



## Prevalence and comorbidity of the ICD-11 and DSM-5 for PTSD caseness with previous diagnostic manuals among the Japanese population

Misari Oe <sup>a</sup>, Masaya Ito <sup>b</sup>, Yoshitake Takebayashi <sup>b,c</sup>, Akiko Katayanagi <sup>b</sup> and Masaru Horikoshi <sup>b</sup>

<sup>a</sup>Department of Neuropsychiatry, Kurume University School of Medicine, Kurume, Japan; <sup>b</sup>National Center for Cognitive Behavior Therapy and Research, National Center of Neurology and Psychiatry, Tokyo, Japan; <sup>c</sup>Department of Health Risk Communication, School of Medicine, Fukushima Medical University, Fukushima, Japan

### ABSTRACT

**Background:** The diagnostic criteria for posttraumatic stress disorder (PTSD) differ between DSM-5 and ICD-11, which may affect the estimation of prevalence.

**Objective:** To investigate the concordance of ICD-11 and DSM-5, as compared to ICD-10 and DSM-IV, regarding PTSD caseness among Japanese people who had experienced different potentially traumatic events. In addition, we estimated the comorbidity with major depressive disorder and generalized anxiety disorder according to these four diagnostic manuals.

**Method:** A web-based survey ( $n = 6,180$ ) was conducted from November 2016 to March 2017. Participants completed the PTSD Checklist for DSM-5, and other standardized measures of PTSD, depression, and anxiety.

**Results:** The prevalence of PTSD caseness according to ICD-11 was significantly lower as compared to DSM-IV, DSM-5, and ICD-10. Cohen's kappa between DSM-5 and ICD-11 was 0.79, indicating substantial agreement. Comorbidity with depression was significantly higher in unique DSM-5 cases than in unique ICD-11 cases. Unique DSM-5 PTSD cases were significantly stronger functionally impaired than unique ICD-11 PTSD cases.

**Conclusions:** Although requiring fewer items, the ICD-11 showed substantial agreement with DSM-5 regarding PTSD caseness. The lower comorbidity rates in unique cases may support the concept of the ICD-11 which intends to reduce comorbidity by identifying the core elements of PTSD.

### Prevalencia y comorbilidad para la casuística de tept según la CIE-11 y DSM-5 con manuales diagnósticos previos entre la población japonesa

**Antecedentes:** Los criterios diagnósticos para trastorno de estrés postraumático (TEPT) difieren entre el DSM-5 y la CIE-11, lo cual puede afectar la estimación de prevalencia.

**Objetivo:** Investigar la concordancia de la CIE-11 y DSM-5, comparada con la CIE-10 y DSM-IV, en relación a la casuística de TEPT entre la población japonesa que ha experimentado diferentes eventos potencialmente traumáticos. Además, estimamos la comorbilidad con el trastorno depresivo mayor y el trastorno de ansiedad generalizada según estos cuatro manuales diagnósticos.

**Método:** Se condujo una encuesta basada en la web ( $n = 6.180$ ) entre Noviembre del 2016 y Marzo del 2017. Los participantes completaron la Lista de verificación de TEPT según el DSM-5, y otras mediciones estandarizadas para TEPT, depresión y ansiedad.

**Resultados:** La prevalencia de casuística de TEPT según la CIE-11 fue significativamente menor comparada con el DSM-IV, DSM-5 y CIE-10. La kappa de Cohen entre el DSM-5 y CIE-11 fue de 0.79, lo que indica un acuerdo sustancial. La comorbilidad con depresión fue significativamente mayor en casos únicos del DSM-5 que en casos únicos de la CIE-11. Los casos únicos de TEPT según el DSM-5 tuvieron una discapacidad funcional significativamente más fuerte que los casos únicos de TEPT según la CIE-11.

**Conclusiones:** Aunque la CIE-11 requiere menos ítems, mostró un acuerdo sustancial con el DSM-5 en relación a la casuística de TEPT. Las tasas más bajas de comorbilidad en los casos únicos pueden respaldar el concepto de la CIE-11 que tiene la intención de reducir la comorbilidad mediante la identificación de los elementos centrales del TEPT.

### 在日本人群中根据以前诊断手册的PTSD病案中根据ICD-11和DSM-5的流行率和共病率

背景: DSM-5和ICD-11对于创伤后应激障碍 (PTSD) 的诊断标准不同, 这可能会影响流行率的估计。

目标: 在经历了不同潜在在创伤事件的日本人中, 考查ICD-11和DSM-5与ICD-10和DSM-IV相比, PTSD病案率的一致性。此外, 根据这四种诊断手册, 我们估计了与重度抑郁障碍和广泛性焦虑障碍的共病率。

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### 关键词

创伤后应激障碍; DSM-5; ICD-11; 共病; 抑郁; 焦虑

### HIGHLIGHTS

- We compared the prevalence of PTSD caseness in Japan using four different diagnostic manuals.
- The lower prevalence of PTSD caseness was observed in ICD-11.
- ICD-11 showed substantial agreement with DSM-5 regarding PTSD caseness.

方法: 在2016年11月至2017年3月期间进行了网络调查 ( $n = 6,180$ )。参与者完成了DSM-5的PTSD检查表, 以及对PTSD, 抑郁和焦虑的其他标准化测量。

结果: 与DSM-IV, DSM-5和ICD-10相比, 根据ICD-11的PTSD病案患病率明显降低。DSM-5和ICD-11之间的Cohen's kappa系数为0.79, 表明了实质性一致。仅为DSM-5的病例中与抑郁症的共病率明显高于仅为ICD-11的病例。仅为DSM-5 PTSD的病例比仅为ICD-11 PTSD的病例在功能受损方面更明显。

结论: 尽管所需条目更少, 但ICD-11在PTSD病案率上与DSM-5表现出了实质上的一致性。在单独病例中较低的共病发生率可能支持ICD-11旨在通过确定PTSD的核心要素来降低共病率的理念。

## 1. Introduction

The final version of the 11<sup>th</sup> revision of the International Classification of Diseases (ICD-11) was made public in 2018 (World Health Organization, 2018). The ICD-11 diagnostic criteria for Posttraumatic Stress Disorder (PTSD) share some commonalities with the Diagnostic and Statistical Manual for Mental Disorders 5th edition (DSM-5). For example, on both systems, PTSD belongs to an independent category from anxiety disorders, and has the similar definition of functional impairments. However, the basic concepts of these two diagnosis systems are substantially different (Friedman, 2013; Kilpatrick, 2013; Maercker et al., 2013). In contrast to the broader approach of DSM-5 that includes 20 different yet clinically significant symptoms, the ICD-11 diagnosis provides a less specific description for traumatic stressors (Kilpatrick, 2013), limits the core symptoms of PTSD, and removes the non-specific symptoms that are comorbid with other disorders to improve the diagnostic utility and decrease psychiatric comorbidity (that is, enhance the discriminant validity) (Maercker et al., 2013). The concurrent existence of two diagnostic criteria presents a major challenge in the trauma field and may result in confusion among patients, clinicians, researchers, and other stakeholders.

A few studies have directly compared these two diagnostic systems, yielding mixed results. According to a review by Brewin et al. (2017), the DSM-5 tends to be associated with a higher PTSD prevalence than the ICD-11 (Hafstad, Thoresen, Wentzel-Larsen, Maercker, & Dyb, 2017; Hyland et al., 2016; O'Donnell et al., 2014; Tay, Rees, Chen, Kareth, & Silove, 2015; Walton et al., 2017; Wisco et al., 2016), with the exception of one study that showed a similar prevalence (Stein et al., 2014) and one that showed contradictory results (Danzi & La Greca, 2016). However, these previous studies had problems, as they used DSM-based measures to estimate ICD-11 symptoms and diagnostic algorithms. Some recent studies have used validated measures of both constructs (Hansen et al., 2017; Shevlin et al., 2018); namely, the PTSD Checklist for DSM-5 (PCL-5) (Weathers et al., 2013) and the International Trauma Questionnaire (ITQ) (Cloitre et al., 2018). A study by Hansen et al. (2017) found that diagnostic rates of PTSD were significantly lower according to

ICD-11 as compared to DSM-5 criteria in the university sample, but no significant differences were found for chronic pain patients and military personnel. A study of internally displaced persons in Ukraine (Shevlin et al., 2018) showed a higher prevalence of PTSD identified by DSM-5 than by ICD-11. Only a few studies have directly compared the four sets of diagnostic criteria used in recent years (i.e. DSM-IV, DSM-5, ICD-10, and ICD-11) (Kuester et al., 2017; O'Donnell et al., 2014; Stein et al., 2014).

Regarding comorbidity of PTSD with other psychiatric disorders such as major depressive disorder and generalized anxiety disorder, two types of studies have been reported. In the first type, a comparison was conducted only between PTSD cases of each ICD/DSM diagnosis (e.g. ICD-11 and DSM-5) (Green et al., 2017; Hyland et al., 2016; O'Donnell et al., 2014). In the second type of studies, a comparison was conducted also between 'unique' cases of PTSD, meaning cases who only fulfilled either ICD or DSM diagnostic criteria of PTSD but not both (La Greca, Danzi, & Chan, 2017; Morina, van Emmerik, Andrews, & Brewin, 2014; Shevlin et al., 2018; Stammel, Abbing, Heeke, & Knaevelsrud, 2015; Wisco et al., 2017, 2016). The advantages of using unique cases are that it can avoid overlap and may also reduce the influence of complex PTSD diagnosis of ICD-11, which seems to have higher levels of functional impairment than ICD-11 PTSD. Regarding major depressive disorder, all studies that compared unique cases of ICD-11 with DSM-IV showed lower comorbidity in ICD-11 than in DSM-IV (Morina et al., 2014; Stammel et al., 2015; Wisco et al., 2016). Results comparing comorbidity with major depressive disorder in unique ICD-11 cases and unique DSM-5 cases are inconsistent; two studies showed lower comorbidity in unique ICD-11 cases (La Greca et al., 2017; Shevlin et al., 2018), but one study led to contrary results (Wisco et al., 2017). Concerning generalized anxiety disorder, there are no consistent results between unique ICD-11 cases and both unique DSM-IV (Morina et al., 2014; Stammel et al., 2015; Wisco et al., 2016) or unique DSM-5 (La Greca et al., 2017; Shevlin et al., 2018) cases.

In this study, we aimed to investigate the concordance between ICD-11, DSM-5, ICD-10 and DSM-IV with regard to PTSD caseness. In addition, we aimed

to compare the proportions of comorbidity with depression and anxiety. We hypothesized that 1) DSM-5 would yield higher prevalence of PTSD caseness than ICD-11, and 2) there would be no differences for comorbidity with depression and anxiety across the four diagnostic manuals. We also examined differences between unique cases of PTSD for DSM-5 and unique cases for ICD-11.

## 2. Methods

### 2.1. Procedures and participants

This study was part of a web-based survey (Ito, Takebayashi, Suzuki, & Horikoshi, 2019) using the panellist pool constructed by Macromill, Inc, which is the largest survey company in Japan. The number of 1,182,255 survey panellists have registered themselves in order to participate in studies using online surveys. These panellists endorsed themselves as currently or historically treated because of certain medical conditions (e.g. depression and anxiety disorders) in the annual complete survey. Therefore, the original panellist pool was not specifically established for this study.

PTSD ‘caseness’ was established using validated questionnaires for index potentially traumatic experiences and PTSD symptoms (for details, see below in the measures section). General functional impairment was assessed as well. However, we did not use this information for establishing PTSD cases, because it was not specified as a result of traumatic experiences (see also ‘General functional impairment’, ‘Diagnostic procedures of PTSD’ below).

This study included a screening phase and a random-sampling phase. The mean time between screening and random sampling was 5.80 days ( $SD = 5.54$ ; range: 0.17 to 14). Random sampling method was used for the comparison among PTSD caseness according to ICD-11, DSM-5, ICD-10 and DSM-IV. At the screening phase, we asked survey panellists ( $n = 40,000$ , including registered as PTSD ( $n = 1,444$ ), anxiety disorder ( $n = 5,638$ ), depression ( $n = 20,836$ ), neuroticism ( $n = 3,157$ ), and non-clinical ( $n = 8,925$ )) whether they had experienced one or more potentially traumatic event(s) (see below for the definition of potentially traumatic events) that occurred more than one month ago, which was endorsed by 26,548 individuals (66.1% of the selected survey panellists). In addition to the data of the random sampling phase, we used the data of the screening phase for measuring the prevalence of PTSD cases and the concordance between PTSD for DSM-5 and for ICD-11, because only PCL-5 was used at the screening phase.

After the screening, we conducted random sampling for our survey. We aimed to obtain anonymous

data from populations of various symptom levels to minimize the spectrum bias (Ransohoff & Feinstein, 1978). Our target sample size was 6,000 individuals; 3,000 patients with PTSD who met DSM-5 diagnostic criteria, 1,000 nonclinical panellists without any traumatic experience, and 2,000 nonclinical or subclinical panellists with traumatic experiences. Random sampling was used with stratification by gender, age, living area, and personal income to improve the consistency of the census data. All the contents of the survey questionnaires were checked in terms of logical flow, face validity, design, and/or miscellaneous errors by nine clinical psychologists (PhD = 7, MA = 1, BA = 1) and double checked by two survey engineers at Macromill, Inc. All participants were required to read the full explanation of the study and gave consent to participate before completing the questionnaires. The final sample population was 6,180 participants, belonging to three categories: 1) no traumatic experiences ( $n = 1,030$ ); 2) Trauma experienced but no PTSD at screening ( $n = 2,060$ ); 3) DSM-5 PTSD at screening ( $n = 3,090$ ). The sociodemographic characteristics of the survey participants are shown in Table 1.

The institutional review board approved the scientific validity and ethical aspects of this study (NCNP approval number, A2015-086).

**Table 1.** Sociodemographic characteristics of participants.

		<i>n</i>	%	
Sex	Female	3260	52.8	
	Male	2920	47.2	
Age (years)	18–29	653	10.6	
	30–39	1510	24.5	
	40–49	2195	35.6	
	50–59	1346	21.8	
	60–79	466	7.6	
	80–97	10	0.2	
Marital status	Single	3184	51.5	
	Married	2996	48.5	
Children	Childless	3462	56.0	
	Parents	2718	44.0	
Household income (yen, per month)	0–199,999	859	13.9	
	200,000–399,999	1654	26.8	
	400,000–599,999	1190	19.3	
	600,000–799,999	727	11.8	
	800,000–999,999	391	6.3	
	1,000,000 or more	402	6.5	
	Don't know	522	8.4	
	No answer	435	7.0	
	Occupation	Public employee	204	3.3
		Manager, Officer	78	1.3
		Employee (Office worker)	742	12.0
Employee (Engineer)		485	7.8	
Employee (Other worker)		726	11.7	
Self-employed		340	5.5	
Freelancer		184	3.0	
Homemaker		1007	16.3	
Part-time job		1035	16.7	
Student		84	1.4	
Other	380	6.1		
Unemployed	915	14.8		

### 3. Measures

#### 3.1. Traumatic events

In this study, the same list of potentially traumatic events was used for all four diagnostic manuals. We used the PTSD module of the World Health Organization Composite International Diagnostic Interview, version 3.0 (WHO-CIDI) (Kessler & Ustun, 2004) to assess the experience of potentially traumatic events. We did not include the item regarding purported violence towards others or homicide to comply with the ethical committee's requirements. A total of 25 items were answered using four anchors to discriminate between acute vs. lifetime, and single vs. multiple experiences of the event: 0, never experienced; 1, experienced within one-month; 2, experienced once, but not within the previous month; and 3, experienced twice or more before one-month. We assessed potentially traumatic events using the question 'The following list describes events that exposed you to actual or threatened serious injury or sexual violence, or to real or perceived danger of death. If you have experienced multiple events for the same item, please answer the item with reference to the worst event among them.' Then, participants chose the index traumatic experience from which to respond to the PTSD Checklist-5 (PCL-5) (Weathers et al., 2013) and other PTSD-related measures at screening, and at the time of survey. At random sampling phase, both PCL-5 and the Post-Traumatic Checklist Scale (PCL-S) were administered for PTSD symptoms.

The types of traumatic experiences among those who met criteria for DSM-5 PTSD were as follows: physical violence = 30.68% ( $n = 948$ ), accidents = 26.54% ( $n = 820$ ), network events such as child with serious illness, traumatic event to loved one, witnessed death/dead body, or saw someone seriously hurt = 14.85% ( $n = 459$ ), unexpected death of loved one = 11.72% ( $n = 362$ ), sexual violence = 9.68% ( $n = 299$ ), war events = 0.91% ( $n = 28$ ), and other experiences = 5.63% ( $n = 174$ ). The types of traumatic experiences among those who did not meet criteria for DSM-5 PTSD were as follows: physical violence = 26.08% ( $n = 479$ ), accidents = 36.25% ( $n = 666$ ), network events such as child with serious illness, traumatic event to loved one, witnessed death/dead body, or saw someone seriously hurt = 15.57% ( $n = 286$ ), unexpected death of loved one = 13.88% ( $n = 255$ ), sexual violence = 5.72% ( $n = 105$ ), war events = 0.54% ( $n = 10$ ), and other experiences = 1.96% ( $n = 36$ ).

#### 3.2. PTSD symptoms

PTSD symptoms were measured by the PCL-5 and PCL-S. The PCL-5 is a 20-item measure for assessing PTSD symptoms as defined by DSM-5 (Weathers

et al., 2013). The 20 items were answered using a 5-point Likert scale (0 = not at all, 4 = extremely). Both high internal consistency ( $\alpha = 0.94$ ) and test-retest reliability ( $r = 0.82$ ) for this measure have been reported (Blevins, Weathers, Davis, Witte, & Domino, 2015). The Japanese version of the PCL-5 developed by Ito et al. (2019) has been found to have satisfactory psychometric properties. Cronbach's alpha for the PCL-5 of the current study was 0.95.

PTSD caseness according to DSM-5 and ICD-11, respectively, was established using the PCL-5 items; each item rated 2 (moderately) or higher was regarded as the existence of a symptom. In DSM-5, a PTSD caseness requires one or more intrusive symptom(s) from items 1–5, one or two avoidance symptom(s) from items 6 and 7, two or more symptoms of negative alterations in cognitions and mood from items 8–14, and two or more symptoms of alterations in arousal and reactivity from items 15–20.

For PTSD caseness according to ICD-11, we included only flashbacks and nightmares as re-experiencing symptoms, i.e. items 2 and 3 of the PCL-5 were used to assess re-experiencing symptoms, of which at least one is required. In addition, one or two avoidance symptoms from items 6 and 7, and one symptom relating to perceptions of heightened current threat from items 17 and 18 are required. Because we did not use questionnaires for symptoms of complex PTSD, we could not separate PTSD from complex PTSD, as individuals can be diagnosed with either one or the other condition but not both (Brewin et al., 2017).

PCL-S, one of the earlier versions of the PCL, is a 17-item measure for assessing PTSD as defined by DSM-IV (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). Items were answered using a 5-point Likert scale (1 = not at all, 5 = extremely). The PCL-S is one of the most widely-used scales with high reliability and validity. We used the PCL-S for the PTSD caseness according to DSM-IV and ICD-10; each item rated 3 (moderately) or higher was regarded as the existence of a symptom. The Japanese version of the PCL-S was developed by Suzuki et al. (2017) and showed moderate diagnostic accuracy (Suzuki et al., 2017). Cronbach's alpha for the PCL-S in the current study was 0.95.

For PTSD caseness according to the DSM-IV, one or more re-experiencing symptoms from items 1–5, three or more persistent avoidance and numbing symptoms from items 6–14, and two or more arousal symptoms from items 15–17 are required. To establish PTSD caseness according to ICD-10, we followed Glück, Knefel, Tran, and Lueger-Schuster (2016) who used items 1–8, and 13–17 of the PCL-S, i.e. one or more remembering or 'reliving' symptoms from items 1–5, one or two actual or preferred avoidance symptoms from items 6 and 7, either the 'inability to

recall' (item 8) or two or more increased psychological sensitivity and arousal symptoms from items 13–17.

### 3.3. Depressive symptoms

Depressive symptoms were measured using the Patient Health Questionnaire, nine-item version (PHQ-9), which scores each of the nine DSM-IV criteria as '0' (not at all) to '3' (nearly every day) (Kroenke, Spitzer, & Williams, 2001). The Japanese version of the PHQ-9 was developed by Muramatsu et al. (2007) and has been used in primary care settings (Inagaki et al., 2013, 2013; Muramatsu et al., 2018). Consistent with previous research (Kroenke et al., 2001), we used the cut-off of 10/11 for comorbidity analysis. Cronbach's alpha for the PHQ-9 in the current study was 0.92.

### 3.4. Anxiety symptoms

Anxiety symptoms were measured using the Generalized Anxiety Disorder-7 (GAD-7) assessment. GAD-7 is a seven-item scale assessing generalized anxiety and has good reliability, as well as criterion, construct, factorial, and procedural validity (Spitzer, Kroenke, Williams, & Löwe, 2006). The Japanese version of the GAD-7 developed by Muramatsu et al. has shown good psychometric properties (Doi, Ito, Takebayashi, Muramatsu, & Horikoshi, 2018). Consistent with previous research (Kroenke, Spitzer, Williams, & Löwe, 2010), we used the cut-off of 10/11 for comorbidity analysis. Cronbach's alpha for the GAD-7 in the current study was 0.92.

### 3.5. General functional impairment

General functional impairment was measured using the Sheehan Disability Scale (SDS) (Sheehan, Harnett-Sheehan, & Raj, 1996). SDS consists of three self-rated items of family, work, and social impairment in the previous week. For each item, 11 potential responses ranging from 0 (not at all), 1–3 (mildly), 4–6 (moderately), 7–9 (markedly), to 10 (extremely) are presented along a continuum graphically represented by a horizontal line. The Japanese version of SDS was developed by Yoshida, Ohtsubo, and Tsuchida (2004). Cronbach's alpha for the SDS in this study was 0.93.

An assessment of functional impairment was required for determining PTSD caseness according to ICD-11, DSM-5, and DSM-IV, but not ICD-10. However, we did not ask participants for their functioning directly derived from their traumatic experiences.

### 3.6. Statistical analysis

To test differences in prevalence of PTSD across the four diagnostic manuals, odds ratios were calculated through exact McNemar's test using exact2by2 package in R (Fay, 2010). Concordances with regard to PTSD caseness were tested using Cohen's kappa (Fleiss, Levin, & Paik, 2013). The kappa coefficient for concordance was interpreted using Fleiss's recommendations (0.40–0.64 = fair, 0.65–0.74 = good,  $\geq 0.75$  = excellent) (Fleiss et al., 2013). Independent pairwise *t*-tests were conducted to examine differences between unique cases for DSM-5 and unique cases for ICD-11 with regard to the severity of concurrent and prospective clinical outcomes (depression and anxiety). The level of significance was set at 0.05.

## 4. Results

### 4.1. Prevalence of PTSD caseness and concordance at the screening phase

Among the trauma-exposed individuals at the screening phase ( $n = 26,548$ ), 24.7% ( $n = 6562$ ) was categorized into DSM-5 PTSD cases, and 19.8% ( $n = 5264$ ) was categorized into ICD-11 PTSD cases. Cohen's kappa between DSM-5 and ICD-11 systems showed substantial agreement ( $\kappa = 0.79$ ).

### 4.2. Prevalence of PTSD caseness

The prevalence of PTSD caseness after random sampling was 45.6% (2,819/6,180) according to DSM-IV, 45.9% (2,839/6,180) according to DSM-5, 47.4% (2,927/6,180) according to ICD-10, and 37.1% (2,294/6,180) according to ICD-11 (Table 2). There were 8.8% more PTSD cases according to DSM-5 as compared to ICD-11. McNemar's test revealed that ICD-11 yielded significantly fewer PTSD cases than DSM-IV or DSM-5, and that ICD-10 yielded significantly more PTSD cases than DSM-IV or DSM-5 (Table 3).

### 4.3. Concordances of PTSD caseness among ICD and DSM criteria

Diagnostic concordance rates of PTSD caseness between ICD and DSM are shown in Table 3. Cohen's kappa between DSM-5 and ICD-11 ( $\kappa = 0.79$ ), indicating substantial agreement, was higher than Cohen's

**Table 2.** PTSD caseness as scored by different PTSD algorithms.

	PTSD caseness	
	% (N)	95%CI
DSM-IV	45.6 (2819)	[44.4–46.9]
DSM-5	45.9 (2839)	[44.7–47.2]
ICD-10	47.4 (2927)	[46.1–48.6]
ICD-11	37.1 (2294)	[35.9–38.3]

**Table 3.** Concordance between DSM and ICD systems.

	DSM-IV (alpha = 0.96)		DSM-5 (alpha = 0.95)		ICD-10 (alpha = 0.93)		ICD-11 (alpha = 0.89)	
	no (n = 3361)	yes (n = 2819)	no (n = 3341)	yes (n = 2839)	no (n = 3253)	yes (n = 2927)	no (n = 3886)	yes (n = 2294)
DSM-IV								
No	-	-	84%	19%	92%	12%	77%	15%
Yes	-	-	16%	81%	8%	88%	23%	85%
Concordance								
McNemar's test			OR = 1.038 [0.919–1.172], p = 0.563	K = 0.65	OR = 1.435 [1.217–1.695], p < 0.01	K = 0.80	OR = 0.403 [0.356–0.457], p < 0.01	K = 0.59
DSM-5								
No					85%	20%	85%	2%
Yes					15%	80%	15%	98%
Concordance								
McNemar's test					OR = 1.181 [1.045–1.336], p = 0.01	K = 0.66	OR = 0.078 [0.056–0.105], p < 0.01	K = 0.79
ICD-10								
No							76%	14%
Yes							24%	86%
Concordance								
McNemar's test							OR = 0.332 [0.291–0.377], p < 0.01	K = 0.59

kappa between DSM-5 and DSM-IV ( $\kappa = 0.65$ ). A moderate agreement was observed between ICD-11 and DSM-IV ( $\kappa = 0.59$ ) and between ICD-11 and ICD-10 ( $\kappa = 0.59$ ).

#### 4.4. Comorbidity with depression and anxiety

Comorbidities of PTSD with depression, anxiety, as well as comorbidity with both (i.e. depression and anxiety), are shown in Table 4. Comorbidity with depression and anxiety was approximately 82% and 70%, respectively. There were no significant differences regarding comorbidities across the four diagnostic manuals.

#### 4.5. Comparison between unique cases of PTSD for DSM-5 and ICD-11

A comparison of PTSD caseness, comorbidities, as well as functional impairment between unique cases of PTSD according to DSM-5 and ICD-11, is shown in Tables 5 and 6. There were a significantly larger number of unique cases according to DSM-5 as compared to ICD-11. Comorbidity with depression was significantly higher in unique DSM-5 PTSD cases than in ICD-11 unique cases. General functional impairment was significantly more pronounced in unique DSM-5 PTSD cases as compared to ICD-11 unique cases.

## 5. Discussion

As far as we know, this is the first study to investigate the concordance of PTSD caseness according to ICD-11, DSM-5, ICD-10 and DSM-IV in Japan. As we hypothesized, the ICD-11 revealed the lowest prevalence of PTSD caseness, which is consistent with previous studies (Glück et al., 2016; Hafstad et al., 2017; Hyland et al., 2016; O'Donnell et al., 2014; Shevlin et al., 2018; Wisco et al., 2016). The working group of the ICD-11 had proposed to identify the three core elements of PTSD rather than the typical features of the disorder. (Maercker et al., 2013) In this sense, 'narrowing' the diagnosis (Stein et al., 2014) may account for the lower prevalence observed compared to the other diagnostic systems. However, because of a lack of information about functional impairment, our results should be interpreted cautiously.

Our study indicated that the agreement between DSM-5 and ICD-11 was substantial. The ICD-11, which includes only six symptoms compared with DSM-5 (20 symptoms), might benefit due to having fewer items (Brewin, 2005; Kuester et al., 2017). The agreement of 0.79 for Cohen's kappa, suggests an overlap of PTSD diagnoses according to DSM-5 versus ICD-11 although they are not identical. Researchers

**Table 4.** Comorbidity of PTSD with depression, anxiety, and depression plus anxiety.

	PTSD plus depression		PTSD plus anxiety		PTSD plus depression plus anxiety	
	% (n/N)	95%CI	% (n/N)	95%CI	% (n/N)	95%CI
DSM-IV	83.0 (2340/2819)	[81.6–84.4]	70.1 (1976/2819)	[68.4–71.8]	66.2 (1866/2819)	[64.4–67.9]
DSM-5	82.8 (2352/2839)	[81.4–84.2]	68.7 (1949/2839)	[66.9–70.3]	64.6 (1835/2839)	[62.8–66.4]
ICD-10	80.8 (2364/2927)	[79.3–82.2]	67.0 (1961/2927)	[65.3–68.7]	62.9 (1840/2927)	[61.1–64.6]
ICD-11	83.6 (1918/2294)	[82.0–85.1]	71.2 (1634/2294)	[69.3–73.1]	67.5 (1548/2294)	[65.5–69.4]

**Table 5.** Proportions of PTSD caseness and comorbidities between unique cases according to DSM-5 and unique cases according to ICD-11.

	PTSD caseness		PTSD plus depression		PTSD plus anxiety		PTSD plus anxiety plus depression	
	% (N)	95%CI	% (n/N)	95%CI	% (n/N)	95%CI	% (n/N)	95%CI
DSM-5 only	9.6 (591)	[8.8–10.3]	78.0 (461/591)	[74.4–81.2]	56.5 (334/591)	[52.4–60.5]	51.3 (303/591)	[47.2–55.4]
ICD-11 only	0.7 (46)	[0.6–1.0]	58.7 (27/46)	[43.3–72.7]	41.3 (19/46)	[27.3–56.7]	34.8 (16/46)	[21.8–50.3]
$\chi^2$ test	$\chi^2(1) = 489.82, p < 0.001$		$\chi^2(1) = 7.833, p < 0.01$		$\chi^2(1) = 3.4043, p = 0.065$		$\chi^2(1) = 4.004, p = 0.045$	

**Table 6.** General functional impairment by SDS between unique cases for DSM-5 and unique cases for ICD-11.

	SDS (mean $\pm$ SD)	t-test
DSM-5 only	14.07 $\pm$ 8.50	t = 6.25, df = 1938, p < 0.001
ICD-11 only	10.80 $\pm$ 8.54	

SDS: the Sheehan Disability Scale.

should, therefore, regard these two diagnoses as comparable but should be cautious in treating them as if they are wholly identical. It is particularly important that clinical practitioners more familiar with the DSM-5 are aware of the differences between the two diagnostic systems when using the ICD-11.

Comorbidity of PTSD with depression and anxiety in this study was similar across the four diagnostic manuals. The high proportion of comorbidity, both with depression (over 80%) and anxiety (around 70%) is consistent with other studies (Stammel et al., 2015; Wisco et al., 2017). For example, in a study recruiting Cambodian and Colombian post-conflict civilians, the proportions of concurrent depression in the two groups were 88.8% according to DSM-IV, and 89.1% according to ICD-11 (Stammel et al., 2015). The proportions of concurrent anxiety in the same samples were 76.3% according to DSM-IV and 78.6% according to ICD-11. However, there are studies with lower proportions of concurrent depression and anxiety (Morina et al., 2014; O'Donnell et al., 2014; Shevlin et al., 2018). The high proportion of concurrent depression and anxiety in our study may be explained by the high prevalence of PTSD caseness. As the lifetime DSM-IV PTSD prevalence in Japan is 1.3% according to a population study (Kawakami, Tsuchiya, Umeda, Koenen, & Kessler, 2014), it should be noted that the sampling of this study was only to allow comparison among different diagnostic systems.

Our comparison of the unique cases of PTSD according to DSM-5 and ICD-11 revealed that

comorbidity with depression was significantly lower in the ICD-11 system. This is consistent with the proposal of the ICD-11 working group to reduce comorbidity by identifying the core elements of PTSD rather than the typical features of the disorder (Maercker et al., 2013).

We found a higher level of general functional impairment for unique cases of PTSD for DSM-5 than for unique cases for ICD-11. This may indicate the difference between DSM-5 and ICD-11 systems. Although we did not measure the symptoms of complex PTSD for ICD-11, our results may be associated with previous findings that complex PTSD had higher levels of functional impairment than PTSD in ICD-11 (Cloitre, Garvert, Brewin, Bryant, & Maercker, 2013; Karatzias et al., 2017; Palic et al., 2016; Zerach, Shevlin, Cloitre, & Solomon, 2019).

There are several limitations of the current study. First, we did not conduct structured clinical interviews such as the Clinician-Administered PTSD Scale for DSM-5 (CAPS-5) (Weathers et al., 2017) or the International Trauma Interview (Roberts, Cloitre, Bisson, & Brewin, 2017) for the ICD-11 diagnosis (ITQ). The use of self-rating questionnaires for the assessments provides less accuracy compared with the use of clinician-administered diagnostic tools. Second, the ICD-11 was not officially published at the time of our study. The PTSD diagnosis of the ICD-11 may, therefore, differ from the definition used in our study. In addition, we did not use a validated self-report measure for ICD-11, and this may have affected the results. Third, we could not assess complex PTSD, because we did not administer a measurement for the symptoms of complex PTSD according to ICD-11. It is strongly recommended to include the assessment of complex PTSD in future studies. Fourth, we did not measure the F criterion of the DSM-5, which requires

symptoms being present for a duration of more than 1 month. This may have influenced the results. Fifth, we did not measure functional impairment directly linked to traumatic experiences which is required for PTSD diagnoses using ICD-11, DSM-5, and DSM-IV. Sixth, we did not consider differences between the definitions of traumatic stressors across the four diagnostic manuals; however, we believe that our results are comparable to those of previous studies, characterized by similar study limitations. Seventh, we did not confirm whether the reported traumatic experiences by the participants were sufficient or appropriate to the diagnostic criteria of PTSD by interviews or further investigations. Eighth, we used only PCL-5 at the screening phase. This might have caused a selection bias in our final sample of study participants.

Regardless of these limitations, this study sheds new light on understanding the nature of PTSD through the comparison of four recently and commonly-used diagnostic systems. Because the ICD system is used for the coding of diagnostic categories in the universal health insurance system in Japan, the new ICD-11 will have a considerable impact on the healthcare system. Future studies need to elucidate the clinical utility and validity of classification approaches in real world clinical settings.

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## ORCID

Misari Oe  <http://orcid.org/0000-0003-4550-036X>  
Yoshitake Takebayashi  <http://orcid.org/0000-0002-6366-0087>

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