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Prevalence and clinical correlates of dissociative subtype of posttraumatic stress disorder at an outpatient trauma clinic in South Korea

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ABSTRACT

Background: Previous studies on of the dissociative subtype of posttraumatic stress disorder (d-PTSD) have relied on specialized statistical methods (i.e. profile or class analyses) for diagnosis than clinical rating available to clinicians.

Objective: This study investigated the prevalence and covariates of d-PTSD diagnosed by a semi-structured interview in a cohort of outpatients with DSM-IV PTSD in a specialized trauma clinic in South Korea.

Method: Data from 249 patients with civilian PTSD were examined, including demographics, clinical variables, Clinical Global Impression (CGI) Scale, and Clinician-Administered PTSD Scale (CAPS-IV). We defined d-PTSD as the presence of either depersonalization or derealization according to additional dissociative items of the CAPS. About one third (n = 82, 32.9%) of patients were designated as having d-PTSD.

Results: Compared to the other patients with PTSD, those with d-PTSD were younger, had more severe PTSD symptoms, frequent interpersonal trauma, and a higher number of comorbid disorders. When these variables and their interactions were entered into a logistic regression model, younger age, severe PTSD symptoms and two or more comorbid conditions remained for the final model. We did not find a significant difference in improvement over the course of treatment between two groups.

Conclusions: This study highlights the high prevalence of d-PTSD in a clinical population. Associated features of d-PTSD were similar to those reported in the Euro-American literature. Further studies are needed to better understand mechanisms and treatment options for d-PTSD.

Prevalencia y correlatos clínicos del subtipo disociativo del trastorno de estrés postraumático en una clínica ambulatoria en Corea del Sur

Antecedentes: los estudios previos del trastorno de estrés postraumático, subtipo disociativo (TEPT-d) se han basado en métodos estadísticos especializados (es decir, análisis de perfil o clase) para el diagnóstico en vez de la calificación clínica disponible para los médicos.

Objetivo: Este estudio investigó la prevalencia y las covariables de TEPT-d diagnosticadas por una entrevista semiestructurada en una cohorte de pacientes ambulatorios con diagnóstico TEPT, según DSM IV, en una clínica especializada en trauma en Corea del Sur.

Método: Se examinaron datos de 249 pacientes con TEPT civil, incluidos datos demográficos, variables clínicas, Escala de Impresión Clínica Global (CGI) y Escala de TEPT administrada por el médico (CAPS-IV). Definimos TEPT-d como la presencia de despersonalización o desrealización de acuerdo con ítems disociativos adicionales de la CAPS. Alrededor de un tercio (n = 82, 32.9%) de los pacientes fueron designados como TEPT-d

Resultados: en comparación con los otros pacientes con TEPT, los que tenían TEPT-d eran más jóvenes, tenían síntomas de TEPT más graves, mayor frecuencia de traumas interpersonales y un mayor número de trastornos comórbidos. Cuando estas variables y sus interacciones se ingresaron en un modelo de regresión logística, la edad más joven, los síntomas graves de TEPT y dos o más condiciones comórbidas permanecieron para el modelo final. No encontramos diferencias significativas en la mejora en el curso del tratamiento entre los dos grupos.

Conclusiones: este estudio destaca la alta prevalencia de TEPT-d en una población clínica. Las características asociadas a TEPT-d fueron similares a las reportadas en la literatura Euroamericana. Se necesitan más estudios para comprender mejor los mecanismos y las opciones de tratamiento para TEPT-d.

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PALABRAS CLAVES

Trauma; TEPT; disociación; subtipo disociativo; prevalencia; comorbilidad

关键词

创伤; 创伤后应激障碍; 解离; 解离亚型; 患病率; 合并症

HIGHLIGHTS

- About one-third of PTSD patients in a clinical cohort were diagnosed as d-PTSD.
- d-PTSD group was younger and had severe PTSD symptoms and more psychiatric comorbidities.
- Rates of d-PTSD may be higher when the diagnoses were made with clinical interviews.

韩国—创伤诊所中创伤后应激障碍解离亚型的患病率和临床相关性

背景：关于创伤后应激障碍解离亚型（d-PTSD）的早先研究依赖于专门的统计学方法（即剖面或类别分析）进行诊断，而不是临床医生可用的临床评分。

目的：本研究调查了在韩国一家专门的创伤诊所接受DSM-IV PTSD患者中经过半结构化访谈诊断为d-PTSD的患病率和协变量。

方法：考察249例平民创伤后应激障碍患者的数据，包括人口统计学，临床变量，临床总体水平（CGI）量表和临床医师使用的创伤后应激障碍量表（CAPS-IV）。我们根据CAPS的附加解离症状题目将d-PTSD定义为出现人格解体或现实解体。约三分之一（ $n = 82$, 32.9%）的患者被指定为患有d-PTSD。

结果：与其他创伤后应激障碍患者相比，那些患有d-PTSD的患者更年轻，PTSD症状更严重，人际创伤更频繁，合并症更多。当这些变量及其交互作用进入逻辑回归模型时，年龄较小严重创伤后应激障碍症状和存在两种或更多共病症状保留在最终模型中。我们没有发现两组病人在治疗过程中的改善有显著差异。

结论：本研究强调了临床人群中d-PTSD的高患病率。d-PTSD的相关特征与欧美文献中报道的相似。还需要进一步研究以更好地了解d-PTSD的机制和治疗方案。

1. Introduction

Posttraumatic stress disorder (PTSD) with persistent or recurrent depersonalization or derealization is known as dissociative PTSD (d-PTSD). D-PTSD has been added to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), 33 years after the first appearance of PTSD in the formal psychiatric nomenclature (American Psychiatric Association, 2013). The decision to include d-PTSD in the manual had stemmed from accumulated research on neuroimaging, symptom patterns, and treatment response in individuals who display severe PTSD and coinciding prominent dissociative symptoms.

First, functional magnetic resonance imaging (fMRI) studies have consistently reported over-modulation of cortico-limbic areas (i.e. increased activation of the medial prefrontal cortex and excessive inhibition in limbic regions) in response to traumatic stimuli in individual patients with PTSD accompanied by derealization or depersonalization. These findings contrast with those from patients with PTSD with re-experience and hyperarousal, who show undermodulation (Lanius, Brand, Vermetten, Frewen, & Spiegel, 2012). More recently, different functional connectivity in cerebellar and supra-marginal gyral pathways were noted between PTSD and d-PTSD (Rabellino, Densmore, Théberge, McKinnon, & Lanius, 2018; Terpou et al., 2018). Second, evidence for a subgroup of individuals with PTSD demonstrating increased levels of PTSD and dissociative symptoms has been steadily obtained from studies using latent profile analysis (LPA) or latent class analysis (LCA), although consistent psychosocial correlates of d-PTSD were not observed (Hansen, Ross, & Armour, 2017). For example, a history of childhood abuse has been addressed as a major cause of d-PTSD but mixed results were also shown (Müllerová, Hansen, Contractor, Elhai, & Armour, 2016). Finally, it has been suggested that these individuals need phased treatments emphasizing stabilization and affect regulation because of their different

response to conventional exposure-based psychotherapy (Lanius et al., 2010).

The prevalence of d-PTSD has been reported to range from 12% to 30% in those with adult PTSD depending on the sample surveyed, measurement method applied, and definition of dissociative symptoms used. Namely, d-PTSD has a reported prevalence of 25% in those with childhood abuse-related PTSD (Steuwe, Lanius, & Frewen, 2012); 12% of military veterans with PTSD (Wolf et al., 2012b); 15% of male combat-related PTSD and 30% of female military personnel with PTSD (Wolf et al., 2012a); and 14.4% of PTSD in the general population across 16 different countries (Stein et al., 2013). Beside these rates obtained from a general or military population, no data is available for civilians seeking psychiatric help. Furthermore, the presence of d-PTSD has been correlated with multiple lifetime traumas including childhood adversities, increased psychiatric comorbidity, suicidality, and functional impairment (Stein et al., 2013).

Previous literature on treatment response of evidence-based trauma-focused psychotherapies to d-PTSD showed mixed results. A recent study demonstrated that salient dissociative symptoms (i.e. derealization and depersonalization) independently predicted poor response among adults with civilian PTSD (Bae, Kim, & Park, 2016). Other studies have found that although PTSD symptoms improved to lesser degrees, presence of dissociative symptoms or d-PTSD did not interfere with outcomes of psychotherapy (Steinberg, Barry, Sholomskas, & Hall, 2005; Wolf et al., 2017). However, a phase-based approach emphasizing initial stabilization and preparation have been suggested for individuals with complex trauma and dissociation before moving on to exposure-based therapy (Lanius et al., 2012). Thus, early detection of d-PTSD in traumatized individuals can provide benefits for subsequent treatment planning and management.

Previous studies have relied exclusively on LPA or LCA for typologically delineating a subgroup (i.e. latent class) of patients corresponding to d-PTSD. While these methods serve to improve the discriminant validity of d-PTSD diagnosis, clinical diagnosis of d-PTSD using the well-established Clinician-Administered PTSD Scale (CAPS) (Blake et al., 1995) seems to be a practical and alternative choice for clinicians. To date, only one self-report measure for d-PTSD has undergone an initial psychometric examination (Wolf et al., 2017) and the other one adding two items of depersonalization and derealization to the PTSD Checklist for DSM-5 has been used but its psychometric properties were not reported (Frewen, Brown, Steuwe, & Lanius, 2015). But several studies including Stein et al. (2013) have reported the prevalence of d-PTSD according to established PTSD measures that include depersonalization and derealization. There is also a lack of cross-cultural support for d-PTSD outside Euro-American countries; although a world epidemiological survey has also included countries from Latin America and Asia (Stein et al., 2013), no published data are available from a clinical population from these nations. The present study was there conducted to estimate the prevalence and clinical correlates (e.g. characteristics, symptom patterns and improvement) of d-PTSD, using clinical data from a trauma clinic in South Korea. We hypothesized that a substantial percentage of treatment-seeking patients with PTSD would be diagnosed with d-PTSD using CAPS items, and that they would display severe symptomatology and lesser clinical improvement.

2. Methods

2.1. Subjects

Data were acquired from an outpatient trauma clinic of a university-affiliated general medical hospital in Guri city in South Korea. Participants initially visited the psychiatric department for treatment and attending psychiatrists referred them to the trauma clinic for trauma assessment and treatment. Consecutively assessment and further treatment data were accumulated during 10-year study period (2005–2014). Psychiatrists or staff nurses explained the purpose and process of the assessment for practice and research and obtained written informed consent from all participants. The study was approved by the Institutional Review Board of the Hanyang University Guri Hospital.

Patients were eligible to participate in the study if they (1) had a current diagnosis of PTSD according to the Structured Clinical Interview for DSM-IV Axis I Disorders-Clinician Version (First, Spitzer, Gibbon, & Williams, 1997), (2) were aged 16 to 70 years, and (3) had

no difficulty communicating in Korean. Patients were excluded if they had (1) an intellectual disability, (2) neurological or cognitive diseases, (3) a serious medical condition, or (4) active substance abuse.

The eligible sample included 318 outpatients; of these, 66 patients (20.7%) were excluded because either the CAPS was not performed or results of depersonalization or derealization were missing, and 3 patients (0.9%) were excluded because they had a CAPS score less than 40. This left a final sample of 249 patients (mean age = 38.7 years old, SD = 12.7, 95% CI = 37.1–40.3). Compared to 249 patients included in this study, 69 excluded were not significantly different with regard to their sex, marital status, education, income and global severity (Supplementary Table S1); however, they had less interpersonal trauma ($\chi^2 = 9.29$, $df = 1$, $p < 0.002$) and younger age ($t = -2.22$, $df = 316$, $p = 0.027$). Interpersonal trauma included assaults, sexual violence, childhood abuse, and intimate partner violence; non-interpersonal ones were traffic accidents, other accidents, witnessing death, critical illness, and loss of loved one (Table 1).

2.2. Measurements

2.2.1. The Clinician-Administered PTSD Scale

The CAPS is a semi-structured interview that assess 17 DSM-IV PTSD symptoms and 3 additional dissociative symptoms (decreased awareness, derealization, and depersonalization) (Blake et al., 1995). Instead of three symptom clusters of A (re-experience), B (hyperarousal), and C (avoidance and numbing) in DSM-IV diagnostic criteria of PTSD, we divided the C cluster into avoidance (C1, C2) and numbing (C3–C7), in accordance with changes made to the DSM-5 and research findings that avoidance and numbing are separate phenomena (American Psychiatric Association, 2013; Asmundson, Stapleton, & Taylor, 2004).

In addition to 17 DSM-IV PTSD symptoms, the CAPS measures three dissociative symptoms as associative features; reduced awareness, depersonalization, and derealization. Reduced awareness was excluded because only depersonalization and derealization are operationally defined for d-PTSD in DSM-5 (American Psychiatric Association, 2013) and it is often considered as non-pathological dissociation with low concurrent validity with other dissociative symptoms (i.e. depersonalization and derealization) of d-PTSD (Wolf et al., 2012b).

Depersonalization in the CAPS-IV is defined as ‘feeling outside one’s body, watching oneself as if one is another person’ and derealization as ‘feeling of unreal, very strange, or unfamiliar about things going on around the person’ (Blake et al., 2000). For endorsement of symptom, the rule of four was used for determining the presence of symptoms of PTSD and dissociative symptoms. This stringent scoring

Table 1. Comparison of categorical variables between dissociative and non-dissociative PTSD groups (n = 249).

Characteristics	Dissociative	Non-dissociative (n= 167)	Statistics	p
	(n= 82)	N (%)		
Sex				
Male	29 (35.4)	61 (36.5)	0.032	0.858
Women	53 (64.6)	106 (63.5)		
Marital status ^a				
Married	42 (51.9)	101 (62.0)	4.364	0.225
Divorced/widowed	11 (13.6)	20 (12.2)		
Never married	28 (34.6)	42 (25.8)		
Employment ^a				
Employed	32 (41.0)	59 (37.8)	3.855	0.145
Unemployed	14 (17.9)	46 (29.5)		
Student or housewife	32 (41.0)	51 (32.7)		
Education ^a				
Below high school	13 (16.3)	45 (28.3)	4.473	0.107
High school graduate	44 (55.0)	79 (49.7)		
More than college	23 (28.8)	35 (22.0)		
Annual Income (US dollars) ^a				
<20,000	26 (36.6)	62 (44.6)	2.039	0.564
20,000–39,999	25 (35.2)	49 (35.3)		
40,000–59,999	10 (14.1)	14 (10.1)		
>60,000	10 (14.1)	14 (10.1)		
Trauma types				
Interpersonal	34 (41.5)	45 (26.9)	5.351	0.021
Non-interpersonal	48 (58.5)	122 (73.1)		
Index trauma				
Traffic accidents	39 (47.6)	96 (57.5)	22.335	0.004
Assaults	10 (12.2)	22 (13.2)		
Accidents	4 (4.9)	20 (12.0)		
Childhood abuse	12 (14.6)	10 (6.0)		
Intimate partner violence	6 (7.3)	9 (5.4)		
Sexual violence	6 (7.3)	4 (2.4)		
Witness death	4 (4.9)	0 (0)		
Life-threatening illness	0 (0)	4 (2.4)		
Traumatic loss	1(1.2)	2 (1.2)		
Comorbidity				
None	7 (8.5)	37 (22.2)	13.048	<0.001
One	35 (42.7)	83 (49.7)		
Two or more	40 (48.8)	47 (28.1)		
Comorbid diagnoses ^b				
Major depression	68 (82.9)	107 (64.1)	9.361	0.002
Substance abuse	5 (6.1)	10 (6.0)		
Anxiety disorder	17 (20.7)	25 (15.0)	1.302	0.254
Somatoform disorder	6 (7.3)	13 (7.8)		
Personality disorder	3 (3.7)	8 (4.8)	0.167	0.683
Dissociative disorder	13 (15.9)	4 (2.4)		
OCD	2 (2.4)	5 (3.0)	0.062	0.803
Other	9 (11.0)	17 (10.2)		
Premature termination				
Yes	24 (29.3)	63 (37.7)	1.730	0.188
No	58 (70.7)	104 (62.3)		
Treatment ^a				
Medication only	40 (50.0)	95(61.3)	2.794	0.247
Psychotherapy only	8 (10.0)	13 (8.4)		
Both	32 (40.0)	47 (30.3)		

PTSD: post-traumatic stress disorder, OCD: obsessive compulsive disorder.

^aMissing data: marital status (n = 5, 1 for dissociative), employment (n = 15, 4 dissociative) education (n = 10, 2 dissociative), income (n = 39, 11 dissociative), treatment (n = 4, 2 dissociative).

^bThe numbers of total comorbid diagnoses exceed original sample size due to multiplicity.

method requires the sum of frequency and severity scores to be four or more and the symptom is regarded to be existent (Weathers, Ruscio, & Keane, 1999). Likewise, the diagnosis of d-PTSD was given when either derealization or depersonalization scores are in the range of 4 to 8.

2.2.2. Clinical Global Impression scale

The Clinical Global Impression (CGI) scale is a brief clinician-rating scale with three items, as follows: illness severity (CGI-S), global improvement or change (CGI-C), and therapeutic response (including adverse

effects of medication) (Busner & Targum, 2007). The CGI-S is rated from 1 (normal) to 7 (the most severely ill) and the CGI-C from 1 (very much improved) to 7 (very much worse). In this study, the clinician-in-charge rated CGI-S at routine initial assessment according to the guideline involving distress and influence of symptom, level of functioning, and need for medication or hospitalization (Busner & Targum, 2007). And for CGI-C was assessed by the same clinician after the last visit after any forms of treatment (pharmacotherapy, psychotherapy, or both) were given.

2.2.3. Symptom Checklist-90-Revised

The Symptom Checklist-90-Revised (SCL-90-R) is a 90-item self-report that measures a broad range of psychological symptoms (Derogatis, Rickels, & Rock, 1976). The SCL-90-R categorizes symptoms into nine clinical sub-scales (Somatization, Obsessive-Compulsivity, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, and Psychoticism) and three global indices including Global Severity Index (GSI), Positive Symptom Distress Index (PSDI) and Positive Symptom Total (PST). The SCL-90-R is rated on a 5-point Likert Scale from 1 (not at all) to 5 (extremely often). All the subscale raw scores were converted to standard T-scores using the norm group according to a large-scale standardization study in Korea (Kim & Kim, 1984).

2.3. Analysis

Chi-square and independent t-tests were used to compare d-PTSD and non-dissociative type PTSD results. Logistic regression analysis was conducted using the significant variables that were identified by the between-group comparison to establish a predictive model for characteristic features of d-PTSD. We used SPSS (Statistical Package for Social Science) version 21 for Windows for all data analyses and statistical significance was defined as $\alpha = 0.05$ (two-tailed).

3. Results

3.1. Characteristics of the sample

Among final sample of 249 participants with PTSD, the following demographic profiles predominated: women ($n = 159$, 63.9%), married ($n = 143$, 58.6%), high-school education or more ($n = 181$, 75.7%), working or students/housewives ($n = 174$, 74.4%), and an annual income less than 40,000 US dollars ($n = 162$, 77.1%).

The most common comorbid diagnosis was major depressive disorder ($n = 175$, 70.3%), followed by anxiety disorder ($n = 42$, 16.9%), somatoform disorder ($n = 19$, 7.6%), dissociative disorder ($n = 17$, 6.8%), substance use disorder ($n = 15$, 6.0%), and personality disorder ($n = 11$, 4.4%). Most participants ($n = 205$, 82.3%) had one or more comorbid psychiatric conditions. Motor vehicle accidents were the most common index trauma ($n = 135$, 54.2%), followed by assault ($n = 32$, 12.9%), other accidents ($n = 24$, 9.6%), childhood abuse ($n = 22$, 8.8%), intimate partner violence ($n = 15$, 6.0%), and sexual violence ($n = 10$, 4.0%).

About a third of participants ($n = 87$, 34.9%) prematurely terminated the treatment, which was defined as leaving the treatment 12 weeks before the advised treatment duration. Of the 235 patients who received treatment, 57.4% ($n = 135$) received pharmacotherapy alone, 8.9% ($n = 21$) trauma-focused

psychotherapy alone, and remaining 33.6% ($n = 79$) both treatments. Pharmacotherapy included psychotropic medications: antidepressants in all cases, often with anti-anxiety drugs and sometimes with mood stabilizers or antipsychotics.

3.2. Prevalence of d-PTSD

When d-PTSD was defined as the presence of either depersonalization or derealization (CAPS score = 4 or more), its prevalence was 32.9% (82/249).

3.3. Dissociative vs. non-dissociative PTSD

Between-group comparisons are shown in Tables 1 and 2. Individuals with d-PTSD had a significantly higher number of comorbid psychiatric disorders, particularly comorbid depressive disorder and dissociative disorder. The d-PTSD group was also younger (*Mean* 35.1 (*SD* = 11.1) vs. 40.4 (13.1), $t = -3.15$, $df = 248$, $p = 0.002$) and had more frequent interpersonal trauma (41.5% vs. 26.9%, $\chi^2 = 5.35$, $p = 0.021$) than those with non-dissociative PTSD.

Additionally, the total scores of the CAPS and all other subscale scores except avoidance (i.e. re-experience, hyperarousal and numbing) were significantly higher in the d-PTSD group. Likewise, global severity (CGI-S) was initially higher in the d-PTSD group but changed over the treatment (CGI-C) was not significantly different between two groups.

3.4. Multivariate analysis

We tested multivariate models by binary logistic regression analysis (forward enter method) drawing upon the results presented in Tables 1 and 2. Entered variables were age, interpersonal trauma, two or more comorbidities, total PTSD scores, and age x interpersonal trauma, total PTSD scores x two or more comorbidities. The final model that best distinguished the d-PTSD was a younger age ($OR = .962$, $p = 0.002$), total PTSD scores ($OR = 1.043$, $p < .001$) and two or more comorbidities compared to none or one ($OR = 1.835$, $p = 0.045$) (Table 3).

4. Discussion

The initial aim of the present study was to examine the prevalence of d-PTSD using CAPS items of derealization and depersonalization in a sample of treatment-seeking civilian PTSD. Second, we aimed to explore sociodemographic or clinical covariates drawn from univariate comparison analyses that best differentiate between d-PTSD and non-dissociative PTSD. About one-third of the sample was categorized as having d-PTSD. Compared to the non-dissociative group, they were younger, had more

Table 2. Comparison of continuous variables dissociative and non-dissociative PTSD groups (n = 249).

Characteristics	Dissociative (n= 82)		Non-dissociative (n= 167)		Statistics	
	Mean	SD	Mean	SD	T or U	p
Age (years)	35.1	11.1	40.4	13.1	-3.150	.002
CGI-S ^a	5.2	1.1	4.5	.9	9327.5	<.001
CGI-C ^{a,b}	2.9	.8	3.0	.8	5074.5	.383
SCL-90-R ^b						
Somatization	71.1	13.9	67.2	14.9	1.774	.078
Obsessive-compulsivity	66.9	12.3	64.0	13.3	1.532	.127
Interpersonal sensitivity	68.0	14.5	63.9	15.6	1.832	.068
Depression	71.6	11.9	67.2	14.2	2.179	.030
Anxiety	75.3	13.7	69.9	14.5	2.547	.012
Hostility	70.4	14.3	65.2	16.1	2.230	.027
Phobia	82.1	19.9	75.1	20.8	2.279	.024
Paranoia	66.3	17.1	64.1	16.5	.898	.370
Psychoticism	69.5	15.2	64.6	16.5	2.045	.042
GSI	75.1	14.2	69.7	15.9	2.355	.019
PSDI	71.0	13.7	66.9	14.8	1.915	.057
PST	70.4	19.5	71.9	56.7	-2.07	.836
CAPS						
Total score	78.8	17.0	67.6	15.6	5.176	<.001
Reexperience	23.3	7.0	19.6	6.7	4.039	<.001
Avoidance ^a	10.3	3.9	10.0	3.6	0.502	.616
Numbing	19.9	7.5	16.1	7.0	4.013	<.001
Hyperarousal	24.2	6.9	21.6	6.9	2.780	.006

PTSD: post-traumatic stress disorder, CGI-S: Clinical Global Impression scale – Severity, CGI-C: Clinical Global Impression scale – Change, SCL-90-R: Symptom Checklist-90-Revised, GSI: General Severity Index, PSDI: Positive Symptom Distress Index, PST: Positive Symptom Total, CAPS: Clinician-Administered PTSD Scale.

^aBy Mann-Whitney U test due to violation of normal distribution.

^bMissing data: CGI-C (n = 29, 7 for dissociative), SCL-90-R (n = 39, 16 dissociative).

Table 3. Binary logistic regression analysis of dissociative vs. non-dissociative PTSD.

Explanatory variables ^a	β	p	Odds ratio	95% CI
Age	-.039	.002	.962	.939–.986
PTSD symptoms ^b	.042	<.001	1.043	1.024–1.062
Two or more comorbidities ^c	.607	.045	1.835	1.014–3.320
Constant	-2.580	.001	.076	

PTSD: post-traumatic stress disorder.

^aAdministered by Enter method (standard regression analysis).

^bTotal score of the Clinician-Administered PTSD scale.

^cvs. none or one.

Excluded variables and interactions were interpersonal trauma, age \times interpersonal trauma, and PTSD symptoms \times two or more comorbidities.

severe PTSD symptoms, and a higher prevalence of psychiatric comorbidity. However, the d-PTSD group had a similar overall response to treatment.

In accordance with our hypothesis, we found a higher rate of d-PTSD than has been reported by previous studies using LPA or LCA. Indeed, the 33% reported in our study is even higher than the highest prevalence reported in the literature, which is 25% in mostly female and childhood abuse-related civilians with PTSD (Steuwe et al., 2012) and 30% in military women with PTSD (Wolf et al., 2012a). It is noteworthy that excluded subjects in our study due to lack of the CAPS assessment had younger age (a predictor variable of d-PTSD). This may suggest that even higher prevalence may have been yielded if they were included.

On the other hand, comparison with the prevalence rates reported from previous studies is inappropriate because they analysed the samples from

community, veterans' medical centres, and participants for PTSD research unlike our sample that represents treatment-seeking psychiatric patients. Higher prevalence of d-PTSD may be due to overrepresentation of more severe and complex cases in our sample.

In a clinical environment in which clinicians rely exclusively on symptom ratings and often confront with individuals with high levels of symptomatology, d-PTSD may be more often encountered. This high prevalence may be in part due to assessment period, that is, the initial stage of treatment-seeking (usually within 1 week after the first visit), which is when symptoms are presumed to be maximal. Although dissociation is recognized as a trait phenomenon itself (Carlson & Putnam, 1993), studies have reported that dissociative symptoms decrease over after treatment (Bae et al., 2016; Steinberg et al., 2005; Wolf et al., 2017). Thus, assessment at the initial stage of illness may inflate the recorded rate

of d-PTSD. Additional research should be conducted to investigate longitudinal changes in d-PTSD status and the severity of depersonalization and derealization symptoms (i.e. temporal stability and consistency of d-PTSD diagnosis and dissociative symptoms).

We further hypothesized that patients with d-PTSD would show more severe symptomatology, including PTSD symptoms. Accordingly, all PTSD symptom clusters except avoidance were elevated in the d-PTSD group. This is comparable to the psychometric studies on d-PTSD in which both high PTSD symptoms and dissociative symptoms were the most prominent and consistent findings in patients with d-PTSD (Lanius et al., 2014). Interestingly, the lack of an association with avoidance has not been reported in the literature, probably because statistical methods used in previous studies do not allow further subgroup analyses according to symptom clusters. Our finding of no correlation between avoidance and dissociation has important theoretical and treatment implications. It was previously thought that dissociation interferes with exposure therapy by avoiding engagement to traumatic memory (Foa et al., 1999). Our finding that symptoms of avoidance were not higher in d-PTSD than non-dissociative PTSD group contradicted this long-held belief. Furthermore, it is in favour of the cognitive-sensory disintegration model of dissociation, whereby dissociation is considered to be a biopsychological trait-like phenomenon rather than an adopted coping strategy of avoiding trauma-related materials (Dutra & Wolf, 2017).

Other psychological symptoms such as anxiety, depression, phobia, and psychoticism were higher in the d-PTSD group, along with overall symptom severities according to both clinical rating (CGI) and self-report (GSI) measures. Previous studies have yielded inconsistent results concerning depression and anxiety as symptomatic correlates of d-PTSD. Interestingly, studies that have reported significant associations of depression and anxiety with d-PTSD were those that have used subscale measures of depression and anxiety derived from more general psychopathology instruments as in our study (e.g. the Trauma Symptom Checklist) (Armour, Elklit, Lauterbach, & Elhai, 2014a; Blevins, Weathers, & Witte, 2014), meanwhile a study that administered more specific and psychometrically validated scales (e.g. the Beck Anxiety Inventory and the Hamilton Depression Rating Scale) have found no such association (Armour, Karstoft, & Richardson, 2014b). Thus, higher subscale scores may reflect increased general distress than specific increased depressive or anxiety symptoms. This speculation is further supported by increased GSI and CGI scores, which represent overall severity and distress of respondents. Second, association with anxiety, depression, phobia, and

psychoticism in d-PTSD group can be explained by increased comorbidity of d-PTSD. A Canadian study noted major depressive disorder and specific phobia was significantly more common in civilians with d-PTSD (Steuwe et al., 2012). In our study, two or more comorbidities predicted d-PTSD in multivariate analysis and major depressive disorder and dissociative disorder were more common in d-PTSD group in between-group comparison. In similar vein, one study showed that patients with dissociative disorder have increased the severity of symptoms across all of the SCL-90 subscales (Steinberg et al., 2005).

We also identified younger age to be predictive of d-PTSD. This conflicts with a study that reported old age as a risk factor for d-PTSD (Wolf et al., 2017). However, the vast difference between that study and our own, in terms of both sample characteristics (male veterans and only 3% with PTSD) and methodology (measurements of dissociation, online survey and latent profile analysis) makes it impossible to meaningfully compare the results. In this study, even after controlling for interaction with interpersonal trauma, young age still remained in the final model that best distinguishes d-PTSD from non-dissociative PTSD. Young age may contain other covariates not measured, such as early onset of illness, complex trauma or adverse childhood experiences, poor psychosocial adaptation, and severity of symptoms other than those of PTSD. In similar context, Stein et al. (2013) found that age of onset of PTSD before 12 and childhood adversities significantly predicted d-PTSD.

Although only a brief impression scale (CGI-C) was used to assess symptomatic improvement after the therapy, we found no difference in the change over time between d-PTSD and non-dissociative PTSD. This finding is in line with the notion that dissociation does not interfere with treatment outcome (Dutra & Wolf, 2017); similarly, two recent studies found no difference in the response to either prolonged exposure therapy or conventional psychotherapy between patients with d-PTSD and those with non-dissociative PTSD (Haagen, van Rijn, Knipscheer, van der Aa, & Kleber, 2018; Wolf, Lunney, & Schnurr, 2016). If this is the case, the current consensus and clinical guidelines for complex PTSD and dissociative disorders do not necessarily apply to d-PTSD. The phased approach is more focused on stabilization before the initiation of exposure-based memory processing (Cloitre et al., 2011).

Contrasting views exist regarding the poor treatment outcomes of patients with d-PTSD. Some studies showed different results that dissociation predicted less response to treatment provided for PTSD (Bae et al., 2016; Cloitre, Petkova, Wang, & Lu, 2012; Resick, Suvak, Johnides, Mitchell, & Iverson, 2012). In addition, it is far more complicated

if the types of treatment are taken into account. Indeed, one study found that the treatment response of patients with d-PTSD differed between patients receiving antidepressant and those treated with prolonged exposure, the latter being more responsive than the former (Burton, Feeny, Connell, & Zoellner, 2018).

The improvement of CGI from initial baseline assessment reported in this study should be treated with caution considering that one-third of our participants prematurely terminated treatment. Thus, decision on treatment response may not guarantee the adequate treatment period and dose of treatment (dose of medication or number of psychotherapy sessions). Also, about a half of the patients only received medication with supportive care, which is not considered as a first-line treatment for PTSD (Forbes et al., 2010). Furthermore, we did not consider the severity and persistence of dissociative symptoms but measured only the dichotomous presence or non-presence of dissociation. Thus, our findings concerning treatment implications require further clarification and replication in studies that control the amount and type of dissociative symptoms; this will allow further insights on treatment response in patients with d-PTSD to be made. Future prospective studies that investigate the longitudinal course of d-PTSD and dissociative symptoms in both general and clinical populations are also warranted, as are those that examine specific treatment outcome after established standard care including trauma-focused psychotherapy.

D-PTSD appears to be a universal condition. Indeed, a recent systematic review examining the literature on d-PTSD found that ethnicity was not a risk factor (Hansen et al., 2017). In addition to a worldwide survey on the general population in 16 countries (Stein et al., 2013), our study supports implication that d-PTSD exists in clinical populations outside Euro-American nations.

Several limitations should be noted. First, this study is based on accumulated cohort data collected at a single centre, university-affiliated hospital, with accident survivors comprising two-thirds of the sample; thus, this sample may over-represent those suffering from a single trauma of a non-interpersonal nature. This limits generalizing our findings to more severely and chronically traumatized individuals more often seen in clinical settings.

Second, the assessment tools used were those of previous versions (DSM-IV) due to the long study period and the lack of validated DSM-5 instruments in Korean language at the time of investigation. Third, the improvement after treatment was assessed using rather simple assessments of treatment response (i.e. the CGI-S) not blinded to treatment conditions. This calls for caution in interpreting and

generalizing the finding due to potential low reliability of this rating method.

Fourth, this study did not use validated measures such as the Dissociative Experiences Scale (Bernstein & Putnam, 1986) and the Childhood Trauma Questionnaire (Bernstein et al., 2003) to delineate dissociative symptoms and childhood trauma experiences.

Subsequent studies are needed to address these limitations including multicenter data collection using DSM-5 PTSD instruments and more detailed assessments of treatment response and the long-term course of illness.

Given the high rates of d-PTSD in real-life clinical settings reported, our study highlights the urgent need to establish better diagnoses and management options for patients with d-PTSD. For initial diagnosis of d-PTSD, depersonalization and derealization items in the CAPS will serve its purpose until the valid screening tools are developed and tested. Although phased approach for complex trauma and dissociative disorders were suggested in the literature (Cloitre et al., 2011), further study is needed to establish which psychotherapy and psychotropic medication work best for d-PTSD and it is also important whether some of d-PTSD patients have tendency to exacerbate of symptoms during exposure therapy.

Furthermore, future research should investigate mechanisms and pathophysiology of d-PTSD at genetic, neuroimaging, and cognitive science levels. For example, d-PTSD and non-dissociative PTSD may represent two different conditions, that is, two opposite neurophysiological reactions to a traumatic stimulus that are currently defined under the umbrella diagnosis of PTSD. To date, we know that non-dissociative PTSD is associated with increased activity in limbic areas and a decreased response in the medial prefrontal cortex. Thus, current conventional treatments target overcoming this exaggerated fear response in the amygdala and related structures, and subsequent activating prefrontal areas. Treatment that works best for d-PTSD may be quite different as neuroimaging studies suggest the quite opposite response to trauma in patients with d-PTSD (Lanius et al., 2012, 2010).

5. Conclusion

Using a rating scale with derealization and depersonalization items, we found a high prevalence of d-PTSD in a clinical population, which suggests that the actual rate of d-PTSD may be higher than those previously reported by studies using latent profile or class analyses. The features of d-PTSD, i.e. severe PTSD symptoms and increased psychiatric comorbidity, were similar to those reported in the Euro-American; d-PTSD is a common and universal subtype of trauma reaction,

and future work should aim to develop treatment strategies that are specifically tailored to d-PTSD.

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