

Relationship between Dissociative Experiences and Schizotypal Personality Traits: Mediating Role of Inferential Confusion

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Abstract

Objective: Previous research has shown a relationship between schizotypal personality traits and dissociative tendencies. The Inference-Based Approach (IBA) can explain this relationship to some extent. Purpose of this study was to investigate the mediating role of inferential confusion in relation to dissociative experiences and schizotypal personality traits.

Method: A total of 341 students from Shahed University participated in this cross-sectional study. Sampling was conducted randomly by the cluster sampling method. Data were collected using the Inferential Confusion Questionnaire (ICQ-EV), Schizotypal Personality Questionnaire-Brief (SPQ-B), and Dissociative Experiences Scale (DES-II). Data were analyzed using SPSS-22 software based on statistical methods including Pearson correlation, Baron and Kenny hierarchical regression and the Sobel test.

Results: There were significant positive relationships between dissociative experiences, schizotypal personality traits, and inferential confusion ($P < 0.01$). Findings showed that inferential confusion mediates the relationship between dissociative experiences and schizotypal personality traits ($\beta = 0.29$; $P < 0.001$).

Conclusion: According to the obtained results, the present study, considering role of inferential confusion, succeeded in explaining the relationship between dissociative experiences and schizotypal personality traits to some extent.

Key words: *Confusion; Dissociation; Imagination; Schizotypal Personality*

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Article Information:

Received Date: 2020/03/31, Revised Date: 2020/12/13, Accepted Date: 2021/01/17



Dissociation is a ubiquitous construct in modern psychopathology (1). Dissociative symptoms play a role in severity of symptoms and dysfunction in many mental disorders (1). However, this construct is relatively neglected in psychological research and treatment and needs more attention from researchers and therapists (2). Dissociation refers to disruption in normal integration of behavior, consciousness, identity, perception, memory, emotion, body representation and action control (3). Previous research has shown that dissociative symptoms are related to a wide range of psychological disorders such as schizophrenia (4), posttraumatic stress disorder (PTSD) (5), panic disorder (6), bipolar disorder (7), depression (8), obsessive compulsive disorder (OCD) (9, 10), and eating disorders (11). Meta-analysis results from Lyssenko *et al.* (1) showed that evaluation of dissociative symptoms is important in psychiatric disorders. Dissociation can play a causal role in some psychopathological symptoms or result from other symptoms (12). For example, positive psychotic symptoms have been suggested to result from dissociation (12). Recently, researchers are interested in investigating role of dissociation in psychosis. Recent meta-analysis findings suggest that some psychotic symptoms can be considered as a kind of dissociation and interventions can be designed for targeting dissociative symptoms in psychotic disorders. (13). Research has provided evidence to suggest that there is overlap between experiencing of dissociative states, including subjective phenomena like depersonalization/derealization, absorption and memory problems, and psychotic-like experiences such as schizotypy (14, 15). The psychosis lies on a continuum ranging from no disorder to schizotypal personality disorder and complete psychotic disorder (16). For example, delusions and hallucinations may be seen in the general population in absence of a psychological disorder or remarkable medical condition. (17). Schizotypal personality traits are examples of psychosis-like experiences seen in the general population and are not clinically significant (16, 18). However, according to research, these traits can predispose people to schizophrenia (19). Three main dimensions have been identified for schizotypal personality traits: cognitive-perceptual (such as unusual experiences like hallucination and magical thinking), interpersonal (such as lack of close friends, constricted affect, social anxiety), and disorganization dimensions (odd behaviors/ speech) (20). Overlap between dissociation and psychotic symptoms has been observed in clinical and nonclinical populations (14). For example, positive symptoms of schizophrenia have been seen in patients with dissociative identity disorder (21-24), and dissociative symptoms have been reported by schizophrenic patients (25-27). Also, a number of studies (28-32) have shown that there is a significant relationship between scores of undergraduate students on

the Dissociative Experiences Scale (DES) (33), which is the most common psychometric instrument for measuring dissociation, and different types of scales for schizotypy such as the Perceptual Aberration Scale (34), the Magical Ideation Scale (35), the Schizotypal Personality Scale (STA) (36), and Schizotypal Personality Questionnaire-Brief (SPQ-B) (37).

A literature review revealed several possibilities for explaining the relation between dissociative experiences and schizotypal traits. One possibility is that the scales designed for assessing schizotypy and dissociation measure similar components and have items with similar content (14, 15). A second possibility explains this overlap in terms of "openness to experience" as a superordinate trait under which both of these variables are nested (14, 15). Openness to experience refers to the extent to which a person actively seeks different and new experiences (38) and tends to be correlated to another psychological trait known as "fantasy proneness" (14, 15, 39). Also, fantasy has been related to maladaptive psychological symptoms such as dissociation in clinical (26) and nonclinical samples (29, 40). Fantasy-prone individuals with high level of openness to experience are immersed in their inner world and disconnected from social interactions (41). However, it cannot fully explain the relationship between dissociation and schizotypy (14, 15). The third explanation suggests the possibility of a common etiology (14, 15). In this regard, one of the common causes refers to severe traumatic experiences such as childhood sexual abuse (14). But childhood trauma is also unable to fully explain the overlap between these two constructs (28, 42). The fourth interpretation points to attention and memory deficits. Interestingly, these deficits are observed in both dissociation (33) and schizophrenia (43). Findings by Giesbrecht *et al.* (14) showed that cognitive deficits, tendency toward fantasy, and traumatic childhood events together could account for 58% of the variance between schizotypy and dissociation.

Recently, a cognitive approach called Inference-Based Approach (IBA) is trying to explain thinking disorders in general and obsessive-compulsive disorder (OCD) in particular. It seems that considering inferential confusion (IC), as a major component of the IBA, is another possible source that can explain the dissociation-schizotypy link to some extent. This concept was first proposed based on observation of people with obsessive-compulsive disorder and overvalued ideas (OVIs) (44) and considered as an important cognitive element in development and maintenance of obsessive compulsive disorder (OCD) (45, 46). Overvalued ideas (OVIs) are defined as a kind of obsessive-compulsiveness that are close to the concept of delusional beliefs (3) due to lack of ego-dystonicity criteria of OCD (47). According to conceptual similarities between OVIs and delusional beliefs, it is assumed that inferential confusion can serve as a possible transdiagnostic model for explaining an

underlying reasoning process behind both (47). Delusional experiences lie on a continuum and occur in both clinical and nonclinical populations. Schizotypy is also used to describe nonclinical delusional phenomena (47) and refers to the unusual ways of thinking about reality (44). Based on the Inference-Based Approach (IBA), some schizotypal phenomena can be explained by considering high levels of inferential confusion in which reality and fantasy are mixed (48). Research findings have also provided evidence to support the relationship between schizotypal symptoms and inferential confusion (9, 47, 48, and 49).

Inferential confusion (IC) is a type of reasoning error in which the person confuses an imaginary probability with a real probability and then behaves as if that imaginary probability is true (45, 46). Distrust of information based on the senses and common sense and investing in remote and imaginary possibilities are the two main components of inferential confusion. This leads people to prefer possible scenarios when reasoning and evidence is to the contrary (50). In other words, immersion in a world of possibilities due to inferential confusion can lead to dissociation between knowing and acting, and reality and fantasy (51). Based on above evidence, involvement of imagination is a common feature in both inferential confusion and dissociation; therefore, it seems there are some conceptual similarities between these two concepts (52). Also, evidence from research has supported the relationship between these two variables. (9, 47, 49, 51). Indeed, research findings have demonstrated a potential connection between dissociation and schizotypy, but the nature of this relationship is not well understood. IBA has opened a research path in this field and tries to explain why some people become so immersed in an imaginary world and, in their perception, possibilities overcome reality (47). This approach suggests the inferential confusion as an imaginative process that has an important role in cases where people interpret emotions and events more probable than they really are (53). We hypothesized that people tend to move away from sensory information and inference based on subjective information and this partially explains the relationship between dissociative experiences and schizotypal symptoms. The goal of the current study was to evaluate the mediating role of IC in the relationship between dissociative experiences and schizotypal personality traits in a nonclinical sample.

Materials and Methods

Participants and Procedures

The statistical population in this study consisted of all undergraduate and medical students at the central campus of Shahed University in their first semester of the 2017-2018 academic year. For sample size adequacy in regression analysis, two formulas were proposed based on the number of independent variables: $N \geq 50 + 8m$ (for multiple correlation), and $N \geq 104 + m$ (for each predictors) (54). A total of 360 students participated in

this study and were selected by the cluster sampling method, and, thus, criterion for sample size adequacy was met. Also, 19 students were excluded from the sample due to incomplete questionnaires. To select the sample, first, four faculties (out of eight faculties) were selected. Then, by calculating the ratio of students in each faculty to the sample size, a number of classes were randomly selected and all students in these classes participated. For students to complete the questionnaires, after obtaining permission from professors, the researcher attended the selected classes and explained the purpose of the study to the students, the confidentiality of the information, and how to complete the questionnaires. Finally, students who were willing to collaborate with researcher answered the questionnaires. Inclusion criteria were willingness to participate in the study, being an undergraduate or professional doctoral student at Shahed University, and lack of physical disability that impaired their ability to respond to the questionnaires independently. Exclusion criteria were having physical disabilities such as severe vision and hearing impairments and disagreement to participate in the study.

Questionnaires

Dissociative Experiences Scale (DES-II)

This questionnaire has 28 items on an 11-point scale that is used to measure frequency of dissociation in clinical and nonclinical samples. Each item is rated on a scale from zero percent (never) to 100% (always) as follows (zero, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100). The mean score of 28 items constitutes the total score. Higher scores on this measure imply greater dissociative experiences. This scale has three subscales: Amnesia (AM), Depersonalization/Derealization (DEP/DER), and Absorption (AB). Internal consistency of this scale has been reported to be excellent (55). Significant relationship with other dissociation scales and higher scores among individuals with dissociative disorders have supported its validity (10). In Iran, psychometric properties of this scale have been studied by Kianpoor, Ghanizadeh, and Badiei (56). They reported desirable test-retest reliability of 0.96 ($P < 0.001$) and Cronbach's alpha of 0.96.

Schizotypal Personality Questionnaire-Brief (SPQ-B)

This questionnaire has 22 items with three subscales: The cognitive-perceptual dysfunction, interpersonal deficits, and disorganization. For each item, the subject must choose his / her answers by selecting one of two options: yes or no. Total score ranges from zero to 22. An increase in scores indicates experiencing more schizotypal symptoms. Raine and Benishay (57) have reported alpha coefficients and test-retest reliability of the subscales in a range from 0.72 to 0.80 and 0.86 to 0.95, respectively. Also, the criterion validity of this scale was confirmed by calculating correlation coefficients between SPQ-B total and subscale scores and a clinical interview for assessing schizotypal personality disorder. All of these coefficients for total

score (0.66) and subscale scores (0.36-0.73) were significant at level of $P < 0.05$ (57).

In Iran, Mohammadzadeh (58) reported appropriate test-retest reliability for the total scale (0.94) and subscales (ranging from 0.83 to 0.90). All coefficients were significant and showed high test-retest reliability. Cronbach's alpha coefficient for total score (0.83) and subscales (ranged from 0.66 to 0.70) demonstrated good internal consistency.

Inferential Confusion Questionnaire (ICQ-EV)

This 30-item self-report questionnaire was developed by Aardema *et al.* (59). Subjects answer on a 6-point Likert scale from 1 (strongly disagree) to 6 (strongly agree). Higher scores indicate a tendency to distrust the senses and rely more overwhelmingly on the imagination in reasoning. Internal consistency through Cronbach's alpha in nonclinical and clinical samples has been reported at 0.96 and 0.97, respectively. Test-retest reliability was reported at 0.90 ($P < 0.001$) in the OCD group. The convergent validity of this scale has been confirmed by observing a significant correlation between ICQ-EV scores and obsessive compulsive symptoms independent of other cognitive variables and negative affects (59).

Psychometric properties of this scale were evaluated by Ghorbali, Shairi & Gholami-Fesharaki (60). Their report indicated that the Persian version of ICQ-EV had high internal consistency and test-retest reliability. Also, convergent and divergent validity of this scale were satisfactory.

Statistical Analysis

Data were analyzed using the SPSS-22 software based on statistical methods such as Pearson correlation, Baron and Kenny hierarchical regression method (61) and Sobel test. First, Pearson correlation coefficients between the variables were calculated. In the next step, the mediating role of IC was calculated by the Baron and Kenny method (61). According to this method, the following four conditions should be met: (1) the independent variable should significantly predict the dependent variable; (2) the independent variable should significantly predict the mediator; (3) the mediator should significantly predict the dependent variable; and (4) after controlling for effect of the mediator, the previously significant relationship between independent and dependent variables should become nonsignificant or reduce significantly. Finally, the Sobel test was employed. The Sobel test is a type of t-test that determines whether reduction in effect of the independent variable on the dependent variable is significant by entering the mediator variable in the model.

Ethical Considerations

All aspects of the present study were in accordance with the ethical standards of conducting research on human participants, such as the voluntary consent of the participants, confidentiality of their data and names,

giving feedback to the participants if desired, etc. Also, the participants were free to end their collaboration with the researcher at any stage of the research. This study was part of the first author's Ph.D. dissertation approved by the ethics committee of Shahed University.

Results

A total of 341 students (183 women and 158 men) with BA and MD degrees in the first semester of the 2017-2018 academic year were selected using the cluster sampling method. Participants' ages ranged from 18 to 29 years (mean = 20.05, SD = 1.96). Table 1 shows the demographic characteristics of the university students who participated in the study.

The mean and standard deviation (SD) for each variable in this study and correlation coefficients between variables are shown in Table 2. As seen in the table, all of the correlation coefficients between variables were significantly positive.

The Baron and Kenny regression method was used to study the mediating role of inferential confusion. As shown in Table 3, the results of the regression analysis showed that four conditions of Baron and Kenny's method were met as follows: (1) dissociative experiences significantly predicted schizotypal traits ($\beta = 0.50$; $P < 0.001$); (2) dissociative experiences significantly predicted inferential confusion ($\beta = 0.53$, $P < 0.001$); (3) inferential confusion significantly predicted schizotypal traits ($\beta = 0.54$; $P < 0.001$); and (4) after controlling for effect of inferential confusion, the association between schizotypal traits and dissociative experiences decreased from 0.50 to 0.29. The results of the Sobel test also demonstrated that the amount of reduction was significant ($Z = 6.24$; $P < 0.001$). Therefore, it can be said that inferential confusion relatively mediates the association between dissociative experiences and schizotypal traits.

Table 1. Demographic Characteristics of the University Students Who Participated in This Research

Variables		Frequency (n)	Frequency Percentage (%)
Gender	female	183	53.7
	male	158	46.3
Age (year)	18-21	274	80.4
	22-25	64	18.7
	25-29	3	0.9
Faculty	Human Sciences	135	39.6
	Engineering	79	23.2
	Fundamental Sciences	56	16.4
	Medicine Sciences	71	20.8

Table 2. Means, Standard Deviations, and Correlation Coefficients between Dissociation, Schizotypy and Inferential Confusion

Variable	Mean	SD	1	2
1. dissociative experiences	20.41	13.02		
2. schizotypal traits	8.99	4.28	0.50**	
3. inferential confusion	92.92	23.21	0.53**	0.54**

** P < 0.01

Table 3. Regression Analysis Results to Examine the Mediating Role of Inferential Confusion in the Relationship between Schizotypal Traits and Dissociative Experiences

Regression Models	Dependent Variables	Independent Variables	Total R ²	F	B	SE	β	t	Sobel Test
1	Schizotypal traits	dissociative experiences	0.25	113.76	0.16	0.01	0.50*	10.66	
2	Inferential confusion	dissociative experiences	0.28	136.36	0.95	0.08	0.53*	11.67	
3	Schizotypal traits	inferential confusion	0.29	144.63	0.1	0.08	0.54*	12.02	6.24
4	Schizotypal traits	dissociative experiences	0.36	95.03	0.09	0.01	0.29*	5.67	
		inferential confusion			0.07	0.01	0.39*	7.57	

* P < 0.001

Discussion

The research objective was to determine the mediating role of inferential confusion in the relationship between dissociative experiences and schizotypal personality traits. The results obtained from this study showed that dissociative experiences can predict schizotypal personality traits. This finding is in line with the results obtained from several studies (13, 14, 15, 28, 29, 33, 36, 42, and 47). Fantasy proneness is one of the possible explanations for the relationship between dissociation and schizotypy (14, 15, and 29). Individuals with fantasy proneness spend a considerable amount of time in a day

fantasizing. They have very vivid childhood memories and fantasies, and have strong bodily experiences associated with fantasies. Out-of-body and other supernatural experiences have also been reported by these individuals (14). Research has shown that the tendency to fantasize had a strong relationship with dissociation (40) and schizotypy (29). Substantial correlations between fantasy proneness and schizotypy provide evidence that there is a common underlying factor between them. This underlying factor is characterized by unusual cognitive-perceptual experiences that arise from disturbed reality testing (62).

Furthermore, Neurobiological findings suggest that dissociative phenomena are likely to disrupt information processing, learning, and memory on various levels (63) and may therefore reduce the individual's confidence in reality monitoring ability and perceived control (64). Therefore, it can be said that impaired reality testing and unusual ways of thinking about reality, which may be rooted in fantasy proneness, are aspects that have a main role in explaining the relationship between dissociative experiences and schizotypal personality traits. Another explanation of the relation between schizotypy and dissociation refers to a common traumatic etiology. One possibility is that trauma leads to strange perceptions and beliefs in people with dissociative symptoms due to distorted reality testing (15). Problems with memory and attention are other possible explanations for the association between dissociation and schizotypy, which have been neglected by researchers. Interestingly, these deficits are observed in both dissociation (33) and schizophrenia (43). These factors are able to explain only a part of the relationship between schizotypy and dissociation. Therefore, more research is needed to determine the exact nature of this relationship. In this regard, in the present study, the mediating role of inferential confusion in the relationship between these two variables was investigated.

The results of this study, in line with previous studies (9, 44, 47, 48, 49, 65), showed a relationship between schizotypal personality traits and inferential confusion. It seems similar fundamental thought processes are involved in both which stem from magical thinking (65). Magical thinking is one of the dimensions of schizotypy and a kind of cognitive bias in which events are attributed to causes that are not really related to the event (66). The tendency to prefer imaginary possibilities to the objective and sensory information as a component of the thought process in inferential confusion (45, 46) is associated with magical thinking. Also, perceptual disturbances, as another dimension of schizotypy, can be explained by considering high levels of inferential confusion (44, 67) because extreme deviation from reality leads to unusual perceptual experiences (48).

Also, findings from this study revealed a relationship between inferential confusion and dissociative experiences. This is consistent with previous studies (9, 47, 49, and 51) and inconsistent with findings of Morrison (52). In explaining the above findings, as Morrison (52) suggests, there seems to be conceptual similarities between inferential confusion and dissociation. According to the IBA, people may have no problem in perceiving reality, but due to inferential confusion, they cannot merge this information efficiently into reasoning. This lack of integration is similar to that seen in dissociation. As previously mentioned, one of the major components of dissociation implies disconnection in normal integration of consciousness, memory, feeling, behaviors, identity and perception (3). Imagination is involved in both inferential confusion and dissociation

(52). O'Connor and Aardema (51) proposed that inferential confusion may be associated with dissociative absorption. Thus, inference about possible states due to inferential confusion leads to feeling a sense of disconnection between the real world and the imaginary world (the world perceived based on inferential confusion). Findings by Aardema and Wu (9) about the relationship between the absorption subscales of DES with inferential confusion provide support in this regard. Based on these findings, it can be concluded that dissociative absorption may play a role in individuals' extreme reliance on possibilities as one of the components of the inferential confusion (51) or at least has similarities with it. Morrison (52) did not find a relationship between dissociation and inferential confusion. These findings cannot be interpreted as certain evidence that there is no relationship between them because he used an experimental task to measure inferential confusion in action and suggested this task may not have reliably operationalized inferential confusion.

As predicted, findings showed that the relationship between dissociative experiences and schizotypal personality traits is mediated by inferential confusion. In explaining this finding, it can be said that dissociation is a kind of imaginative process that plays a role in schizotypal traits. In addition, imagination is an element that plays a role in both inferential confusion and dissociation (52). The relationship between inferential confusion and dissociation can be better understood by considering the two types of dissociation proposed by Holmes *et al.* (68): 1) detachment and 2) compartmentalization. Detachment refers to a changed state of consciousness that is associated with sense of separation from different aspects of daily experiences. Compartmentalization is a phenomenon that occurs due to deficit in the ability to intentionally control the actions or processes that are naturally controllable. This inability is not under control of the will but is somewhat reversible. Similarity among all the phenomena related to compartmentalization is that they are all caused by disturbances in memory retrieval processes associated with formation of consciousness and of automatic behavior control programs (69). According to Brown's model (69), formation of experience requires that information be retrieved from memory and be combined with sensory information. A misinterpretation and consequent perception of an untrue experience is attributed to over activation of primary representations from memory, which might arise from internal experiences (e.g., imagination) or external experiences (e.g., media images). Brown (69) suggests that internally generated information, which may have an internal or external origin, can dominate sensory information during compartmentalization, which is associated with a deficit in memory retrieval and involves high degrees of imaginative involvement. It seems that this explanation is consistent with the notion of inferential confusion. As such, it can be said that severe involvement with imagination, which is a feature

of dissociative experiences, can blur boundaries of reality and fantasy.

However, O'Connor and Aardema (51) explain the relationship between inferential confusion and dissociation based on concept of detachment. They hypothesized that the conscious perception of reality requires presence of the person in the current condition. However, when people are immersed in various possible states regarding their current situation, presence is reduced and attention to other aspects of environment is restricted; thus, perceptions are formed that are somehow distant from reality or are unrealistic (52). They suggest that dissociation can lead individuals who experience inferential confusion to be immersed into imagination and distance them from the reality of the here and now. Here, the person who infers the imaginary possibility to be the real state, will immerse into imagination (51). Therefore, it can be argued that dissociation can reduce confidence to reality monitoring by dissociative absorption and limited attention.

As such, dissociation experiences can lead to imagination and distrust of sensory information, which are the two main components of inferential confusion. Concept of inferential confusion can explain schizotypal traits to some extent. Based on IBA, as the inferential confusion intensifies over the reasoning process, one reaches a point where reality and fantasy are confused. This condition, in turn, can lead to experiencing schizotypal symptoms (48, 67). Therefore, it can be said that the tendency to experience dissociative states can increase vulnerability of individuals to a reasoning style called inferential confusion. Inference confusion leads to unusual ways of thinking about reality, which is a prominent feature of schizotypy. It is suggested that by conducting this study in clinical samples, more evidence can be obtained to support a role for inferential confusion in the dissociation-schizotypy link.

Limitation

One of the most important limitations of this study was the use of nonclinical student samples which limits the generalizability of the findings. Also, using self-report questionnaires to measure variables was another limitation of this study.

Conclusion

Findings of this study revealed that the relationship between dissociative experiences and schizotypal personality traits was relatively mediated by inferential confusion. Therefore, inferential confusion can be considered as one possible entity that can explain the link between dissociative tendencies and schizotypal traits. This finding provides evidence to verify the role of fundamental cognitive processes in overlapping these two phenomena.

Acknowledgment

We thank all the participants for taking part in this study and collaborating with the researchers.

Conflict of Interest

None.

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