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Predictive Effects of Cognitive Flexibility, Marital Relationship Quality, and Meta-worry on Pregnancy Anxiety

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Pregnancy is one of the most difficult and dangerous experiences of any woman. The purpose of this study was to predict pregnancy anxiety based on cognitive flexibility, marital relationship quality, and meta-worry. To this end, this investigation employed the correlational study design. The intended population consisted of all pregnant women in Tabriz who were in the first trimester of pregnancy and had medical records in Alzahra Women's Hospital and Milad Specialty Clinic of Tabriz. A total of 220 women were selected via the systematic random sampling. To collect data, we used Van der Berg's (1990) Pregnancy-related Anxiety Inventory, Dennis & Vander Wal's (2010) Cognitive Flexibility Questionnaire, Busby, et al.'s (1995) Revised Dyadic Adjustment Scale (RDAS), and Wells' (2005) Meta-worry Questionnaire. The

multiple regression analysis results showed that about 34% of changes in pregnancy anxiety were explained by the model, or rather cognitive flexibility, marital quality and meta-worry ($p = .000$). Also, the findings revealed that meta-worry (46%) had the greatest role in predicting pregnancy anxiety compared to marital quality (27%) and cognitive flexibility (18%). Therefore, it is concluded that specialists in the field can make positive changes in pregnancy anxiety by focusing on the present study's variables among others involved.

Keywords: cognitive flexibility, marital relationship quality, meta-worry, pregnancy anxiety.

Pregnancy is considered one of the critical periods, which can lead to both positive and negative psychological anxiety and pressure for women as well as their families. Hutti (2005) believes that in the process of making important life decisions, which involves a significant level of responsibility, individuals have to go through it alone, with pregnancy anxiety being a such an experience. Research shows that women perceive pregnancy positively; however, the changes that it brings to the body and mind can lead not only to physical problems but also to significant psychological challenges (Lowdermilk & Perry, 2004). It is also evident that experiencing anxiety during pregnancy is an inevitable matter (Beck & Driscoll, 2006) and its magnitude can vary in the different stages of pregnancy (Dhillon, et al., 2017). Previous studies have shown that 54% of women with low-risk pregnancies experience pregnancy anxiety. This anxiety follows a U-shaped pattern over the three trimesters of pregnancy, with high anxiety during the first and third trimesters with variable intensities (Teixeira, et al., 2019).

One reason experts pay attention to the issue of anxiety during pregnancy is that they argue that experiencing negative anxiety and psychological distress can either lead to fetal

physical unhealthiness or affect future pregnancies (Viswasam, et al., 2019) although the experience of this type of anxiety during different stages of pregnancy can vary (Yu, et al., 2020). The current literature shows that pregnant women may experience severe worry and anxiety about fetal developmental disorders, fear of labor pain, and worries about personal life changes as a result of pregnancy and childbirth (Farhadi, 2019); they may also be anxious about the experience of preterm birth, low birth weight, and some infant abnormalities such as cleft palate, cleft lip, and infant mortality (Feligreras-Alcalá, et al., 2020; van de Loo KFE, et al., 2020). Note that ramifications of pregnancy anxiety are both physical and familial, i.e., relational (Van Dijk, et al., 2010).

From a cognitive perspective, there is growing evidence of cognitive deficits in anxiety disorders; however, little is known about the nature of cognitive deficits associated with anxiety disorders (Castaneda, et al., 2008). Past research demonstrates that deficiencies in executive cognitive functions have a significant impact on the development and persistence of anxiety, leading to impaired performance and various mental disturbances such as anxiety (Bredemeier, 2012). Empirical studies have shown that a decline in cognitive flexibility is associated with symptoms of anxiety and anxiety disorders (Sepahvand, 2020), and it appears to be a significant factor in pregnancy-related anxiety (Gracia-Gracia & Oliván-Blázquez, 2017).

The term ‘cognitive flexibility’ refers to individuals’ capacity to respond to their current situation based on the opportunities it presents and to take effective actions to support their choices based on their values, even in the presence of involuntary

internal events such as physiological sensations, thoughts, and emotions (Ahmadi Farasani, et al., 2021; Hayes, et al., 2016). In this regard, Ruiz and Odriozola-González (2017) and Nevanperä, et al. (2013) have emphasized the existence of a relationship between cognitive flexibility and anxiety in their research. Indeed, although research studies on the association between cognitive flexibility and anxiety is limited, some findings indicate contradictory results (Stevens, 2009); this contradiction necessitates examination of the relationship between cognitive flexibility and anxiety, especially during pregnancy.

Although the research background related to the quality of marital relationships during different periods of pregnancy is not significant (Martini, et al., 2021), available data have shown that the quality of marital relationships is one of the important factors in experiencing anxiety (Eftekhari, et al., 2018; Arafat, et al., 2020). The quality of marital relationships is commonly conceptualized as the overall feelings of spouses about happiness and satisfaction with their shared life (Larson & Holman, 1994). The quality of marital relationships, which is a multidimensional concept encompassing positive experiences such as feelings of affection, care, and satisfaction in the relationship, contributes to overall well-being (Olanike Busari, 2018; Fincham & Beach, 2010; Ozcan, et al., 2021; Umberson & Williams, 2005); therefore, its comprehensive examination in various areas of life has been greatly emphasized (Hassebrauck & Fehr, 2002).

Given the uncertain conditions of pregnancy and the multiple concerns arising from it, it seems that lack of control over anxiety or distress may adversely affect women's mental health.

When ‘normal’ worry becomes excessive, persistent, and uncontrollable, it gives way to pathological worries known as meta-worry. Meta-worry can be described as the state of worrying about worry (Wells, 2005). Worrying needs to be addressed, not only as a sign of anxiety, but as a motivational style and an active way to assess and cope with fear. It seems that individuals with anxiety disorders use worry to cope with anticipated danger or fear. Although meta-worry can lead to increased anxiety, individuals perceive it as a kind of coping skill and do not attempt at all to break the chain of worrying thoughts. In this way, worrying acts as a factor in avoiding failure in the process of adaptation in future. Relevant studies (Borkovec & Roemer, 1995; Ruscio & Borkovec, 2004; Wells, et al., 2022) on pregnant women suffering from fear, anxiety, and depression indicate that pathological worry in these women is associated with positive beliefs about worry (meta-worry). Spada, et al. (2016) believe that metacognitive dimensions and negative beliefs about worry, cognitive assurance, and the need for thought control play a significant role in the relationship between perceived stress and negative emotions. A possible postulation is that individuals believing in the uncontrollability of worrying engage in incompatible coping strategies such as rumination, avoidance, thought suppression, and threat monitoring. These strategies can provide a wide range of access to threat resources in processing and gradually lead to increasing perceived stress and negative emotions such as pressure on cognitive resources (Wells, et al., 2022). Therefore, it is possible to consider the strong impact of these beliefs on mitigating anxiety and stress an issue that has received little national and international attention in pregnancy-related studies (Zare &

Mohammadi Ahmadi Abadi, 2011; Zare & Mohammadzadeh, 2014).

Related studies conducted in various parts of the world have reported variable prevalence of pregnancy anxiety; meanwhile, it should be noted that pregnancy anxiety often goes undiagnosed and untreated. Considering the arguments above, the present study addressed the following hypotheses:

H₁: There is a relationship between cognitive flexibility and pregnancy anxiety.

H₂: There is a relationship between marital quality and pregnancy anxiety.

H₃: There is a relationship between meta-worry and pregnancy anxiety.

H₄: Cognitive flexibility, marital relationship quality, and meta-worry can predict pregnancy anxiety.

With regard to the possible practical application of the results, this study could create a firm foundation for and contribute to the development of a preventive, therapeutic program for pregnancy anxiety in women – an issue that has grabbed attention of obstetricians, gynecologists, and psychologists.

Method

Drawing on the correlational research design, this study's intended population consisted of all pregnant women in Tabriz who were in the first trimester of pregnancy and had medical records at Alzahra Women's Hospital and Milad Specialized Clinic in Tabriz. Through the systematic random sampling, we selected 220 participants. Based on this sampling method, we

selected every four people in the population list, which was ordered systematically. Note that in this research, ethical concerns were addressed by carefully considering the issues related to institutional approval, informed consent, and participant protections.

Instruments

Van der Berg's (1990) Pregnancy-related Anxiety Questionnaire

This questionnaire measures fears and concerns related to pregnancy and has been developed by Van der Berg in 1989. The initial version of this questionnaire consists of 57 items, but its short version is made up of 17 items, assessing five factors: fear of childbirth (3 items), fear of having a physically or mentally disabled child (4 items), fear of changes in marital relationships (4 items), fear of changes in self-esteem and its impact on the child (3 items), and self-centered fear or fear of changes in the mother's personal life (3 items). Each statement is rated on a scale of one to seven with the total score of the questionnaire obtained by summing the responses to the questions, ranging from 17 to 119.

Dennis & Vander Wal's (2010) Cognitive Flexibility Questionnaire

Developed by Dennis and Vander Wal (2010), the questionnaire is a self-report tool consisting of 20 short questions and is employed to assess a type of cognitive flexibility necessary for challenging and replacing ineffective thoughts with more effective ones. It is scored on a 7-point Likert scale ranging from 1 to 7 and aims to measure three aspects of cognitive flexibility: a) willingness to perceive

difficult situations as controllable situations, b) ability to perceive multiple alternative justifications for life events and human behavior, and c) ability to create multiple alternative solutions for difficult situations. This questionnaire is used in both clinical and non-clinical settings to evaluate an individual's progress in developing flexible thinking in cognitive-behavioral therapy for mental illnesses (Dennis & Vander Wal, 2010). The concurrent validity of this questionnaire with the Beck Depression Inventory was .39, and its convergent validity with the Martin and Rubin Cognitive Flexibility Scale was .75. The Cronbach's alpha coefficient for the total scale was .90, and for the subscales, it was reported as .87, .89, and .55, respectively. Additionally, the CFI of the factor validity and concurrent validity estimated in Iran has been acceptable. In the Persian version, contrary to the original scale which yielded only two factors, the Cognitive Flexibility Questionnaire consists of three factors: perceived controllability, perceived alternative options, and perceived justification of behavior.

Busby, Crane, Larson, and Christensen's (1995) Revised Dyadic Adjustment Scale (RDAS)

The Revised Dyadic Adjustment Scale (RDAS), developed by Busby, et al. (1995), consists of 14 questions. The initial form of this scale consisted of 32 questions, developed by Spanier (1976) based on his theory of marital quality. Busby et al. (1995) also introduced the 14-item questionnaire as a suitable tool for assessing marital quality after presenting their own theory. In the current study, we use the 14-item questionnaire, which is scored on a 6-point scale from 0 to 5, with a score of 5 indicating complete agreement and a score of 0 indicating

complete disagreement. RDAS is made up of three subscales, i.e., agreement, satisfaction, and coherence with the aggregate score calculated indicating the score of marital quality, with higher scores indicating higher marital quality.

Wells' (2005) Meta-worry Questionnaire

This 22-item, multi-dimensional questionnaire is applied to assess meta-worry. The questionnaire is a four-point Likert scale; respondents select one of four options for each item, indicating their own level of agreement, ranging from 1 (almost never) to 4 (almost always). The internal consistency of the items for social concern, health concern, and preoccupation has been found reasonable, i.e., .84, .81, and .75, respectively (Wells, 1994). The scale's reliability coefficient over time using the test-retest method was 0.92. Wells (1994) also examined the correlation of the meta-worry questionnaire with BAI (*Beck Depression Inventory*), BDI-II, and GHQ-28 (*General Health Questionnaire*) in order to determine its convergent validity. Overall results confirmed convergent validity ($r = > .70$). In addition, for the study's sample, the Cronbach's alpha coefficient for the entire questionnaire was estimated as .91.

Results

Descriptive and inferential statistics were employed to address the research hypotheses. The descriptive statistics for the participating sample ($n = 220$) were as follows: cognitive flexibility (mean=93.92, standard deviation=13.98), marital quality (mean = 46.01, standard deviation = 12.09), meta-worry (mean = 13.72, standard deviation = 4.60), and pregnancy anxiety (mean = 51.19, standard deviation = 21.99). Considering

the research design of the study – correlational research – the bivariate and multivariate associations among the study's variables were examined. To this end, Pearson's (r) and multiple regression were considered appropriate.

As a main assumption, the normality of the data distribution was checked using skewness and kurtosis tests. Following Kline's (2011) recommendations, the values of skewness and kurtosis for all variables of the study were in the acceptable ranges of -1 and $+1$. The assumption of linearity was also examined; it helped detect multicollinearity. The two widely used measures of tolerance and inflation variance factor (VIF) were utilized to identify multicollinearity. Neither statistic (tolerance and VIF) reached the threshold values of $>.1$ and <10 , indicating that this assumption was not violated.

As reported in Table 1, there was a negative and significant correlation between cognitive flexibility and pregnancy anxiety, ($r = -.467, p <.01$), suggesting that the first hypothesis is supported. Also, there was a significant negative relationship between marital quality and pregnancy anxiety ($r = -.470, p <.01$), implying that the second hypothesis is supported. It was also evident that there was a positive and significant relationship between meta-worry and pregnancy anxiety ($r = .580, p <.001$). The third hypothesis of the study was thus confirmed.

Table 1
Results of Pearson’s (r) Correlation (n = 220)

	Pregnancy Anxiety	Cognitive Flexibility	Marital Quality	Meta-worry
Meta-worry	.580***	.470**	-.376***	1
Marital Quality	.470**	.577**	1	
Cognitive Flexibility	-.470**	1		
Pregnancy Anxiety	1			

Note. **Significant level less than .01; ***Significant level less than .001

Multiple regression analysis was employed to test the fourth hypothesis. Table 2 indicates that the coefficient of determination (*R*-squared) is the squared value of multiple correlation coefficients, which is equal to .34. This suggests that about 34% of changes in pregnancy anxiety have been explained by the model, or rather by the predictive variables – cognitive flexibility, marital quality and meta-worry.

Table 2
Regression Analysis of Pregnancy Anxiety Scores on Cognitive Flexibility, Marital Quality and Meta-worry

Regression Model	<i>R</i>	<i>R</i> -Squared	Adjusted <i>R</i> -squared	Standard Error of Estimate
Total	.492	.342	.332	18.434

To assess the statistical significance of the result above, it was necessary to examine analysis of variance of regression. Results revealed that the model reached statistical significance, meaning that pregnancy anxiety is significantly related to cognitive

flexibility, marital quality, and meta-worry ($F = 26.126$, $p = .000$). Overall, results confirmed the fourth hypothesis, suggesting that cognitive flexibility, marital quality, and meta-worry can explain pregnancy anxiety.

Finally, standardized regression coefficients (β) were used to determine which of the variables included in the model contributed to the prediction of the dependent variable. Note that the large coefficient of standardized regression (β) indicates relative importance and its role in predicting dependent variables. As outlined in Table 3, meta-worry ($\beta = .46$) made the strongest unique contribution to explaining the dependent variable; other predictive variables, i.e., marital quality ($\beta = -.27$) and cognitive flexibility ($\beta = -.18$) were very lower than 0.46, indicating that they made less of a unique contribution. It was also found that the standardized coefficients of regression for meta-worry variable ($t = 8.134$, $p = .000$), marital quality ($t = -3.132$, $p = .002$) and cognitive flexibility ($t = -2.466$, $p = .044$) was significant. Therefore, it can be stated that meta-worry (46%) in comparison with marital quality (27%) and cognitive flexibility (18%) makes a significant unique contribution to the prediction of pregnancy anxiety.

Table 3**Standardized Regression Coefficients for Cognitive Flexibility, Marital Quality and Meta-worry**

Model	Unstandardized Coefficients		Standardized Coefficients	Sig.*
	β	Std. Error	Beta	
Cognitive Flexibility	-.228	.187	-.185	.044
Marital Quality	-.413	.150	-.279	.002
Meta-worry	2.216	.272	-.468	.000

Discussion

This study aimed to predict pregnancy anxiety based on psychological flexibility, marital relationship quality, and meta-worry in pregnant women. The overall outcome of the study suggests that meta-worry (46%) has the most significant role in predicting pregnancy anxiety when compared to marital relationship quality (27%) and cognitive flexibility (18%). These findings are consistent with similar research results such as Camila, et al. (2020), von Sydow (2019), Schulz, et al. (2006), Yu, et al. (2021), Wells & Carter (2009), and Ruscio & Brokovec (2014).

One reason for the relationship between cognitive flexibility and pregnancy anxiety is that cognitive flexibility, as stated by Dickstein et al. (2007), is an executive ability to adapt the individual's thoughts and behaviors in response to environmental changes. In this regard, Landi, et al. (2022) noted that this factor leads to establishing a connection with the present moment and the ability to differentiate oneself from mental thoughts and experiences. On the other hand, Albal and Buzlu (2021) recently argued that psychological flexibility can

be observed as the ability or the outcome of successful adaptation to threatening conditions; with psychological flexibility individuals can confront negative and unpleasant internal and external experiences as well as maintain their psychological balance and adaptation. Accordingly, if pregnant women have this ability, they can adapt their thoughts and behaviors in response to the challenging conditions of pregnancy. Furthermore, Chen et al. (2021) stated that individuals with flexible thinking (i) use alternative justifications, (ii) positively reconstruct their cognitive framework, and accept challenging situations or stressful events, and (iii) demonstrate greater psychological resilience compared to those who are not flexible. In this regard, Gabrys, et al. (2018) also stated that cognitive flexibility enables individuals to manage worrisome thoughts and provide adaptive responses to existing challenges. Therefore, pregnant women's cognitive flexibility may enable them to overcome worries during pregnancy, utilize adaptive options in unexpected circumstances, and control pregnancy-related anxiety.

Pregnancy is extremely crucial as the period of maternal change and physiological/psychological adaptation (Condon, 2011). The desirable quality of marital relationships, along with its components such as feelings of happiness, satisfaction, compatibility, and marital commitment, can act as a supportive shield and significantly lower the level of pregnancy anxiety (Erbil, 2020). According to Asselmann et al. (2020), undesirable quality of marital relationships leads to dissatisfaction among couples, disturbed family atmosphere with tense relationships, and formation of insecurity in pregnant women; these in turn could result in increased anxiety related to pregnancy with its

unavoidable consequences. On the other hand, Custer (2009) and Taghani, et al. (2019) argued that effective and efficient communication is one of the components of the quality of marital relationships, laying the groundwork for collaboration, understanding, and marital satisfaction, and has a significant impact on reducing anxiety in stressful situations, especially during pregnancy. In this regard, Troxel (2006) emphasized that one of the main aspects of the quality of marital relationships is the relationship with the spouse, in which couples constantly strive to pay attention to their spouse by rallying together to recognize their needs and challenges. Therefore, once a feeling of relatedness dominates the couples' life, pregnancy is experienced with less anxiety; such an emotional relationship provides a sense of having a supportive and protective resource under difficult pregnancy conditions and pave the way for enduring and passing this period.

As a possible explanation for the relationship between meta-worry and pregnancy anxiety as well as the strength of this association when compared to other variables of the study, one can argue that drawing on worrying as a coping strategy, pregnant women suffering from pregnancy anxiety begin to form negative beliefs about worry, resulting in negative evaluations of the worrying process. Such negative evaluations in turn lead to the emergence of a second type of worry, known as meta-worry (Wells, 2000). Wells (2000) has also stated that negative evaluations of worry emerge as a second type of worry or meta-worry since they involve negative evaluations of the process of worrying or the worry about worry. Indeed, each pregnancy is unique in and of its self; hence, in every pregnancy experience, pregnant women worry about their own physical and

mental health as well as the fetus – a kind of worry that, due to its ambiguous nature, causes meta-worry. According to Fell et al. (2023), when meta-worry becomes active, it can intensify anxiety and other emotional responses. Furthermore, meta-worry leads not only to the intensification and perpetuation of anxiety but also to the formation of pathological anxiety; this is because it has a direct relationship with incompatible metacognitive strategies (Kring, et al., 2012). Wells and Carter (2009) argued that although meta-worry intensifies anxiety and stress in anxious individuals, they perceive the need for rumination as a coping mechanism and do not attempt to break its chain. Thus, worry serves as a means of avoiding failure in the process of adaptation, which ultimately disrupts their relationships with themselves and others. Purdon (2004), informed by Well's (2000) theoretical model, believed that the primary reason for the onset and perpetuation of worry in anxious individuals is that they receive information about the dangerous consequences of worry from various sources, and it all seems to be applicable to the experiential-specific pregnancy anxiety that inherently lacks opaqueness.

Furthermore, using a cognitive view on the persistence of anxiety disorder symptoms, Wells (2000) delved into the mechanism of thought control, and suggested that thought control rarely can be an effective effort to stop worry beliefs. From the perspective of thought control proponents, an individual may try not to think about a specific worrying thought and therefore avoid the triggers that may cause worries. However, individuals' efforts to avoid or suppress worry thoughts rarely succeed completely; there is empirical evidence that suppressive thinking strategies may be unproductive and

ineffective. In this way, the individual becomes engaged in a controlling activity which leads to creating information about their inability to control thoughts in an effective manner. This can, in turn, reinforce negative evaluations of mental control meta-worry.

Ultimately, the findings should be interpreted with caution since some limitations could influence outcomes of the research. The use of non-random sample and self-report tools may be major limitations in this study though their use may be justified as long as the sample and the tools are relevant (Haeffel & Howard, 2010; Yusof & Jaafar, 2012); future research should consider replication of the study with various samples and more subjective measuring instruments to obtain more accurate outcomes. Considering the findings, we also suggest that for the prevention and control of pregnancy anxiety, cognitive rehabilitation interventions based on cognitive flexibility should be carried out for pregnant women in healthcare centers. Similarly, educational interventions in the form of family training programs should be implemented to reduce pregnancy anxiety and improve the quality of marital relationships in couples experiencing pregnancy. We also recommend including the concept of meta-worry in the educational intervention programs for pregnant women. Finally, examining the other variables present in different stages of pregnancy is recommended.

Limitations of the study were using research tools, such as a questionnaire which limits the generalization of the results to other populations. Regarding the role of meta-worry, marital relationship quality and cognitive flexibility in predicting pregnancy anxiety, workshops as well as practical materials

should be prepared by psychologists for woman so that pregnancy anxiety could be prevented through awareness and trainings.

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