Dissociative Experiences are Associated with Obsessive-Compulsive Symptoms in a Non-clinical Sample: A Latent Profile Analysis

Disosiyatif Yaşantılar Klinik Olmayan Örneklemde Obsesif-Kompulsif Belirtilerle İlişkilidir: Gizil Profil Analiziyle Bir İnceleme

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ABSTRACT

Introduction: There has been a burgeoning literature considering the significant associations between obsessive-compulsive symptoms and dissociative experiences. In this study, the relationships between dissociative symptomatology and dimensions of obsessive-compulsive symptoms were examined in homogeneous sub-groups obtained with latent class algorithm in an undergraduate Turkish sample.

Method: Latent profile analysis, a recently developed classification method based on latent class analysis, was applied to the Dissociative Experiences Scale (DES) item-response data from 2976 undergraduates. Differences in severity of obsessive-compulsive symptoms, anxiety and depression across groups were evaluated by running multinomial logistic regression analyses. Associations between latent class probabilities and psychological variables in terms of obsessive-compulsive sub-types, anxiety, and depression were assessed by computing Pearson's product-moment correlation coefficients.

Results: The findings of the latent profile analysis supported further evidence for discontinuity model of dissociative experiences. The analysis empirically justified the distinction among three sub-groups based on the DES items. A marked proportion of the sample (42%) was assigned to the high dissociative class. In the further analyses, all sub-types of obsessive-compulsive symptoms significantly differed across latent classes. Regarding the relationships between obsessive-compulsive symptoms and dissociative symptomatology, low dissociation appeared to be a buffering factor dealing with obsessive-compulsive symptoms; whereas high dissociation appeared to be significantly associated with high levels of obsessive-compulsive symptoms.

Conclusion: It is concluded that the concept of dissociation can be best understood in a typological approach that dissociative symptomatology not only exacerbates obsessive-compulsive symptoms but also serves as an adaptive coping mechanism. (*Archives of Neuropsychiatry 2014; 51: 253-262*)

Key words: Dissociation models, latent profile analysis, obsessive-compulsive disorder, anxiety, depression

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ÖZET

Giriş: Obsesif-kompulsif belirtiler ve disosiyatif yaşantılar arasındaki manidar ilişkilere dair çalışmaların sayısı artmaktadır. Bu çalışmada üniversite öğrencilerinden oluşan bir Türk örnekleminde disosiyatif semptomatoloji ve obsesif-kompulsif belirtilerin alt boyutları arasındaki ilişkiler gizil sınıf analizi kullanılarak elde edilen homojen alt gruplarda incelenmiştir.

Yöntem: 2976 üniversite öğrencisinden elde edilen Disosiyatif Yaşantılar Ölçeği (DYÖ) maddelerinden oluşan veriye, gizil sınıf analizine dayalı son zamanlarda geliştirilen bir sınıflama yöntemi olarak gizil profil analizi uygulanmıştır. Obsesif-kompulsif belirtiler, anksiyete ve depresyon şiddeti bakımından gruplar arası farklar multinomial regresyon analizleriyle değerlendirilmiştir. Gizil sınıf olasılıklarının obsesif-kompulsif alt ölçekleri, anksiyete ve depresyonla olan ilişkisi Pearson momentler çarpımı korelasyon katsayıları hesaplanarak değerlendirilmiştir.

Bulgular: Gizil profil analizi sonuçları disosiyasyon kavramına ilişkin süreksizlik modellerini destekleyici ek kanıtlar sunmuştur. DYÖ maddelerine göre yapılan analiz sonucunda üç alt grup arasında önemli farklılıklar olduğu anlaşılmıştır. Örneklemin önemli bir yüzdesi (%42) yüksek disosiyatif özellik gösteren sınıf içinde kümelenmiştir. Sonraki analizlerde obsesif-kompulsif belirtilerin gizil sınıflar arasında manidar düzeyde farklılaştığı görülmüştür. Obsesif-kompulsif belirtiler ve disosiyatif semptomatoloji arasındaki ilişkiler ele alındığında, düşük disosiyasyon düzeylerinin obsesif-kompulsif belirtilerle başa çıkmada tampon işlevi gördüğü halde yüksek disosiyasyonun artmış obsesif-kompulsif belirtilerle ilişkili olduğu gözlemlenmiştir.

Sonuç: Araştırma sonucunda disosiyasyon kavramının en iyi tipolojik bir yaklaşım içinde açıklanabileceği, disosiyatif semptomatolojinin obsesif-kompulsif belirtilerdeki artışa neden olurken uyuma yönelik bir başa çıkma stratejisi olarak da işlev gördüğü sonucuna varılmıştır. (*Nöropsikiyatri Arşivi 2014; 51: 253-262*)

Anahtar kelimeler: Disosiyasyon modelleri, gizil profil analizi, obsesif-kompulsif bozukluk, anksiyete, depresyon

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Introduction

In recent decades, scientific interest in the phenomenon of dissociation has considerably increased. DSM-IV TR is proposing a definition of dissociation as “a disruption in the usually integrated functions of consciousness, memory, identity, or perception” (1). Dissociative disorders are not rare in the general population. The prevalence of dissociative disorders in normal population has found to be ranging from 1.7 to 18.3% (2,3,4,5).

Although dissociative experiences have been more prevalently recognized in clinical practices, there has been an ongoing controversy about whether the dissociation can be best understood in a continuum or a typological model. According to the continuum model, dissociative experiences are pervasive in everyday life and extend from normal to pathological. Stress diathesis model proposes that some individuals may have a higher tendency to dissociation which may turn to a pathological form by adverse experiences such as sexual trauma. However, on the contrary, normal dissociation or absorption is thought to play a buffering role in dealing with stressful situations (6,7,8). Although childhood traumatic experiences are significantly associated with dissociative symptoms (9,10,11,12), dissociation positively correlates with affective symptoms independent from a history of childhood abuse (13).

Qualitatively different forms of dissociative experiences have been conceptualized in an effort to specify sub-types of dissociation. Distinction between pathological and non-pathological dissociation is the most proponent model. Using the statistical approach of taxometric analysis, Waller and his colleagues (14,15) reported two distinct types of dissociation. These studies found that individuals can be assigned into two groups according to pathological dissociation including depersonalization and dissociative amnesia. Non-pathological dissociation probably exposes a continuum mainly characterized by absorption (16,17). A distinct developmental pathway suggested for the pathological dissociation which is significantly associated with childhood trauma revealed distinguished features compared to normative dissociative experiences (18).

In line with the earlier theoretical contributions, Holmes, Brown (19) have suggested a distinction in the concept of dissociation as “compartmentalization” and “detachment”. Compartmentalization is characterized by a failure to volitional control over information processing such as dissociative amnesia and conversion symptoms. On the other hand, detachment is characterized by alterations in the states of consciousness such as derealization and depersonalization. Intrusive memories and flashbacks may be comprised in detachment component of dissociation which has been suggested to be associated with traumatic experiences and posttraumatic syndrome (20, 21).

These distinctions and taxonomic appraisals refer to a variety of processes and represent the traumagenic model of development of dissociative tendencies which is widely supported by research findings. Nevertheless, research provides strong evidence that assumptions of a dissociative continuum may not be valid for pathological dissociation but for nonpathological dissociative tendency (8, 16). Another study field is the related psychiatric conditions involving dissociative

spectrum. Dissociative symptoms are among the diagnostic criteria for acute stress disorder, post-traumatic stress disorder (PTSD), and borderline personality disorder (1). Researchers have shown that miscellaneous diagnostic groups are associated with elevations in dissociation scores. These are eating disorders (22,23,24), conversion disorder (25,26), somatization disorder (27), personality disorders (28,29), panic disorder (30), alcohol dependency (31,32), obsessive compulsive disorder (33), and PTSD (34); whereas dissociation is the core feature of the dissociative disorders (35,36,37).

Since the significant linkages between dissociative symptoms and traumatic experiences have been well-established in the literature (4), further taxonomies have been proposed with respect to the role of dissociative tendency in PTSD. Heinen (38) hypothesized a distinction between PTSD symptoms based on neurobiological studies that there may be two subtypes of traumatic response: one is acute and primarily dissociative, and the other is chronic and predominantly intrusive and hyperarousal. Goodman (39) noted that dissociative symptoms in PTSD may be a distinct aspect of the disorder but also a part of maladaptive posttraumatic process certain with emotional overmodulation mediated by midline prefrontal inhibition of limbic regions. In a study conducted on Vietnam veterans by using various taxonomic analysis algorithms, it was found that individuals assigned to a taxon according to Dissociative Experiences Scale (DES) scores had significantly more severe PTSD symptoms and were more frequently diagnosed with PTSD compared to non-taxon members (40). Wolf and her colleagues (41, 42), using latent profile algorithm, have replicated and extended the previous findings that dissociation is a salient aspect of PTSD and individuals with a tendency to dissociative symptoms constitute a subset of people with PTSD.

Obsessive-compulsive disorder (OCD) is a heterogeneous disorder that early conceptualizations proposed a distinction between obsessions and compulsions. However, structural analyses offered at least four or five sub-categories of obsessive-compulsive symptoms (43,44,45,46). Moreover, the term ‘obsessive compulsive spectrum’ has been more commonly used by the researchers. To explore the obsessive-compulsive spectrum, distinct dimensions of the disorder have been focused on by the authors. These are biological bases of the pathology as obsessive personality traits, varying degrees of insight in OCD, clinical characteristics in terms of symptom subtypes, age of onset, course, symptom severity, comorbidity, response to treatment, common etiological factors, and similar psychopathological symptoms (47,48,49,50,51). The OCD symptoms have overlapping features with several related disorders that obsessive-compulsive spectrum disorders are suggested to be grouped into three categories as follows: 1) impulse control disorders, i.e. kleptomania, pathological gambling, 2) preoccupation with body appearance and bodily sensations, i.e. body dysmorphic disorder, and 3) repetitive behaviors with neurological bases, i.e., autism, Tourette’s syndrome (52).

Of particular interest have been the relationships between dissociative tendency and obsessive-compulsive symptoms as well. In recent years, overlaps between obsessive compulsive

and dissociative spectrums have consistently been emphasized by scholars. Grabe et al. (53) found that checking, symmetry, and ordering symptoms were associated with dissociative symptomatology in patients with OCD. Goff et al. (33) reported a significant relationship between DES and Maudsey Obsessive Compulsive Inventory scores. Patients with OCD were assigned to high dissociators and low dissociators groups with respect to their DES scores and, OCD patients assigned to the high dissociator group had significantly higher levels of checking symptoms. In a German OCD patients sample, the researchers have replicated these findings that scores on the symmetry/ordering, checking and obsessive thoughts subscales of the Hamburg Obsessive-Compulsive Inventory significantly correlated with DES scores (54). In another study (55), 15.8% of patients with OCD scored 30 or higher than 30 on Dissociative Experiences Scale. A similar percentage of dissociative disorders (14%) were detected among Turkish patients with OCD by a clinical assessment measure, the Dissociative Disorders interviews (56). However, Yale-Brown Obsessive Compulsive Scale scores did not associate with DES scores (57, 58). Watson et al. (59) conducted three studies, of which out of two were among undergraduates and out of one was among 70 psychiatric outpatients, investigating the relationship between dissociation and obsessive compulsive symptoms by using two instruments together for assessing obsessive-compulsive symptoms. All the three studies consistently provided further evidence for the linkages between dissociative symptomatology and all symptom dimensions in OCD. Finally, clinicians have demonstrated that high dissociation scores among patients with OCD predicts poor treatment outcome of cognitive behavior therapy (60,61).

Given the previous findings in the literature, relationships between obsessive-compulsive symptoms and dissociation may be explained in several ways. First, it seems that both OCD and dissociation have overlapping features in attention and memory functioning. Individuals who reported higher scores of dissociative tendency were more prone to get higher scores on the Cognitive Failure Questionnaire (62,63,64) as well as individuals who reported higher scores of obsessive compulsive symptoms (65,66). However, subtle neurocognitive deficits in the information processing may be found among patients with dissociative disorders, but findings considering general cognitive performance are not remarkable. Studies have demonstrated strong evidence for cognitive inhibition deficits in processing emotionally negative materials (67). Also patients with OCD did not significantly differ from healthy controls on various verbal memory tests (68,69,70); whereas deficits on using organization strategies in acquiring knowledge were salient among patients suffering from OCD (71,72,73). Scholars noted that a general failure in cognitive and behavioral inhibition process and impairments in decision making process may be the antecedents of clinical manifestations in OCD (74,75,76). In short, breakdowns in cognitive inhibition process have been appeared to be salient among patients diagnosed with either of these disorders.

Second, traumagenic model of dissociative tendency has been widely accepted. Early traumatic experiences that encompass a broad range such as physical, sexual and emotional abuse, and neglect are associated with dissociative tendency (11,77,78,79).

Apparent linkages between exposure to traumatic experiences and development of OCD have been demonstrated in eight case examples (80). Çelikel and Beşiroğlu (81) found significant correlations between impulses sub-scale of the Padua Inventory (PI) and all subtypes of childhood trauma measured by the Childhood Trauma Inventory (CTI) from a low of $r=.13$ to a high of $r=.23$ among college students. Rumination sub-scale significantly correlated with all dimensions of the CTI from a low of $r=.12$ to a high of $r=.25$ as well. Overall DES scores linked to all sub-scales of the PI with an exception of washing sub-scale. Mathews et al. (82) found evidence for linkages between obsessive compulsive-symptoms and childhood traumatic experiences, particularly with emotional and physical abuse. In another study (83), patients with OCD and patients with trichotillomania reported significantly higher scores on physical abuse and emotional neglect sub-scales of the CTI than healthy controls.

Third, dissociative experiences are generally concomitant with affective and anxiety symptoms (13,84). Normal dissociative experiences, such as absorption and fantasy proneness, are thought to be an adaptive buffering mechanism dealing with stressful situations; whereas pathological dissociation including depersonalization, derealization and amnesia symptoms refers to a pathological process causing deteriorations in emotional well-being (7,8,15,16,85). Raszka et al. (86) noted that dissociative tendency is related to anxiety rather than obsessive-compulsive symptoms in OCD. Dissociative symptoms may play a compensating role in obsessive-compulsive symptoms to an extent to which elevations in the severity of obsessive-compulsive and dissociative symptoms may possibly affect each other reciprocally.

This research would contribute to a burgeoning literature on the OCD spectrum to understand the relationships between obsessive compulsive symptoms and individual differences in dissociative tendencies. The aims of the study were two-fold. First, it was aimed at investigating whether a classification among nonclinical individuals would be possible and if taxonomy would be statistically plausible, then, how many homogeneous sub-groups would emerge according to the DES items by using latent profile analysis. Second, this study also provided an opportunity to assess the associations of dissociative experiences with obsessive compulsive symptoms, anxiety and depression. Of particular interest have the taxonomic models of dissociation, associations of sub-types of obsessive-compulsive symptoms with dissociative experiences were explored after splitting the non-clinical sample into more homogeneous sub-groups with respect to the DES scores by using the latent class analysis.

Method

Participants and Procedure

Subjects were 3243 undergraduates recruited into the study at Ankara University, Ondokuz Mayıs University, and Yüzüncü Yıl University in Turkey. Data collection process had taken from October 2010 to April 2011 before the earthquake in Van city. Of the sample, data were collected from 2976 undergraduates who voluntarily participated in the study. The mean age of the participants was 22.08 (SD ± 3.50) years. 51.7% of the sample were male ($n=1539$).

This study was conducted in collaboration with researchers in these three universities. The research was announced in classrooms at different faculties of these universities. Volunteers were included in the study. There were no exclusion criteria. After participants were given an adequate explanation of the study's procedures, they provided written informed consent.

Psychometric Instruments

The instruments used in the study were the DES, the PI, the Beck Depression Inventory (BDI), and the Beck Anxiety Inventory (BAI).

Dissociative Experiences Scale (DES)

The DES is a self-report measure developed for the assessment of severity of dissociative symptoms (87). The instrument comprises 28 items and each item is rated on a Likert-type scale ranging from 0 to 100 (0=not at all; 100=very much). A cut-off score of 30 and higher than 30 on the DES has been recommended to identify significant levels of dissociation (88). The Turkish version of the DES is a reliable and valid measure (89). The Turkish version has an alpha coefficient of .97 and has high test-retest reliability ($r=.77$). The convergent validity of the instrument with the DIS-Q was $r=.90$ in a Turkish population.

Padua Inventory (PI)

The PI is a self-report questionnaire developed in order to assess severity of obsessive compulsive symptoms (90). However et al. (91), revised the original PI using factor analysis in a large clinical- and non-clinical sample in order to exclude the items related with worry. The revised version comprises 41 items and each item is rated on a Likert-type scale ranging from 0 to 4 (0=not at all; 4=very much). The PI has five dimensions: 1) impulses, b) washing, c) checking, d) rumination, and e) precision. For the Turkish version, Besiroglu et al. (92) found internal consistency ranging between .79 and .95, and test-retest reliability between .86 and .91 across subscale and total scores.

Beck Depression Inventory (BDI)

The BDI is a self-report questionnaire developed in order to assess severity of depressive symptoms (93). The instrument consists of 21 items and each item is rated on a four-point scale ranging between 0 and 3. The Turkish version of the measure has been found to have good psychometric properties (94).

Beck Anxiety Inventory (BAI)

The BAI is a self-report questionnaire developed in order to assess severity of clinical anxiety (95). The instrument consists of 21 items and each item is rated on a four-point scale ranging between 0 and 3. The Turkish version of the measure had good validity and reliability (96).

Statistical Analysis

Latent profile analysis is a categorical data analysis method based on latent class approach that seeks to identify the optimal number of latent classes with similar profiles along a set of continuous variables. It is assumed that individuals with the same latent class membership would differ in symptom severity only because of measurement error or stochastic factors (38).

In the current latent profile analysis, latent profile models were computed using Mplus version 4.1 (97). In the model estimating process, 2-class through 4-class solutions were compared. Bayes information Criterion (BIC) and sample-size-adjusted Bayes information Criterion (ABIC) were used in comparing latent profile models. Lower the values of information criteria, better the estimated model. Additionally, the Lo-Mendell-Rubin test compares a specified model with $M+1$ class to a model with M class solution. A substantial chi-square value refers to a better fit for the specified model (98). Entropy index indicating how well individuals have been classified in the latent class model was also calculated. Values closer to one indicates better classification of individuals (99).

Bonferroni adjusted multinomial logistic regression analysis was utilized in evaluating the differences between latent classes. Pearson's product-moment correlation coefficients were computed between latent class membership probabilities and psychological variables. Significance threshold for the p values held at $p<.016$ (critical $p=.05/3=.016$).

Results

Model Fitting

The latent profile analysis was conducted on the 28 DES items. Three latent profile models were fitted to the data, including a 2-class through a 4-class solution. All three latent profile models were converged but 3-class and 4-class models could be converged after constrains. Mplus software technical reports warned that matrix could not be inverted for some classes because of problems in certain items. Equality constrains across classes were determined due to these warnings in order to estimate the models. 3-class model could be estimated after the variance of the item 4 was constrained as equal across class 1 and class 2 since the Mplus gave warning for the item as the covariance matrix could not be inverted in these classes. The 4-class solution was obtained after the variance of the item 28 was constrained as equal between class 1 and class 4, as well as item 4 of which its variance was assumed as equal across three latent classes of those that were class 1, class 2, and class 3.

Table 1. Latent class analysis of dissociative symptoms: Fitness statistics

Number of Latent Classes	Loglikelihood	NFPAR	AIC	BIC	ABIC	LMRA (p)	Entropy
Latent Class 2	-359410.87	113	719047.74	719725.55	719366.51	41807.95($p<.01$)	.97
Latent Class 3	-356769.94	152	713843.88	714755.62	714272.66	8292.42($p<.01$)	.96
Latent Class 4	-357798.09	168	715932.18	716939.90	716406.10	665.63($p=.59$)	.97

Note-NFPAR= Number of free parameters; AIC= Akaike Information Criterion; BIC= Bayesian Information Criterion; LMRA= Lo-Mendell-Rubin Adjusted LRT Test; ABIC = Adjusted Bayesian Information Criterion

When the number of classes was increased to a 3-class model, either the BIC or ABIC decreased appreciably. Additionally, the Lo-Mendell-Rubin likelihood chi square value was significant. On the contrary, for the 4-class model, the BIC and ABIC both decreased, and the Lo-Mendell-Rubin likelihood chi square value was not significant. Based on the solutions 2-class and 4-class models were rejected but the 3-class model was accepted. The entropy index was 0.96 for the model. Model fitness statistics are presented in Table 1.

Associations Between Psychological Variables

Descriptive statistics for the psychological variables in terms of means, standard deviations and internal reliability coefficients are presented in Table 2. Pearson's product-moment correlation coefficients among psychological variables were also computed. In our sample, associations of the DES scores with the subscale and composite PI scores were significant ($p < .01$). Pearson's product-moment correlation coefficients between dissociative experiences and sub-types of obsessive-compulsive symptoms ranged from a low of $r = .29$ (between dissociation and washing) to a high of $r = .59$ (between dissociation and impulses). Significant relationships between dissociative experiences and the composite scores of the PI were found ($r = .55$). The correlation coefficient between the DES scores and the BAI was high ($r = .51$) as well as the correlation between the DES scores and the BDI ($r = .42$). The correlation coefficients are given in Table 2.

Class Membership

Latent profile estimates computed owing to severity scores of the DES items for the 3-class model. Participants assigned into three classes based on membership probabilities. Average latent class membership probabilities ranged between .97 and .99 for the 3-class solution. 42.27% of the overall sample ($n = 1258$) were assigned into the high dissociation group, 36.83% ($n = 1096$) into the average dissociation group, and 20.90% of participants ($n = 622$) were assigned into low dissociative group.

Of the sample, 740 participants (24.87%) scored 30 and higher than 30 on the DES. On the DES scores, respondents who were classified in the latent class 1 scored to a maximum of 16, in the latent class 2 scored to a maximum of 29, and in the latent class 3 scored to a maximum of 100. 58.82% of the participants ($n = 740$) in the third latent group scored 30 and higher than 30 on the DES. In short, all of the individuals in the high dissociative group received 30 and higher than 30 on the DES. DES-taxon classification, which was computed based on Waller and Ross (15), was used in assessing pathological dissociation as well. 553 subjects (28.58%) whose dissociative experiences scores revealed 90 percent or higher Bayesian probability of pathology were assigned as DES-taxon positive. 98.92% of DES taxon positive subjects ($n = 547$) were classified in the highly dissociative latent class, and 1.08% of DES taxon positive subjects ($n = 6$) were classified in the average dissociative latent class.

Differences Between Latent Classes

As seen in table 3, Bonferroni-adjusted multinomial logistic regression models were ran for evaluating differences between latent classes. Latent classes were the dependent variable in the

Figure 1. Mean scores on DES Items by latent classes

Table 2. Means, standard deviations, internal consistencies and Pearson product-moment correlation coefficients

	1	2	3	4	5	6	7	8	9
1. Dissociative Experiences Scale	-								
2. Padua Inventory	.55 **	-							
3. Impulses (PI)	.59 **	.71 **	-						
4. Washing (PI)	.29 **	.77 **	.35 **	-					
5. Checking (PI)	.39 **	.83 **	.47 **	.55 **	-				
6. Rumination (PI)	.53 **	.84 **	.61 **	.47 **	.63 **	-			
7. Precision (PI)	.40 **	.76 **	.49 **	.54 **	.57 **	.53 **	-		
8. Beck Depression Inventory	.42 **	.62 **	.49 **	.49 **	.47 **	.50 **	.51 **	-	
9. Beck Anxiety Inventory	.51 **	.55 **	.50 **	.38 **	.35 **	.56 **	.36 **	.59 **	-
Mean	21.55	52.75	6.85	14.68	11.59	13.87	5.77	14.61	14.56
Standard Deviation	14.00	25.58	5.17	8.09	6.89	7.85	4.46	11.00	11.31
Cronbach's Alpha	.93	.94	.76	.88	.89	.88	.77	.91	.92

** $p < .01$

logistic models and regressed on psychological variables. Chi-square values computed in nine logistic models indicated that differences in the levels of dissociation, depression, anxiety, and obsessive-compulsive symptoms across classes were significant. Post-hoc comparisons among the groups were performed by running Bonferroni-adjusted logistic analyses. The participants assigned into the high dissociative group scored higher on the DES, PI sub-scales, BDI, and BAI than those in two latent classes. The participants assigned into the low dissociative tendency class also differed significantly and scored lower on the DES, PI sub-scales, BDI, and BAI than the participants assigned into the average and high dissociation group. Findings are presented in Table 3.

Finally, Pearson's product-moment correlation coefficients between latent class probabilities and psychological variables were computed. Latent class probabilities obtained for each individual participant according to DES item scores indicating the class membership. Latent class probabilities of low dissociators were reversely associated with the sub-scales and the overall PI scores as well as BDI and BAI scores. Poor correlations of latent class 2 probabilities with Impulses, Rumination, and Precision sub-scales, and total scores of the PI were found. However, correlations of washing and checking symptoms with latent class 2 probabilities were not significant. Weak associations of latent class probabilities with anxiety and depression symptoms were significant. Finally, latent class probabilities of high dissociator individuals correlated with a low of $r=.21$ (checking symptoms) to a high of $r=.46$ (impulses symptoms). Latent class probabilities were significantly associated with the overall PI scores as well as BDI and BAI scores in the high dissociator group. Findings are presented in Table 4.

Discussion

This study examined the latent profile of dissociative experiences among undergraduate students. A latent profile analysis, based on the latent class approach, on the DES item-data collected from a large college population yielded a three class solution. A three class solution best fitted to data as a low dissociation class, an average severity dissociation class, and a high dissociation severity class. Interestingly, high dissociative individuals, who were more prone to pathological dissociation, were the largest proportion of the sample ($n=1258$; 42% of the sample). The number of individuals who had an average dissociative tendency followed the pathological group ($n=1096$; 37% of the sample), and individuals with a low dissociative tendency were in the smallest class ($n=622$; 21% of the sample). Means of all 28 items of the DES compared by using ANOVAs revealed significant differences across three latent classes.

Findings have contributed to the ongoing debate about whether the concept of dissociation should be considered in a continuum or in a taxonomy that current three-solution emerged in the latent profile analyses partially supported the discontinuity hypothesis. This solution also replicated and extended the previous results. Reliable findings supporting the discontinuity model of dissociation have emerged in the taxonomic analyses. Researchers have consistently provided evidence for that pathological dissociation

behaves as a discrete latent structure. Waller and colleagues reported that a pathological group certain with experiencing intense derealization, depersonalization and dissociative amnesia could be successfully discriminated by using taxonomic methods. Researchers also proposed a measure of pathological dissociation conceptualized as DES-Taxon (14,15). Waller et al. (22), or and noted that pathological dissociation assessed with DES-Taxon has an invaluable clinical utility for indicating the level and presence of dissociative psychopathology in eating disorders. Current findings as well as previous studies using taxonomic analyses provided further evidence for the discontinuity model of dissociation, whereas previous studies consistently supported that individuals can be classified into two groups according to their dissociative tendency. In the previous taxonomic analyses, certain symptoms measured by the DES (eight items called as the DES-Taxon) substantially deviated from other symptoms that these items were suggested to be measuring a distinct psychological construct evaluating pathological dissociation. Contrary to these results, in the current study, mean item differences among latent classes were significant for all items, but any of the symptoms measured on the DES did not behave as a discrete construct. In other words, latent profile analysis portrayed a distinction due to the levels of dissociative symptomatology rather than differentiation among 28 symptoms measured by the DES items.

Epidemiological studies have detected that the prevalence of dissociative disorders in the general population ranged from 1.7 to 18.3% (2-5). In the current study, 24.9% of the sample ($n=740$) scored 30 and higher than 30 on the DES and 18.6% of the sample ($n=544$) were detected to be DES taxon positive. Moreover, a great proportion of the participants (42.3%) were assigned into the high dissociative group in the latent profile analysis. Current findings were consistent with the previous studies that particularly DES taxon membership percentage computed in the study was approximately the same with the research conducted by Sar et al. (3) in a Turkish sample. Given the overall findings covering the current one, it is obvious that dissociative symptoms are not uncommon in the general population and need more attention in public mental health. Not only are dissociative symptoms exclusive indicator of dissociative disorders but also involve in psychopathology in a wide range (5, 100). A great proportion of a high dissociative tendency may probably be associated with prevalence of psychological problems among Turkish college students. This may be because of the lack of effective preventive mental health approaches in the Turkish education system and insufficiency of the preventive public health policies (101, 102). In this vein, high dissociative symptoms can be thought as a key indicator among individuals at risk of developing a psychiatric disorder, particularly OCD. The predictive value of dissociative symptoms in the etiology of psychopathology should be more comprehensively examined in further studies.

Considering the relationships between dissociation and obsessive-compulsive symptoms, strong Pearson's correlation coefficients of the DES scores with overall and sub-scales of the PI supported and extended the previous findings. There has been a number of studies that found significant overlaps between dissociative and obsessive-compulsive spectrums in clinical- and non-clinical samples (33,53,59,81). Current findings provided

further support for such relationships that not only checking but also all sub-types of obsessive-compulsive symptoms were found to be significantly associated with dissociation. Moreover, overall and sub-scale scores of obsessive-compulsive symptoms significantly differed among latent dissociative groups that mean scores of obsessive compulsive measures were the highest among individuals assigned into the high dissociative class. Participants with a tendency to average dissociation followed high dissociators in terms of obsessive compulsive severity, and participants who were assigned into low dissociation class also reported the lowest scores of obsessive-compulsive symptoms. Similarly, high dissociators reported higher mean scores of depression and anxiety symptoms than did average and low dissociators.

In a recent cognitive model of OCD, the role of dissociation has been emphasized in the inference-based approach to understand antecedents of obsessive compulsive symptoms. An experimental study (103) demonstrated that people with OCD

are more receptive to possibility-based information compared to non-clinical participants, and imaginative involvement seems to play a mediator role in committing obsessions and compulsive behaviors. A tendency to rely on subjective possibilities of harm that leads to absorption in obsessions which are experienced as real refers to the concept of "inferential confusion". It was proposed that detachment and derealization may accompany problems of reality testing in OCD (104, 105). Aardema and Wu (106) found that inferential confusion and dissociative absorption are associated with obsessive-compulsive symptoms. Current analyses supported the previous findings about the relationships between dissociative symptomatology and obsessive compulsive symptoms. On the other hand, latent classes obtained with the classification analysis did not support a distinction between the DES items that non-clinical participants were assigned into subgroups according to the severity of their dissociative experiences. In another aspect, correlations of latent class probabilities with obsessive compulsive symptoms demonstrated

Table 3. Likelihood chi-square tests and logistic regression analyses across latent classes

	Low (n=622) Mean(SD)	Average (n=1096) Mean (SD)	High (n=1258) Mean (SD)	LC1 vs LC2 ODDS (95% CI)	LC1 vs LC3 ODDS (95% CI)	LC2 vs LC3 ODDS (95% CI)	df	χ^2	P
Dissociative Experiences Scale	6.13(3.21) A	16.19(5.06) B	33.84(11.95) C	1.90(1.78-2.02)	2.65(2.47-2.85)	1.40(1.36-1.44)	2	4020.16	<.01
Padua Inventory	35.66(19.47) A	49.46(21.26) B	65.07(25.88) C	1.04(1.03-1.04)	1.06(1.06-1.07)	1.03(1.02-1.03)	2	297.91	<.01
Impulses (PI)	3.27(3.01) A	5.89(3.84) B	9.69(5.61) C	1.27(1.21-1.34)	1.50(1.42-1.58)	1.18(1.15-1.22)	2	388.42	<.01
Washing (PI)	11.95(7.60) A	14.14(7.55) B	16.67(8.33) C	1.04(1.02-1.06)	1.08(1.060-1.10)	1.04(1.02-1.06)	2	68.32	<.01
Checking (PI)	8.11(5.67) A	11.28(6.38) B	13.79(7.11) C	1.10(1.07-1.13)	1.16(1.13-1.19)	1.06(1.04-1.07)	2	139.90	<.01
Rumination (PI)	8.45(5.43) A	12.92(6.77) B	17.70(7.90) C	1.14(1.11-1.18)	1.25(1.21-1.29)	1.09(1.07-1.11)	2	317.86	<.01
Precision (PI)	3.88(3.29) A	5.23(3.89) B	7.29(4.96) C	1.11(1.06-1.15)	1.23(1.18-1.28)	1.11(1.08-1.15)	2	127.81	<.01
Beck Depression Inventory	9.11(8.30) A	13.03(9.34) B	18.53(11.94) C	1.07(1.05-1.09)	1.12(1.11-1.14)	1.05(1.04-1.06)	2	327.63	<.01
Beck Anxiety Inventory	7.71(7.64) A	13.48(9.66) B	19.03(12.17) C	1.09(1.07-1.12)	1.14(1.12-1.17)	1.05(1.03-1.06)	2	206.71	<.01

NOTE- Means(SD) that do not share letters (A, B, C) are significantly different ($p < 0.016$).

Table 4. Pearson product-moment correlation coefficients between latent class probabilities and psychological variables

	Latent Class 1 Low	Latent Class 2 Average	Latent Class 3 High
Padua Inventory	-.37 **	-.10 **	.40 **
Impulses	-.38 **	-.14 **	.46 **
Washing	-.19 **	-.05	.21 **
Checking	-.28 **	-.03	.27 **
Rumination	-.38 **	-.09 **	.41 **
Precision	-.23 **	-.09 **	.28 **
Beck Depression Inventory	-.26 **	-.11 **	.32 **
Beck Anxiety Inventory	-.33 **	-.07 *	.35 **

*, $p < .05$; **, $p < .01$

that high dissociator individuals were more prone to obsessive-compulsive symptoms, whereas reverse relationships between obsessive-compulsive symptoms and dissociative symptomatology were found in the low dissociator group. These findings are evidence for discontinuity hypothesis of dissociation that low levels of dissociation appears to be a compensation factor in dealing with obsessive-compulsive, anxiety, and depression symptoms to an extent. After a threshold, dissociative experiences may cause deterioration of obsessive-compulsive, anxiety, and depression symptoms. In this vein, levels of dissociative symptomatology seem to have a key role rather than sub-types of dissociation in the development of psychopathology, especially OCD.

The study has several limitations. Dissociative symptoms have been consistently found to be associated with traumatic experiences (9,11,17,18). Similar relationships between childhood trauma and OCD have been reported (81-83). However, it was not evaluated in the current study whether participants had a history of trauma or not. So far, taxonomic studies considering sub-groups according to the severity of dissociative experiences among clinical and nonclinical individuals have analyzed the data collected at one time point. Temporal variations in dissociative tendency may be preponderant in determining sub-groups. Normative dissociation has been suggested to be a common experience and to play a buffering role in dealing with stressful situations. Taxonomic studies may explain the distribution of the severity of dissociative symptoms among individuals but do not give enough information considering dissociative process that should be addressed across situational changes. The current study was also conducted in a cross-sectional experimental design that further longitudinal design taxonomic studies are needed. Finally, study generalizability was limited by the exclusive focus on a nonclinical sample and inclusion of clinical individuals may possibly have affected the solutions.

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