

Childhood Traumatic Experiences and Trauma Related Psychiatric Comorbidities in Dissociative Disorders

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ABSTRACT:

Childhood traumatic experiences and trauma related psychiatric comorbidities in dissociative disorders

Objective: Different prevalence rates are reported for dissociative disorders (DD) in different clinical populations (inpatient, outpatient, emergency). It is around 10% among admissions to psychiatry outpatient clinics. Since DD harbors disruption/discontinuation of memory, identity, emotion, and perception many other psychiatric symptoms may be triggered by it. On the other hand, high amount of childhood traumatic experiences in DD patients may be associated with comorbid trauma related psychiatric disorders among them. We aimed to determine the diagnostic distribution of DD in psychiatric outpatients; to show the types of childhood traumatic experiences, their frequencies and sub-types, and co-morbid psychiatric disorders related to these traumas; and to compare the patients with and without DD diagnoses.

Methods: We conducted a cross-sectional study involving 1314 participants who were screened with the Dissociative Experience Scale (DES) and the Somatoform Dissociation Questionnaire (SDQ). Of the participants, 272 who scored above the cut-off point of either of these scales (DES score > 30 or SDQ score > 40 points) were invited to complete a structured interview using the Dissociative Disorders Interview Schedule (DDIS). Of this subsample, only 190 participants agreed to participate in this second phase of the study. A semi-structured interview form was applied to them to collect demographical and clinical variables. In these patients psychiatric comorbidity and trauma history were assessed according to DDIS sub-items, conversion disorder was diagnosed according to DSM IV-TR criteria, and post-traumatic stress disorder was diagnosed according to the post-traumatic stress disorder module of Structured Clinical Interview (SCID-I). Patients with DD diagnosis and without it were compared in terms of study variables.

Results: In the first phase of the study, a total of 272 patients (20.7%) have scored above cut-off level of either of DES or SDQ. Of the 190 participants who were enrolled to the second phase, 167 patients were diagnosed with a dissociative disorder (87.8%). We found that dissociative disorder not otherwise specified was the most prevalent type of DD in these patients. All the measured traumatic experiences were significantly higher in the patients with DD than patients without DD, except for sexual abuse. When compared to patients with and without DD, borderline personality disorder, conversion disorder and lifetime major depressive episodes were significantly higher in the patients with DD ($p=0.011$, $p=0.035$, $p=0.013$, respectively). In the logistic regression analysis the neglect, physical trauma, verbal abuse/threat histories in childhood were identified as predictive factors of DD diagnosis (Table 5).

Conclusion: Clinicians should keep in mind that around one fifth of psychiatry outpatients have clinically significant amount of dissociative symptoms. Childhood traumas and related psychiatric comorbidities are quite common among them with a higher frequency observed in those patients with DD diagnosis. Further studies are needed to determine dissociative symptoms, childhood trauma and trauma related psychiatric comorbidity of psychiatry outpatients and to understand better how they interact with each other especially in those diagnosed with DD.

Keywords: dissociative disorders, frequency, outpatients clinic, childhood trauma, trauma related comorbidity

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INTRODUCTION

Dissociative disorders (DD) were known as a rarely observed and exotic group of disorders¹; however, epidemiological studies researching the frequency of DD have proved that this is not the case²⁻⁶. They have shown different rates in different countries; studies conducted in Turkey have found rates similar to those reported in North America^{4,5}.

DD can be seen simultaneously with many other psychiatric disorders, such as borderline personality disorder (BPD)⁷, conversion disorder⁸, substance use disorders⁹, and somatization disorder¹⁰. As a result of this co-occurrence, questions about these groups of disorders have been asked in diagnostic tests, as well as in screening tests for DD. Among these comorbidities, conversion disorder can be considered to have unique place. The diagnoses of conversion disorder and DD are discussed as a group of disorders with similar features and the current diagnostic system ICD-10 mentions the diagnosis of conversion disorder as a part of the DD group¹¹. Additionally, in a previous study comparison of conversion disorder and other psychiatric disorders in terms of co-occurrence of dissociative symptoms have shown that dissociative symptoms were significantly more common among conversion disorder cases¹². Pseudo-seizures and mixed type conversion disorders were diagnosed as the most common sub-groups in that study¹². Two other studies conducted in Turkey have shown that the rate of comorbid DD in conversion disorder cases ranged between 30.5 and 47.7%¹³⁻¹⁴.

There are several studies showing the relationship between trauma and dissociation¹⁵⁻¹⁷. History of a childhood trauma in patients with DD was reported in 85-100% of cases in different studies¹⁸. In another study, an independent association between childhood sexual abuse and dissociation has been shown which eventually had negative impact on mental health, self-mutilation, suicidal behavior, and sexual aggression¹⁹. Some authors have demonstrated in their clinical trials

the destructive effects of verbal abuse and emotional neglect on traumatized people, as well²⁰. Moreover, clinical trials have also reported a relationship between the severity of trauma and dissociation^{19,21}.

The aim of this study was to determine the frequency and diagnostic distribution of DD in psychiatric outpatients who had reported a significant amount of dissociative symptoms; to demonstrate the types of childhood traumatic experiences, their frequency and subtypes, and co-morbid disorders related to these traumas (i.e., BPD, post-traumatic stress disorder [PTSD], and somatization disorder). Another purpose of this study was to compare the patients with and without DD diagnoses in terms of study variables.

METHODS

In the present study, we planned to include approximately 2,000 patients who were admitted to the psychiatric outpatient clinics of Erenkoy Psychiatry and Neurological Disorders Research and Training Hospital between December 1, 2010 and September 1, 2011. Patients who were diagnosed with schizophrenia, schizoaffective disorder, and mental retardation according to the DSM-IV-TR criteria were excluded from the study. Additionally, presence of severe psychopathology that limits cooperation, mental disorders due to general medical conditions, and physical disability (visual or hearing impairment etc.) were also defined as exclusion criteria. A total of 2,000 admissions have been initially screened for the study. Among them 534 patients were excluded due to the exclusion criteria, and an additional 152 cases did not agree to complete the scales of the study. There were 1,314 patients who voluntarily signed the informed consent form agreeing to be included in our study and who gave their telephone number to be informed about the second phase of the study. In the first phase of the study, these patients were asked to complete the Dissociative Experiences Scale (DES) and Somatoform Dissociation Questionnaire (SDQ).

All cases above the cut-off points of either of

these screening tests (DES>30 and/or SDQ>40, n=272) were contacted by telephone for the second phase of the study. Among them 190 patients responded and agreed to participate into the second phase. They were interviewed by using Dissociative Disorders Interview Schedule (DDIS) and PTSD module of Structured Clinical Interview (SCID-I) prepared according to the DSM-IV-TR criteria, and DSM-IV-TR criteria for conversion disorder. DDIS was applied to all cases by the same psychiatrist (O.Y.) after obtaining the necessary training from Prof. Dr. Vedat Sar who is a well-recognized author in this field and a faculty member of Istanbul University School of Medicine, Department of Psychiatry.

Scales Applied

Semi-structured Interview Form: In this short sociodemographic form, age, education level, psychiatric and general medical history of the participants, chief complaint of the first psychiatric symptoms, suicide attempts, psychosocial functioning, income status, marital status, and gender were reported.

Dissociative Experiences Scale (DES): The self-reported DES, developed by Bernstein and Putnam in 1986, consists of 28 items²². Even though the DES is not known as a diagnostic scale, it is a successful screening test for DD with a score ranging from 0 to 100. Its validity and reliability in Turkey was proven by Yargic et al. The cut-off point for general psychiatric patients was defined as 30^{23,24}.

Somatoform Dissociation Questionnaire (SDQ): This self-reported questionnaire was developed by Nijenhuis et al. It consists of 20 questions, evaluating the severity of the somatoform dissociation²⁵. According to validity and reliability studies in Turkish samples, the cut-off point was defined as 40 for DD²⁶.

Dissociative Disorders Interview Schedule (DDIS): Consisting of 131 questions based on the DSM-IV-TR, the DDIS is an interview schedule

used for the diagnosis of five sub-diagnostic groups; somatization disorder, major depressive disorder, borderline personality disorder, alcohol and substance abuse disorder, and DD. With this interview, supernatural experiences, childhood traumas, dissociative disorder-related secondary identity features, and Schneiderian symptoms are evaluated. In the evaluation, the false positive case rate for DD is reported as less than 1%²⁷. Case studies in Turkey obtained nearly the same data as in North America, adding questions about emotional abuse and neglect in childhood²⁴.

SCID Post-traumatic Stress Disorder (PTSD) Module: For the diagnosis of PTSD, the SCID PTSD module sensitivity has been determined to be 0.69 and specificity to be 1.00; inter-rater correlations between all evaluators was 0.76²⁸⁻³⁰.

Statistical Analysis

The SPSS 16.0 statistical software package was used for the evaluation of patients participating in our study. The chi-square test was used to compare categorical variables, and Fisher's Exact Test was performed in cases where the expected values in any of the cells of a contingency table were below 5. The Mann-Whitney U test was used to compare continuous variables. In order to determine which type of abuse predicts the diagnosis of dissociative disorder, logistic regression analysis was performed. Candidate variables for multivariate logistic regression were selected by using univariate analysis. The backward LR elimination method was used to refine the logistic regression model and determine the best model. In all comparisons, significance was defined as $p < 0.05$.

RESULTS

The study was planned to include 2,000 patients, of whom 534 cases were excluded because of exclusion criteria, and an additional 152 patients did not agree to complete the scale required to participate in the first phase of the study. Of the

1314 cases that were included in the first phase of the study, 272 (20.7%) were reached by their telephones, and 69.8% of these cases (n=190) agreed to participate in the second phase of the study. Of the patients participating in the second phase of the study (n=190), 87.8% were diagnosed with one of the DD (n=167). The diagnostic distribution of DD among them is shown in Table 1.

According to the DDIS, 62.8% (n=105) of all patients with DD were diagnosed with dissociative disorder not otherwise specified (DD-NOS). No significant differences in terms of sociodemographic characteristics were observed between the patients with a diagnosis of DD and those without (Table 2). Of the patients participating in the study, 81.4% of those

diagnosed with any kind of DD and 91.3% of those without any DD diagnosis were female. In terms of marital status, 35.9% of those with DD and 17.4% without DD were single. Looking at the socio-demographic features of the patients, the other notable point was that 26.8% had lived in a village or small town in their childhood, while this number decreased to 2.1% in their adulthood.

When the sub-diagnoses were evaluated according to the DDIS and SCID-I, between the patients diagnosed with and without any DD, conversion disorder (p=0.035), BPD (p=0.011) and lifetime major depressive disorder (p=0.013) were significantly higher in the DD diagnosed group. However, the frequency of comorbid somatization disorder in the DD diagnosed group showed no significant difference when compared to the patients without DD diagnosis (p=0.066) (Table 3).

In our study, another notable fact was the response to the routinely asked question whether or not patients had suffered febrile convulsions (FC) in their childhood. The rate of childhood FC with a DD diagnosis was found to be 18.7% (n=31). Another disorder connected with DD is migraine.

Table 1: Distribution of DD diagnoses according to DDIS

DD diagnosis according to DDIS	n (167)	%
Dissociative Disorder Not Otherwise Specified	105	62.8
Dissociative Identity Disorder	15	8.9
Dissociative Amnesia	14	8.5
Dissociative Fugue	4	2.3
Depersonalization Disorder	29	17.5

DD: Dissociative disorders, DDIS: Dissociative Disorders Interview Schedule

Table 2: Comparison of sociodemographic features between patients with DD and without DD

Sociodemographic features		Patients with DD (n=167)		Patients without DD (n=23)		χ^2/Z	p
		n	%	n	%		
Gender	Female	136	81.4	21	91.3	1.371	0.194
	Male	32	18.6	2	8.7		
Marital Status	Married	79	47.3	11	47.8	5.526	0.063
	Single	60	35.9	4	17.4		
	Other	28	16.8	8	34.8		
Socioeconomic situation	Low	73	43.7	9	39.1	0.315	0.854
	Medium	65	38.9	9	39.1		
	High	29	17.4	5	21.8		
Education Level	Literate	2	1.2	0	0	1.627	0.804
	Elementary school	86	51.5	12	52.2		
	High school	51	30.5	9	39.1		
	Postgraduate	27	16.2	2	8.7		
	Master	1	0.6	0	0		
Occupational Distribution	Unemployed	100	59.9	14	60.9	1.914	0.590
	Employee	55	32.9	9	39.1		
	Clerk	5	2.9	0	0		
	Self-employed	6	3.7	0	0		
	Other	1	0.6	0	0		
Mean age		31.01±9.49 minimum:18 maximum:61		32.52±9.16 minimum:18 maximum:51	-0.856	0.392	

DD: Dissociative disorders

Table 3: Comparison of psychiatric comorbidities and psychiatric history in patients with DD and without DD

Psychiatric comorbidities and psychiatric history	Patients with DD (n=167)		Patients without DD (n=23)		χ^2	p
	n	%	n	%		
Posttraumatic stress disorder(SCID-I)	16	9.6	3	13.0	0.269	0.412
Conversion Disorder (DSM IV-TR)	97	58.1	8	34.8	4.440	0.035
Somatization disorder (DDIS)	64	38.3	6	26.1	5.430	0.066
Borderline personality disorder (DDIS)	91	54.5	6	26.1	6.527	0.011
Lifetime major depressive disorder (DDIS)	165	98.8	21	91.3	8.648	0.013
Previous psychiatric history	158	94.6	20	87.0	2.643	0.267
Suicidal ideation, suicide attempt	133	79.6	16	72.7	0.557	0.456
Self-mutilative behaviors	58	34.7	5	21.7	1.730	0.421

DD: Dissociative disorders

Table 4: Comparison of trauma subtypes between patient groups with DD and without DD

Trauma subtypes	Patients with DD (n=167, %)		Patients without DD (n=23, %)		χ^2	p
Physical abuse	60	35.9	1	4.3		
Neglect	68	40.7	2	8.7	10.928	0.004
Emotional abuse	108	64.7	9	39.1	8.679	0.013
Sexual abuse	53	31.7	4	17.4	2.370	0.306
Verbal abuse/threat	86	51.5	5	21.7	7.173	0.007

DD: Dissociative disorders

Table 5: Multivariate Logistic Regression Terminal Model to Predict Traumatic Factors of DD

Trauma sub-types	B	S.E	Wald	df	p	OR 95.0% C.I
Neglect	1.689	0.770	4.809	1	0.028	5.413 (1.197-24.485)
Physical trauma	2.025	1.049	3.727	1	0.054	7.574 (0.970-59.174)
Verbal abuse/threat	1.035	0.547	3.579	1	0.059	2.816 (0.963-8.232)

DD: Dissociative disorders

When the patients were asked whether or not they had received treatment for migraine, 19.8% (n=33) of the patients indicated that they were being or had been treated at some time in their lives.

Looking at the psychiatric background of the patients, there was no difference between DD-diagnosed patients and the patients without DD regarding their past psychiatric history (p=0.267), suicidal ideation and behavior (p=0.456), or self-mutilative behaviors (p=0.421).

When trauma subtypes were compared between the patients diagnosed with and without DD, physical abuse (p=0.001), neglect (p=0.004), emotional abuse (p=0.013), and verbal abuse (p=0.007) showed significant differences, while no such difference was observed in sexual abuse (p=0.306) (Table 4).

In the logistic regression analysis that defined all DD patients as the dependent variable and childhood trauma types as the independent variable, the neglect, physical trauma, verbal abuse/threat items were described as predictive factors of DD diagnosis (Table 5).

DISCUSSION

Literature reviews determining the frequency of DD in psychiatry outpatients show fairly different mean scores for the DES²⁻⁵. In our study, 1,314 participants completed the DES or SDQ to assess the dissociative symptoms. Around one fifth of the cases scored high on DES or SDQ. This rate was higher than that in a similar study published previously Sar et al. in 2000⁵. They screened 150

cases and found that on the DES scale, around 15.3% of them were above the cut-off point⁵. This difference may be caused by the sociocultural variation of the cases presenting to our outpatient clinics. Of the participants in our study, only 17.9% had a high-income status and only 15.8% were university graduates or postgraduates that were lower than the rates reported in their study. It has been suggested that a low socioeconomic and education level may be risk factors for the development of DD and exposure to traumas. In a study carried out in the US, dissociative disorder was found in outpatients at a frequency of 29%². To account for this high rate, it was pointed out that the study population came from a low socioeconomic level and consisted of minorities with a high incidence of childhood abuse and DD (Latin Americans and African Americans)².

In the second phase of the study, the DDIS was applied, and the rate of cases with any type of dissociative disorder diagnosis was found to be 87.8% (n=167 cases). The most common diagnosis was DD-NOS with 62.8%, a result supporting our hypothesis in this study. The high prevalence of DD-NOS had been shown in some earlier studies, triggering a variety of discussions^{2-5,31}. This issue had been touched upon during the preparation of DSM-5, and various changes had been envisaged in order to reduce the common use of DD-NOS. For example, possession experience, which in the DSM IV-TR was defined within the remit of DD-NOS, in DSM-5 was planned to be included in the diagnosis of dissociative identity disorder (DID), given its amnesic traits, and thus it was thought to reduce the frequency of DD-NOS^{32,33}.

Among the participants in the second stage of our study, no significant sociodemographic differences were found between cases diagnosed with DD and those not receiving such a diagnosis. However, one sociodemographic detail was noticeable; the ratio of village residents decreased significantly from childhood (26.8%) to adulthood (2.1%). For these cases, migration during childhood may have been a coercive process. Studies have shown that migrants are more susceptible to psychiatric diseases than are people

living in their home residence. For example, among Mexicans living in the US, a lifetime psychiatric morbidity of 33.8% was determined, compared to a morbidity of 24.1% for Mexicans living in Mexico³⁴. Similarly, in a study conducted among Korean migrants living in Brazil, the rate of dissociative disorder was determined to be 4.9%³⁵. We assume that migration had an effect on some of our cases regarding their general psychopathology and DD diagnoses. While not considering the migration as primary factor in our study, we believe that it is a question worth studying if domestic relocation also constitutes a risk for psychiatric diseases and particularly for DD.

Conversion disorder diagnosis was made in 58.1% of the DD cases and in 34.8% of the patients not diagnosed with DD. An association of dissociative symptoms and conversion disorder like in our study is reported quite commonly in the literature. One study compared 72 inpatients with conversion disorder and 96 cases with other psychiatric diagnoses such as anxiety and depression¹². All cases in that study were assessed by using SCL 90-R and DES scales. In conversion disorder cases; DES scores were found to be significantly higher, whereas no difference was present in terms of SCL 90-R sub-scores. In the mentioned study, similar to our study, the most common conversion disorder subtypes were pseudoseizure and mixed type¹². ICD-10 includes the diagnosis of conversion disorder in the group of DD, and some authors argue that if this inclusion is adequate^{12,36}. The association between conversion symptoms and dissociation can be established in different ways; for example, pseudoneurological symptoms are quite common in DID; those signs are one of the most common reasons for patients with DD to present to psychiatric emergency services³⁷. Hence, it has been pointed out that pseudoneurological symptoms and DD share similar psychological processes³⁶. In this context, several DSM-5 revisions were proposed such as defining conversion symptoms, pseudoseizure, and other somatic complaints as accessory symptoms for diagnosing DID³³. High conversion symptoms observed in our DD patients is also consistent with

the literature that has reported them to be common among DID patients^{32,33}. Thus, detecting conversion symptoms in DD patients may help us to identify better the DID cases.

Another significant result of our study is the observation of a significantly increased frequency of BPD among DD patients. Compared to healthy controls and patients with other personality disorders and general psychiatric diagnoses, dissociation scores in BPD patients were found to be significantly higher^{3-5,38}. There are associations between dissociation and BPD from two different perspectives. First, both conditions may be seen together and this comorbidity is associated with increased morbidity and reduced functionality in these cases⁴⁰. In BPD population, the frequency of DID has been determined to be between 10% and 27%^{5,7}. On the other hand, among patients diagnosed with DID, the incidence of BPD varied between 30% and 70%³⁸. Second, in some BPD patients without DD comorbidity, one or more dissociative symptoms can also be observed^{3,12}. In those patients, dissociative symptoms usually do not reach to a point that meets the diagnostic criteria of DSM IV-TR for DD. The topic is still an ongoing discussion in the current literature¹⁹. The 6 cases in our study that had scored high either in the DES or SDQ scales and who did not receive a DD diagnoses after DDIS at the same time would represent such a group of patient. Relatively small number of this type of patients may hinder their detection in daily clinical practice and therefore may be the reason for limited data in the literature.

Current or lifetime diagnosis of major depression in patients with DD was significantly higher than that of patients without DD (98.8% vs 91.1%, respectively). Saxe et al. compared DD patients with patients treated for other psychiatric reasons. In 93% of the DD patients they have identified major depression history, a rate significantly higher than among those not diagnosed with DD¹⁰. A study published by Tutkun et al., comparing inpatients with and without DD diagnosis, found that the ratio of those with at least one lifetime major depressive episode was significantly higher among patients with DD

diagnosis⁴. Our results also support the data found in the literature regarding the prevalence of major depression history in the group diagnosed with DD.

In cases with DD diagnosis, an incidence of 38.3% for somatization disorder was found, compared to 26.1% in cases without a DD diagnosis. In their similar study Sar et al. reported somatization disorder comorbidity in 20.1% of patients with DD³, while Saxe et al. determined it to be 64% in their study¹⁰. High comorbidity of somatic complaints with DD most probably raised a need to quantify them in clinical and research settings. In order to address this need Nijenhuis et al. developed the SDQ scale²⁵. May be important to note at this point that in discussions about the diagnosis of DD, somatic symptoms have frequently assumed to be related with DID cases, as well³².

It is interesting to note that in the present study 17.8% of all patients reported a pediatric FC history. Among all children, the incidence of FC is known to be in the range of 2-5%³⁹. It has been found that in FC cases the subsequent risk of developing epilepsy is increased, particularly in cases with a family history of epilepsy and with a low Apgar score⁴⁰. According to some authors, certain EEG anomalies have been found in DD patients, moreover some regional blood flow changes have also been reported in DID cases^{40,41}. Considering that EEG abnormalities are associated with ictal and pre-ictal epileptic states^{2,24}, high incidence of FC in this diagnostic group (DD patients) may be relevant and requires future research.

In our cases, we could not find any statistically significant differences in terms of previous psychiatric treatment, suicidal ideation, suicide attempt, and self-mutilative behavior between those patients with DD and without DD, which is inconsistent with the literature³. Methodological differences may account for this inconsistency. Different from those studies our study included only the patients who had scored above the cut-off point of DES or SDQ scales, which probably resulted in a study population with a more severe psychopathology. High BPD diagnosis even in our control group supports this suggestion.

Childhood traumatic experiences, except

sexual abuse, were more frequent among patients with DD when compared to patients without DD. While these findings are partly consistent with the literature, they conflict with the literature when it comes to the differentiation in exposure to sexual abuse^{3-5,9}. High BPD and conversion disorder (disorders known to be related with high sexual abuse history^{7,8,38}) comorbidity even in our patients without DD might limit the difference to reach a statistically significant level. In fact, frequency of sexual abuse history was higher in our DD patients.

An analysis carried out to determine trauma types that are predictive for a DD diagnosis found that neglect as well as physical and verbal abuse are predictive for it (Table 5). A number of studies has established predictive factors for a diagnosis of DD; for example, physical and sexual abuse were identified in epidemiological studies in the US², while a study in our country specified sexual abuse, emotional abuse, and physical neglect as predictive factors³. Predictive value of physical abuse and neglect on DD diagnosis in our study population was consistent with the previous data from our country and from the US^{2,3}.

Different from the literature our results did not show any predictive value of sexual abuse on DD diagnosis. Again high BPD and conversion disorder frequency among our patients without DD might hinder a possible predictive value of

sexual abuse to identify DD diagnosis^{14,38}. Besides, high sexual abuse frequency in our patients without DD (17.4%) would be another reason. On the other hand, the presence of verbal abuse was also shown as a predictive factor for DD diagnosis¹⁴. In one study, verbal abuse and the use of swear words have also been associated with anxiety, depression, and dissociation²⁰. Particularly the cases' exposure to abusive words by peers and family at various stages of their lives has been described as a potential trigger for these presentations at a comparable level²⁰.

Limitations of our study include the fact that in dealing with psychiatric comorbidities, SCID could not be applied, while the diagnoses of conversion disorder were made according to the diagnostic criteria of the DSM; examinations of the general medical state (EEG, MR, etc.) for cases with a history of pseudoseizures or febrile convulsions could not be carried out, and during the first screening, childhood trauma scores had not been determined.

In conclusion; as our study has confirmed, psychiatric comorbidities are relatively common in cases of DD. Identifying the similarities and differences between the presentations of BPD, conversion disorder, or somatization disorder and DD will allow us a better diagnosis of the DD. Thus, future follow-up studies with these case samples will contribute to the illumination of this topic.

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