

The Predictive Role of Cognitive Flexibility and Problem-Solving Methods in the Severity of Preclinical Obsessive-Compulsive Disorder Symptoms

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Abstract

Introduction: It is assumed that the level of cognitive flexibility and maladaptive problem-solving methods, probably lead to the exacerbation of preclinical obsessive-compulsive symptoms. Therefore, an attempt has been made to show how the level of cognitive flexibility and the type of problem-solving methods can predict the severity of premorbid symptoms of obsessive-compulsive disorder.

Method: This study followed a descriptive cross-sectional design. Sampling was done using cluster sampling among university students. The number of samples was 263 people. In addition, the data analysis method was regression.

Results: It was shown that problem-solving methods based on thinking and feeling significantly predict obsessive-compulsive slowness. It was also observed that feeling-focused problem-solving can significantly predict obsessive-compulsive hesitation.

Conclusion: It seems that encouraging people to use a specific model of problem solving, such as just thinking, can lead to a decrease in individual functions, especially executive functions. Moreover, finding the optimal level of cognitive flexibility based on reality can increase the efficiency and satisfaction of a person.

Keywords: Coping Styles, Solution, Flexibility, Obsession, Compulsion

Introduction

Obsessive-Compulsive Disorder (OCD) is a condition defined by recurrent and persistent thoughts, impulses, and imaginings that lead to special behaviors or mental actions [1]. There is evidence that these symptoms often cause distress and according to people, are out of their control [2]. There is increasing concern that OCD is recognized as one of the most debilitating disorders and is considered a treatment-resistant disorder [3].

The importance of identifying, preventing, and treating OCD has been so great that in the Diagnostic and Statistical Manual of mental disorders, fifth edition (DSM-5), this disorder has been separated from the category of anxiety disorders and has been taken into consideration [4]. Regarding international studies, it has been reported that the prevalence of this disorder is such that it causes significant personal, social and economic damage to the individual and society [4-6].

Identifying the factors that may play an effective role in the formation or maintenance of this disorder has been investigated in several reports [1, 7, 8]. Moreover, efforts have been made to clarify factors that either increase our understanding of this disorder or help us to develop effective therapeutic strategies to deal with OCD [9].

Recent evidence suggests that OCD is influenced by various factors such as cognitive, emotional, behavioral, family, social, genetic and biological factors [10, 11]. Therefore, in each of

these general categories of issues, factors have been identified and introduced that can initiate or perpetuate this condition [2]. According to previous studies, one of the most common findings about OCD, which is part of the scientific definition of this disorder, is repetitive thoughts, behaviors, and impulses [12]. Therefore, a variable such as cognitive flexibility that can guarantee new thought processes and adaptation to the new situation should be taken into consideration.

Cognitive flexibility is generally defined as the ability to change thinking to adapt to new situations [13]. In neuroscience, this variable is known as a change in the axis of attention [14]. Therefore, the key concept obtained from cognitive flexibility is the ability to adapt to the situation [15]. This adaptability seems to be problematic in patients with OCD [16]. These people do not have or have lost the ability to change their thoughts and emotions about a certain subject [17].

Furthermore, reducing the level of cognitive flexibility creates a situation where a person only uses stereotyped and repetitive solutions to solve problems [18]. Maybe this is why people with OCD only use one stereotyped method to control distressing situations [19]. Mind rumination and compulsive behaviors are among the maladaptive solutions that some people with traces of OCD use in a distressed situation [20].

As a result, it is assumed that low levels of cognitive flexibility and maladaptive problem-solving methods, probably lead to the exacerbation of preclinical obsessive-compulsive symptoms and lead the premorbid symptoms of OCD to become a full-fledged disorder. Therefore, in the present study, an attempt has been made to show how the level of cognitive flexibility and the type of problem-solving methods can predict the severity of premorbid symptoms of OCD.

Method

This study followed a descriptive cross-sectional design. After the approval of the initial plan by the psychology department of the Islamic Azad University, Roudehen branch, administrative measures were taken in order to implement the research and the code of ethics was received (IR.IAU.R.REC.1402.007). The population of this research included the students of Islamic Azad University, Roudehen Branch, who were studying in the second semester of the academic year 2022-2023. Sampling was done in two steps. In the first step, by using cluster sampling, faculties and classes were selected. Then, in the next step, random sampling was done using a list of students' names and the list of random numbers. In this way, a random number was assigned to each student of each sampling unit and a lottery was conducted without identifying the names of the individuals. The number of samples was 263 people. The sample size was determined according to research literature and the Morgan table. The inclusion criteria were: age between 18 and 35 years, and studying in the second semester of the academic year 2022-2023. The exclusion criteria were: receiving a significant score in one of the indicators of the SCL-90 scale, receiving one of the types of psychotherapy in the last six months, and taking psychiatric medication. The data analysis method was regression

performed using SPSS-22 software

In order to comply with ethical principles, after obtaining the necessary permission to carry out the research (IR.IAU.R.REC.1402.007), before filling the forms, the participants were assured that participation in the research is not mandatory, their personal information will remain confidential, and their participation or non-participation in this research will not affect their educational process. Participants were also informed that they could receive their assessment results via email if they wished.

The tools used in this study were as follows:

Problem Solving Style Questionnaire (PSSQ): In this study, Parker's Problem-Solving Style Questionnaire (1990) was used. It has 20 Likert scales. The questionnaire embraces four styles including problem solving as sensing, intuitive, feeling, and thinking. The problem-solving questionnaire has been prepared and tested with several samples of subjects. The PSSQ calculates the score for each dimension by adding up the responses to the five items. The score for each dimension ranges from 5 to 25, with higher scores indicating a stronger inclination towards that problem-solving style. In Iranian research, the reliability of this tool was declared as 0.83 to 0.89 [21, 22].

The Symptom Checklist-90: This test was introduced by Derogatis, in 1973 and was revised based on clinical experiences and psychometric analyses, and its final form was prepared in 1976. This nine-dimensional test examines physical complaints, obsessions and compulsions, sensitivity in mutual relationships, depression, anxiety, aggression, morbid fear, paranoid thoughts, and psychosis and presents the results of each one separately. The score for each dimension is obtained by adding up the scores of the items that pertain to that dimension. The score for each dimension can range from 0 to 40, with higher scores indicating a greater degree of that dimension. The retest method with an interval of one week had the highest reliability coefficient of 0.93. Moreover, the splitting method had a reliability coefficient of 0.85, while the internal consistency method also had a reliability coefficient of 0.85 [23, 24].

Cognitive Flexibility Inventory (CFI): The cognitive flexibility tool was developed by Denay and Vanderwaal in 2010. This questionnaire consists of 20 questions. It is used to evaluate flexible thinking. In Iran and in the research of Share et al. (2014), three subscales have been obtained for this questionnaire, which are alternatives, control and alternatives for human behavior. The total score for the CFI is obtained by summing the scores of all 20 items. Higher scores indicate greater cognitive flexibility. The possible range of scores for each subscale is 10-60, and the possible range of scores for the CFI is 20-120. In the study of Dennis and Vanderwaal (2010), the concurrent validity of this questionnaire with the Beck Depression Inventory (BDI-II) was found to be -0.39 and its convergent validity with Martin and Robin's cognitive flexibility scale was found to be 0.75. In Iran, Share et al. reported the retest coefficient of the whole scale as 0.71 and Cronbach's alpha coefficient as 0.90 [25, 26].

Maudsley Obsessional Compulsive Inventory (MOCI): This questionnaire was prepared by Hodgson and Rachman (1977) for the purpose of research on the type and scope of obsessive-compulsive problems. The MOCI is a

questionnaire consisting of 30 true-false items that evaluate the severity of obsessive-compulsive symptoms. The total score for the MOCI is calculated by adding up the scores of all 30 items. The total score can range from 0 to 30, with higher scores indicating more severe obsessive-compulsive symptoms. The reliability and validity of this test have been confirmed in studies conducted on clinical samples from different countries. In Iran, the retest reliability of this tool is 0.85, the reliability coefficient of the whole test is 0.84, and its convergent validity with the Yale Brown Obsessive Compulsive Scale is reported as 0.87 [27, 28].

Results

The data obtained from the research showed that 46% were women and 54% of them were men. The average age of the participants in this research was 21 years (1.1). In addition, 30% of people were married and 7 of them had children.

40% of these people were undergraduate students, 45% were master's students and 15% were doctoral students. It should also be noted that 50% were the first child, 35% were the middle child and 15% were the last child of the family. The initial analysis of the data showed that regression analysis can be used for the data of this research (Table 1). The following are the statistical results related to the summary of Obsessive-Compulsive traits model based on cognitive flexibility and problem-solving style (Table 2). Finally, it was shown that problem-solving methods based on thinking and feeling significantly predict obsessive compulsive slowness. It was also observed that feeling-focused problem solving can significantly predict obsessive compulsive hesitation. Another finding showed that both subscales of cognitive flexibility, including alternative and control, could significantly predict obsessive-compulsive hesitation (Table 3).

Table 1. Statistical Results of Analysis of Variance of the Models

Analysis	Sum of Squares	df	Mean Square	F	P
Regression 1	1.46	6	0.24	1.13	0.398
Residual 1	2.81	257	0.21		
Total 1	4.28	263			
Regression 2	0.11	6	0.01	0.22	0.961
Residual 2	1.12	257	0.08		
Total 2	1.24	263			
Regression 3	0.63	6	0.10	0.87	0.537
Residual 3	1.56	257	0.12		
Total 3	2.19	263			
Regression 4	1.76	6	0.29	2.84	0.554
Residual 4	1.34	257	0.10		
Total 4	3.11	263			

Table 2. Statistical Results Related to the Summary of the Obsessive-Compulsive Traits Model based on Cognitive Flexibility and Problem- Solving Style

Model	R	R square	Adjusted R square	Std. Error of the Estimate	R Square Change	F Change	P Change
Slowness 1	0.58	0.34	0.03	0.46	0.34	1.13	0.398
Checking 2	0.30	0.09	0.32	0.29	0.09	0.22	0.961
Cleanliness 3	0.53	0.28	0.04	0.34	0.28	0.87	0.537
Hesitation 4	0.75	0.56	0.36	0.32	0.56	2.84	0.054

Table 3. Statistical Results Related to the Obsessive-Compulsive Traits Prediction based on each of the Cognitive Flexibility and Problem- Solving Style Subscales

Model	B	Std. Error	Standardized Coefficients Beta	t	P
PSSQ, Thinking / Slowness 1	0.39	0.22	0.40	1.74	0.010
PSSQ, Feeling / Slowness 1	0.43	0.44	0.23	0.99	0.033
PSSQ, Intuition / Slowness 1	0.42	0.28	0.40	1.48	0.161
PSSQ, Sensation / Slowness 1	0.17	0.40	0.12	0.42	0.678
CFI, Alternative / Slowness 1	0.24	0.40	0.14	0.61	0.552
CFI, Control / Slowness 1	0.20	0.55	0.10	0.37	0.712
PSSQ, Thinking / Checking 2	0.03	0.14	0.06	0.84	0.831
PSSQ, Feeling / Checking 2	0.23	0.27	0.23	0.21	0.412
PSSQ, Intuition / Checking 2	0.03	0.18	0.06	0.84	0.844
PSSQ, Sensation / Checking 2	0.07	0.25	0.10	0.20	0.773
CFI, Alternative / Checking 2	0.12	0.25	0.13	0.29	0.636
CFI, Control / Checking 2	0.05	0.34	0.04	0.48	0.888
PSSQ, Thinking / Cleanliness 3	0.18	0.16	0.26	1.09	0.295
PSSQ, Feeling / Cleanliness 3	0.05	0.32	0.04	0.16	0.870
PSSQ, Intuition / Cleanliness 3	0.05	0.21	0.07	0.25	0.801
PSSQ, Sensation / Cleanliness 3	0.34	0.30	0.34	1.15	0.270
CFI, Alternative / Cleanliness 3	0.09	0.30	0.07	0.31	0.259
CFI, Control / Cleanliness 3	0.17	0.41	0.13	0.43	0.671
PSSQ, Thinking / Hesitation 4	0.29	0.15	0.35	1.86	0.085
PSSQ, Feeling / Hesitation 4	0.01	0.30	0.00	0.04	0.026
PSSQ, Intuition / Hesitation 4	0.52	0.19	0.58	2.65	0.120
PSSQ, Sensation / Hesitation 4	0.00	0.28	0.00	0.01	0.988
CFI, Alternative / Hesitation 4	0.48	0.28	0.33	1.72	0.010
CFI, Control / Hesitation 4	0.64	0.38	0.39	1.70	0.011

Discussion

The analysis of the obtained results showed that the general hypothesis of the research based on the ability to predict the preclinical symptoms of OCD based on problem solving methods and cognitive flexibility is confirmed. Accordingly, with the increase in problem solving methods based on thinking, the obsessive-compulsive slowness also increases. The same phenomenon applies to the increase in the use of emotion-based problem solving. It should be noted that problem solving based on feelings has been able to significantly predict the level of obsessive-compulsive hesitation. Also, regarding the variable of cognitive flexibility, it should be noted that both subscales of cognitive flexibility, including control and alternative, have significantly predicted obsessive-compulsive hesitation. Obsessive compulsive slowness is one of the variables that has been widely investigated and different findings have been reported about it [1, 7]. In some findings, it has been shown that in line with the current research, increasing the use of problem-solving methods based on thinking or feeling can increase the rate of slowness [21, 29]. In this direction, an explanation has been provided that maybe a person needs introductions and conclusions when thinking, which usually leads to obsessive-compulsive slowness [30]. In this regard, different findings should be mentioned; so that in some reports it is stated that the only method of problem-solving based on feeling predicts obsessive-compulsive slowness [31]. This is because a person must passively wait for an emotional perception that triggers a behavior or even behavior change [30]. Hence, it has been reported that problem solving of a feeling type predicts obsessive-compulsive slowness [32]. This is despite the fact that, contrary to the findings of the current research, it has been shown in some reports that intuition also causes obsessive compulsive slowness [33, 34]. It should be noted that in the present study, intuition did not have a significant prediction of any of the preclinical symptoms of OCD. Reports have also been published about the relationship between sensory problem solving and obsessive-compulsive symptoms, but more than this variable can predict the four preclinical symptoms of OCD, apparently it can significantly predict impulsive behaviors [35, 36]. A neuroscience approach can be used to explain why thinking-based problem solving can be associated with obsessive-compulsive symptoms. So that it has been shown that one of the main functions of the frontal lobe is in thinking; Likewise, the frontal lobe is one of the most specific points that can cause delayed behavior [37]. Although this delay in behavior leads to survival and increased efficiency in many situations, but by increasing the function of the frontal lobe too much in causing behavioral delay, slowness decreases efficiency and executive functions [38]. In this regard, in line with the present research, it has already been shown in some studies that problem solving using a thinking method can increase obsessive-compulsive hesitation [14, 21]. In studies that have examined executive functions, it has been reported that

the increase in the options that a person is faced with to make a decision and choose has an optimal level that if the number of options crosses that border and if it becomes more, the person may become passive and practically does not show any special behavior [17, 32]. Obsessive-compulsive hesitation in qualitative studies have often been associated with multiple options in the mind of a person, which has caused hesitation and stagnation [39]. One of the complaints that people report when solving problems using thinking is that they are often faced with multiple options that have the same benefits and losses, and this conflicting situation makes them feel helpless [15].

It should be also mentioned that in the existing reports about the symptoms of OCD and cognitive flexibility, the relationship between these two variables has been reported in a two-way manner. It seems that some studies have reported a direct relationship and some have reported an inverse relationship between these variables [11, 30]. In the explanation of these contradictions, it is mentioned that the person's flexibility in replacing the upcoming options, if it is enough to cause confusion in the choice and the person is unable to evaluate their benefits and losses, she/he will suffer from obsessive-compulsive hesitation. On the other hand, if a person does not have enough cognitive flexibility and is forced to make a decision with only very few options, she/he will still suffer from obsessive-compulsive hesitation [17]. This is due to the fact that in this situation, cognitively, people suffer from tunnel vision and thinks that there is only one way; If there is a possibility of danger in this one way, it makes a person panic. Reducing the available options makes a person believe that a serious danger will threaten her/him [1, 18].

One of the subscales of cognitive flexibility is control, which in the present study was also able to significantly predict obsessive-compulsive hesitation. In this regard, it should be explained that the control caused by cognitive flexibility leads to the perception of control over the situation. This feeling makes the person feel more responsible for their decisions and behaviors [31]. Therefore, it should be noted that if the control caused by cognitive flexibility can lead to making more rational and intelligent decisions, it can also cause a person to have unusual hesitation that may sometimes be harmful [13]. In this matter, we can also refer to the theory of internal and external locus of control, that a person's tendency to use excessive internal locus of control can lead to slowness and hesitation in decision-making and behavior [40]. In the same way, it has been reported that an extreme increase in the external locus of control can also be associated with passivity and the person practically does not show any specific behavior [41].

One of the most important limitations of the present research was the implementation of this research in only one specific sample of a city. This limitation reduces the generalizability of the findings. In future studies, qualitative methods and tools based on structured or unstructured interviews are suggested. The next suggestion is that in subsequent studies, samples be

taken from other cities in order to increase the generalizability of the research results. From a practical point of view, it can be pointed out that these findings can be used to develop psychological training protocols in order to prevent the formation or exacerbation of obsessive-compulsive symptoms.

Conclusion

In this research, it was shown that problem solving methods based on thinking and feeling can predict an increase of slowness and obsessiveness. Therefore, it seems that encouraging people to use a specific model of problem-solving, such as just thinking, can lead to a decrease in individual functions, especially executive functions. Furthermore, it should be mentioned that cognitive flexibility can also be a significant predictor of obsessive-compulsive hesitation. Therefore, training a person in the field of finding the optimal level of cognitive flexibility based on reality can increase the efficiency and satisfaction of a person with the current situation, which will also improve the quality of life.

Conflicts of interest

The authors declare that they have no competing interests.

Ethical Approval

The research has received the approval of the ethics committee of the Islamic Azad University, Roudehen branch (IR.IAU.R.REC.1402.007).

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References

- Jalal B, Chamberlain S.R., Sahakian B.J. Obsessive-compulsive disorder: Etiology, neuropathology, and cognitive dysfunction. *Brain and Behavior*, 2023: e3000. doi.org/10.1002/brb3.3000
- Foa EB, et al. Maintenance of wellness in patients with obsessive-compulsive disorder who discontinue medication after exposure/response prevention augmentation: a randomized clinical trial. *JAMA psychiatry*. 2022 Mar 1;79(3):193-200. DOI: 10.1001/jamapsychiatry.2021.3997
- Khedr EM, Elbeh K, Saber M, Abdelrady Z, Abdelwarith A. A double blind randomized clinical trial of the effectiveness of low frequency rTMS over right DLPFC or OFC for treatment of obsessive-compulsive disorder. *Journal of Psychiatric Research*. 2022 Dec 1;156:122-31. DOI: 10.1016/j.jpsychires.2022.10.025
- Yan J et al. The Prevalence and Comorbidity of Tic Disorders and Obsessive-Compulsive Disorder in Chinese School Students Aged 6–16: A National Survey. *Brain Sciences*. 2022 May 16;12(5):650. doi.org/10.3390/brainsci12050650
- Tiyatiye, B. and W. Akosile, A systematic review of prevalence of comorbid obsessive-compulsive disorders and substance use disorders in clinical settings, 1990-2021. *Journal of Substance Use*, 2022: 1-6. doi.org/10.1080/14659891.2022.2148579
- Yong, M. and C. Keh, Prevalence of Depressive, Anxiety, and OCD Symptoms among University Students in Singapore During COVID-19. *Journal of Concurrent Disorders*, 2022. doi.org/10.3389/fpsyg.2022.816961
- Barzilay R, Patrick A, Calkins ME, Moore TM, Wolf DH, Benton TD, Leckman JF, Gur RC, Gur RE. Obsessive-compulsive symptomatology in community youth: Typical development or a red flag for psychopathology?. *Journal of the American Academy of Child & Adolescent Psychiatry*. 2019 Feb 1;58(2):277-86. https://doi.org/10.1016/j.jaac.2018.06.038
- Sehlo, M.G., U.M. Youssef, and H.M. El-Gohari, Prevalence and risk factors of suicidal ideations among patients with obsessive-compulsive disorder in Egypt. *Middle East current psychiatry*, 2021. 28: 1-6. doi.org/10.1186/s43045-021-00087-8
- Fullana MA et al. Risk and protective factors for anxiety and obsessive-compulsive disorders: an umbrella review of systematic reviews and meta-analyses. *Psychological medicine*. 2020 Jun;50(8):1300-15. DOI: https://doi.org/10.1017/S0033291719001247
- Kim SJ et al. Factors associated with obsessive-compulsive symptoms in people with epilepsy. *Epilepsy & Behavior*. 2020 Jan 1;102:106723. DOI: 10.1016/j.yebeh.2019.106723
- Trak E, Inozu M. Developmental and self-related vulnerability factors in relationship-centered obsessive compulsive disorder symptoms: A moderated mediation model. *Journal of Obsessive-Compulsive and Related Disorders*, 2019. 21: 121-128. doi.org/10.1016/j.jocrd.2019.03.004
- Rasmussen A.R, Parnas J. What is obsession? Differentiating obsessive-compulsive disorder and the schizophrenia spectrum. *Schizophrenia Research*, 2022. 243: 1-8. DOI: 10.1016/j.schres.2022.02.014
- Davis S et al. Cognitive flexibility supports the development of cumulative cultural learning in children. *Scientific Reports*. 2022 Aug 18;12(1):14073. doi.org/10.1038/s41598-022-18231-7
- Uddin L.Q. Cognitive and behavioural flexibility: neural mechanisms and clinical considerations. *Nature Reviews Neuroscience*, 2021. 22(3): 167-179. doi.org/10.1038/s41583-021-00428-w
- Tello-Ramos MC, Branch CL, Kozlovsky DY, Pitera AM, Pravosudov VV. Spatial memory and cognitive flexibility trade-offs: to be or not to be flexible, that is the question. *Animal Behaviour*. 2019 Jan 1;147:129-36. doi.org/10.1016/j.anbehav.2018.02.019
- Tomiyama H et al. Dysfunction between dorsal caudate and salience network associated with impaired cognitive flexibility in obsessive-compulsive disorder: A resting-state fMRI study. *NeuroImage: Clinical*. 2019 Jan 1;24:102004. doi.org/10.1016/j.nicl.2019.102004
- Robbins T.W. Cognitive flexibility, OCD and the brain. *Brain*, 2022. 145(3): 814-815. DOI: 10.1126/science.1154433
- Park J, Moghaddam B. Impact of anxiety on prefrontal cortex encoding of cognitive flexibility. *Neuroscience*, 2017. 345: p. 193-202. DOI: 10.1016/j.neuroscience.2016.06.013
- Şahin H, Köşger F, EşSizoğlu A, Aksaray G. The relationship between obsessive belief level and cognitive flexibility in patients with obsessive compulsive disorder. *Archives of Neuropsychiatry*. 2018 Dec;55(4):376. DOI: 10.5152/npa.2017.21648
- Abramovitch A, Cooperman A. The cognitive neuropsychology of obsessive-compulsive disorder: A critical review. *Journal of Obsessive-Compulsive and Related Disorders*, 2015. 5: 24-36. doi.org/10.1016/j.jocrd.2015.01.002
- Abdollahi A, Talib MA, Yaacob SN, Ismail Z. Problem-solving skills and hardiness as protective factors against stress in Iranian nurses. *Issues in mental health nursing*. 2014 Feb 1;35(2):100-7. doi.org/10.3109/01612840.2013.843621
- Sadeghi A, Mousavian S.H., Comparative study of learning style, resiliency and problem solving skills in Iranian chess players. *Advances in Physical Education*, 2017. 8(1): 58-65. doi: 10.4236/ape.2018.81007.
- Akhavan Abiri F, Shairi M.R. Validity and reliability of symptom checklist-90-revised (SCL-90-R) and brief symptom inventory-53 (BSI-53). *Clinical Psychology and Personality*, 2020. 17(2): 169-195. doi.org/10.1155/2021/2053795
- Ardakani A et al. Construct validity of symptom checklist-90-revised (SCL-90-R) and general health questionnaire-28 (GHQ-28) in patients with drug addiction and diabetes, and normal population. *Iranian journal of public health*. 2016 Apr;45(4):451. doi.org/10.1590/2237-6089-2017-0116
- Dennis J.P, Vander Wal J.S. The cognitive flexibility inventory: Instrument development and estimates of reliability and validity. *Cognitive therapy and research*, 2010. 34: 241-253. doi.org/10.1007/s10608-009-9276-4
- Shareh H, Farmani A, Soltani E. Investigating the reliability and validity of the Cognitive Flexibility Inventory (CFI-I) among Iranian university students. 2014. jpcp.uswr.ac.ir/article-1-163-fa.html. doi.org/10.1186/s13104-016-2070-y
- Assareh M, Rakhshani T, Kashfi M, Ayazi M. Status of obsessive compulsive disorder among Iranian college students in Kermanshah, Iran. *Journal of Human Environment and Health*

- Promotion. 2016 Sep 10;1(4):213-9. DOI: [10.3109/01612840.2013.843621](https://doi.org/10.3109/01612840.2013.843621)
28. Shams G, Foroughi E, Esmaili Y, Amini H, Ebrahimkhani N. Prevalence rates of obsessive-compulsive symptoms and psychiatric comorbidity among adolescents in Iran. *Acta Medica Iranica*. 2011;680-7. DOI: [10.5152/npa.2017.21648](https://doi.org/10.5152/npa.2017.21648)
 29. Bakshi P, Ganguly O. Relationship between Coping Strategies and Emotion Regulation among Persons with Obsessive Compulsive Disorder. *National Journal of Professional Social Work*, 2021: 120-127. doi.org/10.51333/njpsw.2021.v22.i2.282
 30. Simón-Martínez V, Laseca-Zaballa G, Lubrini G, Perriáñez JA, Álvarez RM, Torres-Díaz CV, Moreno NM, Álvarez-Linera J, Ríos-Lago M. Cognitive deficits and clinical symptoms in patients with treatment-refractory obsessive-compulsive disorder: The role of slowness in information processing. *Psychiatry Research*. 2021 Oct 1;304:114143. DOI: [10.1016/j.psychres.2021.114143](https://doi.org/10.1016/j.psychres.2021.114143)
 31. Fischer C, Pampaloni I, Gardiner S., Obsessive compulsive disorder: a case of extreme obsessional slowness in an 18-year-old presenting to the national OCD unit. *BJPsych Open*, 2021. 7(S1): S115-S115. DOI: <https://doi.org/10.1192/bjo.2021.337>
 32. Rosa-Alcázar Á, García-Hernández MD, Parada-Navas JL, Olivares-Olivares PJ, Martínez-Murillo S, Rosa-Alcázar AI. Coping strategies in obsessive-compulsive patients during Covid-19 lockdown. *International Journal of Clinical and Health Psychology*. 2021 May 1;21(2):100223. doi: [10.1016/j.ijchp.2021.100223](https://doi.org/10.1016/j.ijchp.2021.100223).
 33. Abramowitz J.S., Lackey G.R., Wheaton M.G. Obsessive-compulsive symptoms: The contribution of obsessional beliefs and experiential avoidance. *Journal of Anxiety Disorders*, 2009. 23(2): 160-166. DOI: [10.1016/j.janxdis.2008.06.003](https://doi.org/10.1016/j.janxdis.2008.06.003)
 34. Cogle J.R., Lee H.-J. Pathological and non-pathological features of obsessive-compulsive disorder: Revisiting basic assumptions of cognitive models. *Journal of Obsessive-Compulsive and Related Disorders*, 2014. 3(1): 12-20. doi.org/10.1016/j.jocrd.2013.11.002
 35. Arslan, C. Interpersonal Problem Solving, Self-Compassion and Personality Traits in University Students. *Educational Research and Reviews*, 2016. 11(7): 474-481. DOI: [10.3109/01612840.2013.843621](https://doi.org/10.3109/01612840.2013.843621)
 36. Ekiz E, Van Alphen SP, Ouwens MA, Van de Paar J, Videler AC. Systems Training for Emotional Predictability and Problem Solving for borderline personality disorder: A systematic review. *Personality and Mental Health*. 2023 Feb;17(1):20-39. doi.org/10.1002/pmh.1558
 37. Robertson S.I. *Problem Solving: Perspectives from cognition and neuroscience*. 2016: Psychology Press. doi.org/10.4324/9781315712796
 38. Kounios J, Beeman M. The cognitive neuroscience of insight. *Annual review of psychology*, 2014. 65: 71-93. doi.org/10.1146/annurev-psych-010213-115154
 39. Kobori O, Salkovskis PM, Read J, Lounes N, Wong V. A qualitative study of the investigation of reassurance seeking in obsessive-compulsive disorder. *Journal of Obsessive-Compulsive and Related Disorders*. 2012 Jan 1;1(1):25-32. doi.org/10.1016/j.jocrd.2011.09.001
 40. Akbarikia H.R. and Gasparyan K., The relationship between schema and locus of control with obsessive compulsive symptoms. *International Journal of Collaborative Research on Internal Medicine & Public Health*, 2012. 4(1): 0-0. DOI: [10.3109/01612840.2013.843621](https://doi.org/10.3109/01612840.2013.843621)
 41. Conway-Williams E. *Forgiveness, obsessive-compulsive symptoms, and locus of control in a college sample*. 2011, East Tennessee State University. 1501618. doi.org/10.1080/13617672.2022.2133427