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Cognitive Flexibility and Coronavirus Anxiety: Mediating Role of Emotion Regulation and Maladaptive Schemas

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Abstract: Corona disease anxiety is one of the factors that threaten the mental health of working women, and it is very important to identify the psychological factors affecting it. This study aimed to investigate the structural relationship between Corona anxiety and cognitive flexibility and evaluate the mediating role of emotion regulation and early maladaptive schemas. The current research is a descriptive correlational study. Statistical population of this study was all the occupied women of Kermanshah city (Iran) in 2022, from which 364 people were selected by cluster random sampling method. The research tools include the Corona Disease Anxiety Scale (CDAS) (Alipour et al., 2018), the short form of the Young Schema Questionnaire (1998) (YSQ-SF), Cognitive Emotion Regulation Questionnaire (CERQ) (Garnefsky and Kraaij, 2006) and Cognitive Flexibility Inventory (Dennis & Vander Wal, 2010). The research data was analyzed using SPSS-25 software. Based on this, the path analysis method was used to analyze the research hypotheses. The evaluation of the proposed model had an acceptable fit. Path analysis identified the relationship between cognitive flexibility and corona anxiety, in addition, the findings indicated that cognitive flexibility is indirectly related to corona anxiety and predicts corona anxiety through the mediation of emotion regulation and early maladaptive schemas. In general, the findings showed that the implementation of interventions related to improving the psychological flexibility of working women by holding training classes and job webinars in the post-Corona era, in order to control and reduce anxiety, prepare and protect this group in possible relapses of infectious diseases is suitable.

Keywords: Coronavirus anxiety, Cognitive flexibility, Emotion regulation, Early maladaptive schemas

Introduction

December 31, 2019, the outbreak of a new viral disease with respiratory symptoms in China was officially announced to the World Health Organization. In just a few months, this infectious disease caused deaths, disruptions and unprecedented economic problems all over the world and affected the mental health of many people (Padovan-Neto et al., 2023). The Corona pandemic has had major effects on the mental health and well-being of many vulnerable groups in society (Cowie & Myers, 2021). Women are among the people who were severely affected (Marshall et al., 2020). This disease directly affects the well-being of different groups (based on gender and age) by increasing the levels of anxiety, stress and loneliness, and in women it is associated with an increase in long-term anxiety so that women have more anxiety symptoms than men and experience more neurological complications (Juszko et al., 2023). This public health crisis has required health workers to observe the state of emergency and high vigilance for a long time, which can be the cause of anxiety in the post-corona era. So far, a wealth of

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information on disease epidemiology, pathogenesis, infection control and prevention has been reviewed, however interventions to support health care workers during outbreaks and post-disease assessment have received less attention (Heath et al., 2020). Therefore, it is necessary to use interventions and support strategies specifically for frontline health and treatment workers who are responsible for fighting the virus (Dixit et al., 2023). Anxiety is a common psychological state in humans, which everyone experiences in some way during their life, but if its level is out of balance, it becomes a full-fledged mental disorder (Fillenbaum et al., 2019).

Anxiety is defined as a vague and uncontrollable worry that is accompanied by physical symptoms in the absence of certain objects, movements, and situations (Melnyk, 2020) and the corona anxiety is anxiety caused by the corona virus, which is due to an unknown cause and corresponding cognitive ambiguity is created (Alipour et al., 2020). The occurrence of anxiety is usually associated with symptoms of increased heart rate, sweating, and shortness of breath (Protudjer et al., 2021). The long-term effects of corona anxiety are also evident in the post-crisis era, and existing research emphasizes the role of cognitive flexibility in reducing anxiety. But the mediating mechanisms and its moderators have not yet been studied and researched in detail (Akdeniz & Gültekin Ahçı, 2023). Corona anxiety may be an important risk factor for job burnout among the general population, and cognitive flexibility greatly reduces it by activating effective cognitive mechanisms (Yıldırım & Ashraf, 2023). It has a great effect on people's mental health and is useful in dealing with stress that a person has no control over.

Cognitive flexibility is the ability to adapt thoughts to changes in the existing environmental conditions (Ionescu, 2012). People who have a higher capacity for cognitive flexibility are capable to replace own thoughts with more suitable ones and more suitable thoughts lead to stress reduction (Dajani & Uddin, 2015). Psychological flexibility seems to represent a promising and practical process in understanding how people are affected by and cope with the acute and long-term challenges of the Covid pandemic (Dawson & Golijani-Moghaddam, 2020). The results of numerous studies showed that cognitive flexibility has a negative and significant relationship with Corona anxiety and it predicts it, in addition to many other factors such as cognitive regulation strategies (Rahimzadegan & Atadokht, 2020; Talebi, 2022; Zonoubi & Soori, 2022).

Emotions are related to anxiety, and it is possible that these factors are also related to Corona anxiety. Emotional regulation refers to a set of processes related to the individual's goals, which includes reducing the intensity or maintaining a certain emotion ((Saladino et al., 2020) therefore includes cognitive emotional and behavioral strategies are conscious or unconscious that are used to maintain, increase or decrease emotional experience (Strauss et al., 2019) and in a way express the person's adaptation to stressful conditions and unfortunate incidents.

Cognitive emotion regulation strategies are generally divided into two categories: positive and negative cognitive emotion regulation strategies. Adaptive strategies in dealing with stressful factors lead to the improvement of self-esteem and strengthening of social competences of people (Smith et al., 2019).

By creating proper emotion regulation, a person can perform more adaptive behaviors and tolerate disappointing experiences better. Therefore, emotion regulation plays an important role in improving

mental health and reducing anxiety of people, and the inability to manage emotions causes many psychological problems. Psychological flexibility and accepting these conditions as protective factors can have an impact on this issue (Mohammadpour et al., 2021). Many studies have pointed to the relationship between Corona anxiety, cognitive flexibility and emotion regulation. Dubey et al. (2020) in India investigated the relationship between cognitive flexibility and cognitive regulation of emotion during the outbreak of Corona and showed that cognitive flexibility is one of the main factors that reduce anxiety in Corona, although long-term stress but coping strategies based on emotion regulation create a balance between reality orientation and optimism in people. Riaz et al. (2021) in Pakistan pointed out the role of emotion regulation mediator in Corona anxiety. Mohammadpour et al. (2021) in a study showed that the fear of corona has a negative relationship with psychological flexibility and a positive relationship with difficulty in regulating emotions. Sayinta et al. (2022) investigated the direct and indirect relationships between cognitive flexibility and anxiety caused by Corona with the mediating role of cognitive regulation roles of incompatible emotions. The results of data analysis showed that cognitive flexibility was related to anxiety caused by Corona and has a direct and negative relationship with cognitive regulation strategies of maladaptive emotion, but maladaptive cognitive regulation strategies of emotion have a positive correlation with Corona anxiety. Also, the results of bootstrap mediation showed that maladaptive strategies of emotional regulation including self-blame, rumination, catastrophizing and blaming others completely mediate between cognitive flexibility and anxiety.

On the other hand, there is also a significant relationship between early maladaptive schemas and corona anxiety. Schemas refer to psychological structures that originate from a person's belief about himself, the surrounding world, and other people. Changing the content and structure of the maladaptive schema, which according to Beck is necessary to prevent the recurrence of anxiety, increases the cognitive flexibility of people through improving cognition and using effective cognitive mechanisms (Fischer et al., 2016). Research shows that schemas act as psychological vulnerability factors against stressful life situations. In the Corona crisis, anxiety and distress have been recorded and reported as the main symptoms and complaints around the world, however, the relationship between the specific schema and anxiety caused by Corona is still unknown (Faustino et al., 2022). In this context, it is possible to refer to the results of related researches that show the relationship between Corona anxiety and early maladaptive schemas. For instance, Fathi et al. (2021) aimed to predict corona anxiety based on incompatible schemas of abandonment, vulnerability to harm and disease and showed a significant relationship between schemas of harm to loss and illness and abandonment with corona anxiety. Also, Ghorbani et al. (2022) indicated a relationship between early maladaptive schemas and cognitive flexibility.

Therefore, considering the destructive and long-term effects of corona anxiety in the post-crisis period, the vulnerable groups, especially women working in the health and treatment fields, who bear the serious responsibility of maintaining and promoting the health of the society, in addition to fulfilling their simultaneous roles in the family and society, designing a model to find the main factors affecting anxiety in order to protect and prepare this group in the possible recurrence of epidemic diseases seems to be an

important and fundamental issue. Consequently, the model of this study, which is a structural equation model, examined the structural relationship between cognitive flexibility and corona anxiety mediated by emotion regulation ability and eraly maladaptive schemas.

Material and Methods

The current research is descriptive research of the correlation studies type. This research is of the fundamental type and for data analysis, the path analysis method was used using SPSS 25 software. The statistical population of this study included all the women working in the health centers of Kermanshah in 2022, of which 364 people were selected as participants based on Morgan's formula and cluster random sampling method. This article is taken from the PhD thesis of psychology of Kermanshah branch and registered with ethics code number IR.KUMS.REC.1400.826 in Kermanshah University of Medical Sciences. Data were collected by following measures:

Corona Virus Anxiety Questionnaire (CDAS): Alipour et al.'s Corona Anxiety Scale (2018) was used to measure Corona anxiety (Alipour et al., 2020). This tool was prepared and validated to measure Corona anxiety in Iran. The final version of this questionnaire has 18 questions and includes 2 components. Items 1 to 9 measure mental symptoms and items 10-18 measure physical symptoms. The scoring of this questionnaire is scored in a four-point Likert scale from (never: zero to always: three). The highest and lowest scores obtained by respondents in this questionnaire are from (0 to 54), and higher scores indicate higher levels of anxiety. In the study of Alipour et al. (2020) the reliability of this tool with Cronbach's alpha method for the first factor is 0.87, for second factor is 0.86 and for the total questionnaire 0.91, and in order to check the validity, the correlation of this tool with the GHQ-28 questionnaire was assessed, and its validity has been confirmed using exploratory and confirmatory factor analysis.

Young's early maladaptive schemas questionnaire (YSQ-SF): To measure early maladaptive schemas, a questionnaire prepared by Yang (1998) with 75 questions, a 6-point Likert response scale (completely false = 1 to completely true = 6) and 15 subscales was used. The original version of the Schemas Questionnaire was created by Young to measure early maladaptive schemas (1994). The short form of the Young Questionnaire (YSQ-SF) has 75 questions and is composed of 5 questions that are more preferred in the long form. It is mostly used in research and is a self-reporting tool for measuring schemas. In this questionnaire, every 5 questions measure a schema, and to obtain the score of the schemas, the average score is calculated for each 5 questions. In each of the schemas, if a person gets a higher score, that schema is considered as his preferred schema. The reliability and validity of this tool has been proven in numerous researches (Cui et al., 2011). The standardization of this questionnaire in Iran was done by Ghiasi et al. (2011), and the internal consistency of the questionnaire using Cronbach's alpha was ۰.۹۴.

Cognitive Emotion Regulation Strategies Questionnaire (CERQ): For the assessing the emotion regulation, the short form of the Cognitive Regulation of Emotion Questionnaire (CERQ) (Garnefski & Kraaij, 2006) which is a 18-item instrument and examines cognitive regulation strategies of emotion in

response to threatening and stressful life events was used. This scale has a five-point Likert scale of (never: 1 to always: 5) is scored according to 9 subscales include self-blame, blaming others, mental rumination and catastrophic thinking, acceptance, refocusing on planning, positive refocusing, positive retesting and perspective taking and adjustment strategies. The lowest and highest score in each subscale is 2 and 10, respectively, and a higher score indicates a person's greater use of the relevant cognitive strategy. This questionnaire has good validity and the alpha coefficient for the subscales of this questionnaire has been reported by the creators in the range of 0.71 to 0.81. The Persian version of this questionnaire has been standardized and confirmed by (Abdi et al., 2012), and by examining the correlation of the instrument's subscales with Beck's depression questionnaire, the validity of the instrument was confirmed, and its Cronbach's alpha ranged from 0.68 to 0.82.

Cognitive Flexibility Questionnaire (CFI): The cognitive flexibility questionnaire was created by Dennis and Vander Wal (2010). It is a 20-question short self-report tool that is used in clinical and non-clinical work to measure a person's cognitive flexibility in successfully challenging and replacing ineffective thoughts with effective ones. The scoring method is based on a 7-point Likert scale from 1 to 7. This questionnaire is used to determine the progress of people in developing flexible thinking in the cognitive-behavioral treatment of depression and other mental illnesses. The concurrent validity of this questionnaire with the Beck depression questionnaire is equal to 0.39 and its convergent validity with the cognitive flexibility scale of Martin and Robin is 0.75. The Cronbach's alpha coefficient of the whole scale is 0.90 and for the subscales it is reported as 0.87, 0.89, and 0.55 respectively. The CFI has a convergent factorial validity and a good concurrent validity in Iran. Shareh et al. (2014) reported reliability as 0.90. In the Farsi version, unlike the main scale which has only two factors, the cognitive flexibility questionnaire has three factors: perception of controllability, perception of different options and perception of behavior justification.

Results

According to demographic information, 89 participants are between 20 and 30 years old, 157 people are between 31 and 40 years old, 106 people are between 41 and 50 years old, and 12 people are between 51 and 60 years old. Also, among the 364 participants, 77 have a diploma, 164 have a bachelor's degree, and 123 have a master's degree or higher. The mean, standard deviation, skewness and kurtosis of the variables are presented in Table 1. Considering that the values of skewness and skewness of the data are between +2 and -2, the data have a normal distribution at the level of 0.05.

Table 1. Descriptive indices of research variables

Variable	Skewness	Kurtosis	Mean	SD
Cognitive flexibility	-0.505	0.836	58.46	7.738
Emotion regulation	-0.269	0.808	64.79	7.209
Early maladaptive schemas	0.353	1.050	115.78	14.875
Corona anxiety	0.490	0.899	28.01	4.638

Tolerance indices and variance inflation factor were used to check the existence of multiple collinearities between variables. Tolerance value less than 0.1 or VIF greater than 10 indicates the presence of multiple collinearity.

Table 2. Results of multiple collinearity test

Variable	Tolerance	VIF
Cognitive flexibility	0.466	2.148
Emotion regulation	0.380	2.630
Early maladaptive schemas	0.416	2.407

Based on the results presented in Table 2, no deviation from the assumption of multiple collinearity was observed in any of the tolerance and VIF values calculated for the research variables.

Table 3. Matrix of correlation coefficients between research variables

Variable	**1**	**2**	**3**	**4**
1. Cognitive flexibility	1			
2. Emotion regulation	0.57**	1		
3. Early maladaptive schemas	-0.49**	-0.46**	1	
4. Corona anxiety	-0.64**	-0.57**	0.65**	1

In order to examine the overall fit of the corona anxiety prediction model based on cognitive flexibility with the mediating role of emotion regulation ability and early maladaptive schemas, the path analysis method was used. Before using path analysis, univariate outlier data were checked using box plot and multivariate outlier data were checked using Mahalanobis distance and excluded from the data set. The skewness and kurtosis of the distribution of variable scores were calculated using SPSS software and the results showed that none of the values of skewness and kurtosis were greater than the range of ±1. The normality of the data was checked using the Kolmogorov-Smirnov test. The results showed that the distribution of scores of model variables is normal ($P<0.05$). The assumption of independence of errors was investigated with Durbin Watson statistic to calculate the regression equations of the research model, and the obtained value indicates the establishment of this assumption. The assumption of collinearity between variables was investigated using Pearson correlation between pairs of variables. Considering that the correlation of two variables of 0.9 and higher indicates collinearity, this problem was not observed in the data of this research. In addition, tolerance statistics and variance inflation factor were calculated in order to investigate multiple collinearity. The results showed that none of the values of the tolerance statistic are smaller than the permissible limit of 0.1 and none of the values of the variance inflation factor are larger than the permissible limit of 10. Therefore, based on the two mentioned indicators, the existence of multiple collinearity was not observed in the data. After examining the assumptions and ensuring their establishment, path analysis was used to evaluate the studied model. The indices related to the fit of the model are presented in the table 4.

Table 4. Model fit indices

Fit indices	Accepted value	Observed value	Result
IFI	> 0.90	0.92	Appropriate
GFI	> 0.90	0.91	Appropriate
SRMR	< 0.08	0.057	Appropriate
CFI	> 0.90	0.92	Appropriate
NFI	> 0.90	0.92	Appropriate

The chi-square ratio index on the degree of freedom (df/χ^2) confirms the fit of the model which is in the range between 1 and 5 and means the fit of the model with the data. The square root of the residual mean square (SRMR) is equal to 0.057, which is smaller than the criterion value (0.08) and thus confirms the fit of the model. Accordingly, IFI, CFI, GFI, and NFI indices are also greater than the desired criterion (0.9). In total and considering the sum of the calculated fit indices, the fit of the corona anxiety prediction model is confirmed based on cognitive flexibility with the mediating role of emotion regulation ability and primary schemas.

Table 5. Direct path coefficients of research variables in the model

Path			B	Beta	T value	p
Cognitive flexibility	➔	Corona anxiety	-0.088	-0.15	-3.405	0.01
Emotion regulation	➔	Corona anxiety	-0.14	-0.22	-5.59	0.01
Early maladaptive schemas	➔	Corona anxiety	0.05	0.16	3.94	0.01

In Table 5, the results related to the coefficients of the path between the variables of cognitive flexibility, the ability to regulate emotion and primary schemas with corona anxiety are presented. Based on the obtained results, the path coefficients related to the relationship between cognitive flexibility, the ability to regulate emotion with corona anxiety is negative and significant and the path coefficient related to the relationship between early schemas and corona anxiety is positive and significant ($p < 0.01$). According to the significance of the obtained coefficients, it is concluded that corona anxiety can be predicted based on cognitive flexibility, the emotion regulation and early schemas.

Bootstrap method was used to examine the sub-hypotheses and determine the statistical significance of the mediating role of emotion regulation and early schemas in the relationship between cognitive flexibility and corona anxiety (table 6).

Table 6. The path coefficient of the indirect effect of cognitive flexibility on corona anxiety through the emotion regulation and early schemas

Indirect path			Beta	p
Cognitive flexibility	Emotion regulation	Corona anxiety	-0.079	0.05
Cognitive flexibility	Early maladaptive schemas	Corona anxiety	-0.088	0.05

According to table 6, the indirect effect of cognitive flexibility on corona anxiety through the emotion regulation is significant ($p<0.05$). Therefore, the hypothesis of the research based on predicting Corona anxiety based on cognitive flexibility with the mediating role of emotion regulation is confirmed. Also,

the indirect effect of cognitive flexibility on corona anxiety through the early schemas is significant ($p<0.05$). Therefore, the research hypothesis based on the prediction of Corona based on cognitive flexibility with the mediating role of early schemas is confirmed as well.

Discussion

The current research was conducted with the aim of compiling and testing the Corona anxiety prediction model based on cognitive flexibility through emotion regulation and early maladaptive schemas in working women. The results indicated the confirmation of the research objectives and indicated that Corona anxiety can be predicted based on cognitive flexibility with the mediation of emotion regulation and early maladaptive schemas.

The results of this research showed that Corona anxiety has a significant negative relationship with cognitive flexibility and cognitive flexibility predicts Corona anxiety negatively. These results are in agreement with the findings of Mohammadpour et al. (2021) and Juszko et al. (2023). They showed that cognitive flexibility has a significant negative relationship with Corona anxiety. In the explanation of the results, it can be acknowledged that people who have a higher flexibility capacity have a greater ability to adapt in different situations, instead of avoiding unwanted experiences accepted the existing conditions.

Also, our results showed that cognitive flexibility with the mediation of emotion regulation has the ability to predict Corona anxiety, which means that the higher a person has cognitive flexibility and the more adaptive emotion regulation ability, the less likely he/she is to have anxiety. These results were in line with the findings of Sayinta et al. (2022), Dubey et al. (2020) and Mohammadpour et al. (2021). In explaining the relationship between cognitive flexibility and emotion regulation in reducing anxiety, it should be said that by creating appropriate emotion regulation, a person can perform more adaptive behaviors and tolerate disappointing experiences better. Therefore, emotional regulation plays an important role in improving mental health and reducing people's anxiety, and the inability to manage emotions causes many psychological problems that psychological flexibility and acceptance of these conditions as protective factors can have an impact on this issue. The necessity of acquiring sufficient communication and social skills to cope in the era of post-epidemic isolation is quite evident, and emotion regulation is considered as one of the best predictors of a person's psychosocial skills, which is influenced by his cognitive processes (Renati et al., 2023).

The results of this research regarding the relationship between cognitive flexibility and maladaptive schemas, including the schema of vulnerability to harm and disease, with Corona anxiety are in line with the findings of Faustino et al. (2022), Fathi et al. (2021) and Ghorbani et al. (2022). In explaining this issue, it can be acknowledged that incompatible schemas act as cognitive infrastructures at the deepest level of cognition, and usually outside the level of the individual's awareness. Schemas are predictors of psychological symptoms such as anxiety and depression. Therefore, the conditions of threat and stress lead to the weakening of the individual's cognitive processes and the ground is provided for the awakening of the initial maladaptive schema and the recurrence of anxiety.

The findings can be used by psychologists to treat and prevent people's anxiety in pandemics like the Corona pandemic. Conducting research on women in Kermanshah city and using self-report questionnaires and the possible bias of the respondents in answering the questions are the most important limitations of the present study, which should be considered in the generalization of the findings.

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