related distress, suggesting that the quality of the emotional support that women receive from others may be a promising target of future interventions.

Compliance with Ethical Standards

Conflict of Interest

The authors declare that they have no conflict of interest.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

Table 1
Sample Characteristics

	Mean (SD) or %
Demographic Characteristics	
Mean age (*SD*)	28.5 (5.8)
Race/ethnicity	–
White/Caucasian	78%
Black/African-American	12%
Hispanic/Latina	6%
Other	4%
Education level	–
Some high school education	11%
High school diploma	35%
Some college education	41%
Bachelor's degree	8%
Master's degree	5%
Mean individual annual income	$20,000 to $34,999
Mean annual household income	$35,000 to $49,999
Reproductive Health Characteristics	
Months trying to conceive (SD)	41.78 (36.02)
Number of current children	–
None	59%
1	25%

2+	16%
Previous pregnancy	66%
Previous miscarriage	61%
Prior fertility treatment	15%
Diagnosis of endometriosis	14%
Diagnosis of polycystic ovarian syndrome (PCOS)	25%
Irregular menstruation or acne without PCOS diagnosis	23%
Strategies for trying to conceive	
Cycle tracking	88%
Timed intercourse during “fertile window”	75%
Ovulation predictor tests	57%
Monitoring cervical mucus	51%
Basal body temperature measurement	28%
Psychological Variables	
Fertility Quality of Life (/100)	52.3 (19.2)
PHQ-9 Score (/27)	9.6 (6.8)

Table 2

Factor Loadings with Varimax Rotation for Exploratory Factor Analysis of Coping Techniques

Coping Technique	1	2	3	4
1. When I start thinking about trying to get pregnant, I tell myself to stop	**.76**	.01	.04	.29
2. Trying to keep my expectations low when it comes to my chances of getting pregnant this cycle	**.70**	.06	.19	.08
3. Trying to hide my feelings about getting pregnant from other people	**.69**	.19	-.15	0
4. Taking steps to minimize the impact of a negative pregnancy test (e.g. explore fertility treatment options, look into adoption).	.22	**.76**	.06	.08
5. Thinking about how I will effectively manage my emotions if I don't get pregnant this cycle	.20	**.78**	.04	.08
6. Trying to stay optimistic about my chances of getting pregnant this cycle	-.13	**.74**	.21	-.03
7. Sought information that could help me achieve pregnancy	.34	**.54**	.31	-.20
8. Distracted myself from thinking about getting pregnant this cycle	.21	0	**.67**	.23
9. Sought or found emotional support from loved ones, friends, or professionals.	-.08	.31	**.72**	.04
10. Sought or found spiritual comfort or support (e.g. praying or going to church)	-.08	.09	**.80**	.10
11. I've done things with the intention of relaxing (e.g. take a bath, go to the movies)	.37	.17	**.59**	-.16
12. Maybe it would be for the best if I didn't get pregnant this cycle	.30	-.10	.20	**.67**
13. Maybe having biological children is less important to me than I thought.	.03	.14	.02	**.88**

Factor loadings > .40 are in boldface.

Table 3.

Examination of individual coping techniques in predicting psychological outcomes in instances of significant effects of coping factor.

Coping technique	Distress	Depression	Anxiety
Behavioural Engagement			
Distraction	-0.58 (0.13)***	-1.25 (0.33)**	-0.50 (0.24)
Social support	0.44 (0.13)**	0.00 (0.32)	-0.02 (0.24)
Spiritual	-0.19 (0.16)	-0.69 (0.38)	-0.71 (0.28)*
Relax	-0.50 (0.14)**	-1.57 (0.34)***	-1.03 (0.24)***
Downplaying the importance of biological children			
Benefit finding	0.31 (0.39)	N/A	N/A
Downplaying	0.43 (0.49)	N/A	N/A

*p<.017, **p <. 001, ***p<.0001

Figure 1. Flow of participants through the study.

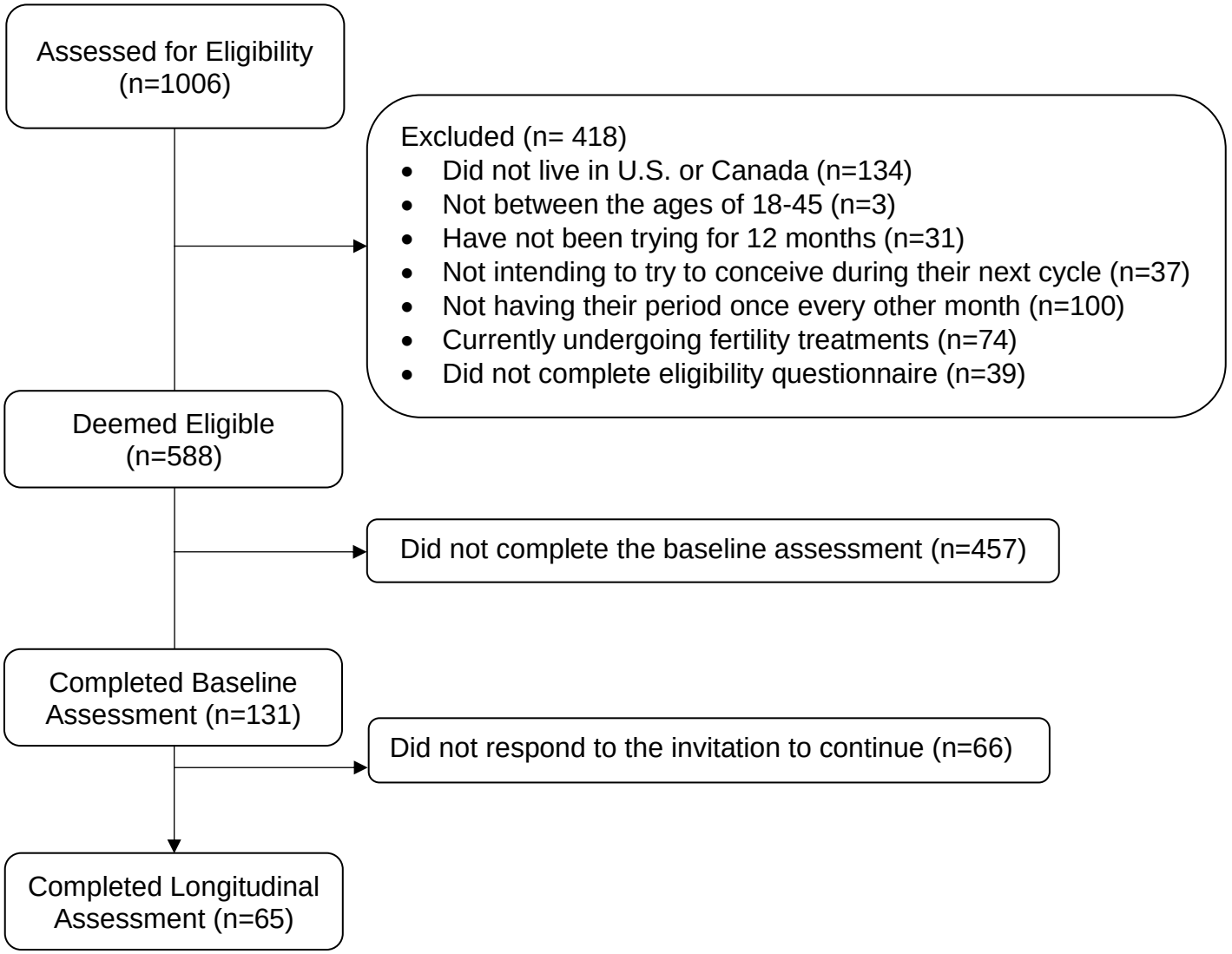


Figure 2. Mean day-to-day anxiety, depression, and distress by menstrual cycle phase.

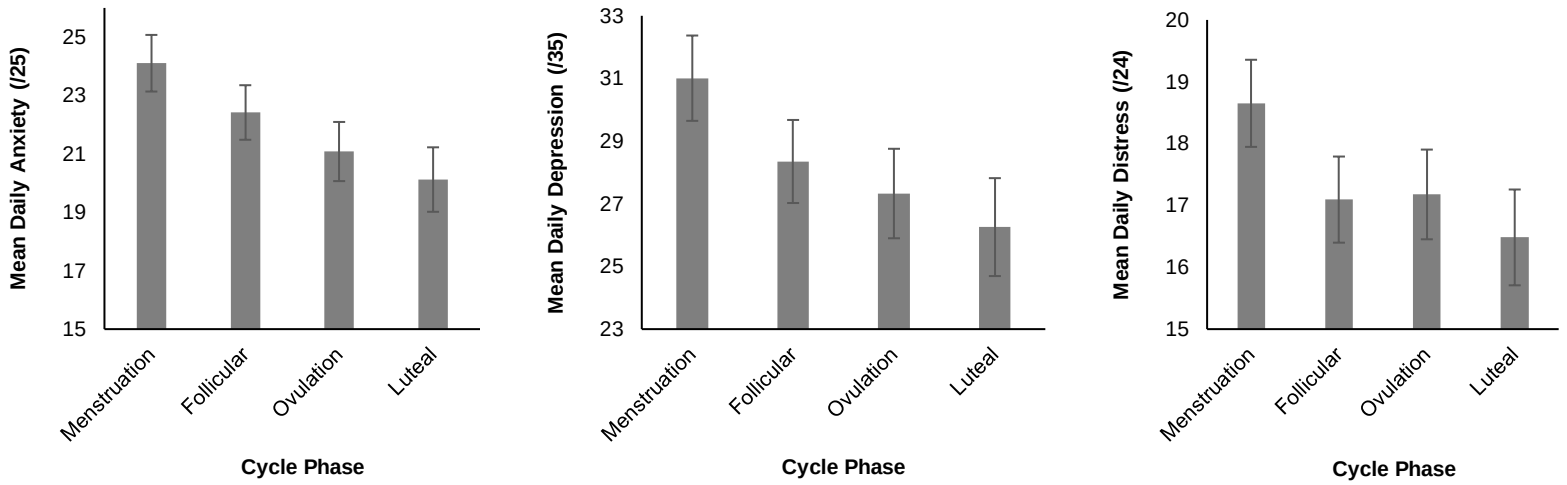
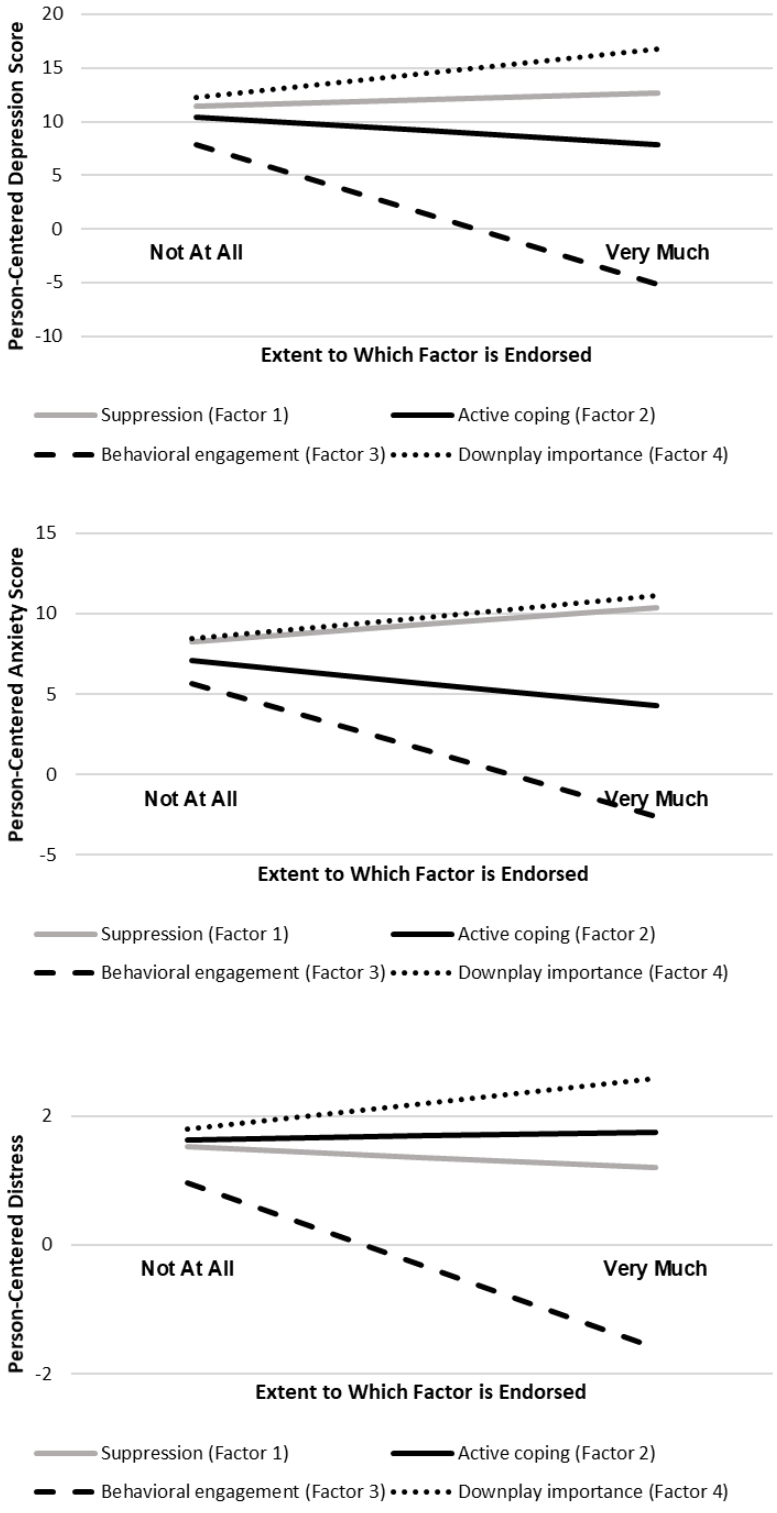


Figure 3. Main effect of coping strategies on person-centred daily depression, anxiety, and infertility-related distress.



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