



## Identifying PTSD symptom typologies: A latent class analysis

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### ABSTRACT

Posttraumatic stress disorder (PTSD) is characterized by re-experiencing, avoidance, negative alterations in cognition and mood, and arousal symptoms per the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5). While numerous symptom combinations are possible to meet diagnostic criteria, simplification of this heterogeneity of symptom presentations may have clinical utility. In a nationally representative sample of American adults with lifetime DSM-5 PTSD diagnoses from the third wave of the National Epidemiologic Survey on Alcohol and Related Conditions ( $n = 2,365$ ), we used Latent Class Analysis (LCA) to identify qualitatively distinct PTSD symptom typologies. Subsequently, we used linear and logistic regressions to identify demographic, trauma-related, and psychiatric characteristics associated with membership in each class. In contrast to prior LCAs with DSM-IV-TR diagnostic criteria, fit indices for the present analyses of DSM-5 PTSD revealed a four-class solution to the data: Dysphoric (23.8%), Threat-Reactivity (26.1%), High Symptom (33.7%), and Low Symptom (16.3%). Exploratory analyses revealed distinctions between classes in socioeconomic impairment, trauma exposure, comorbid diagnoses, and demographic characteristics. Although the study is limited by its cross-sectional design (preventing analysis of temporal associations or causal pathways between covariates and latent classes), findings may support efforts to develop personalized medicine approaches to PTSD diagnosis and treatment.

### 1. Introduction

In recent years, the concept of precision medicine (i.e., prevention and treatment strategies tailored to account for patient individual differences) has gained increased attention and has been aided by advances in technology and statistical methods (Collins and Varmus, 2015). In the interest of translating these concepts into practice, the National Institutes of Health have called for research leading to the development of “individualized prevention and therapy” (Cornetta and Brown, 2013). In the field of mental health, the Research Domain Criteria (RDoC) initiative calls for studies deconstructing current diagnostic classifications with the goal of facilitating individualized treatment. Some of these efforts have begun to bear fruit; for example, specific subtypes of depression have been shown to reliably predict differential response to treatment (Chen et al., 2007; Drysdale et al., 2017; Liston et al., 2014; Salvatore et al., 2009).

Research on Posttraumatic Stress Disorder (PTSD) has similarly endeavored to ascertain whether individuals with PTSD cluster into different subtypes (Horn et al., 2016; Pietrzak et al., 2014). Knowledge regarding PTSD subtypes may help the development of treatment approaches consistent with the goals of precision medicine. Indeed, with 636,120 possible symptom combinations that meet criteria for PTSD in the Diagnostic and Statistical Manual of Mental Disorders – 5th Edition (DSM-5; APA, 2013; Galatzer-Levy and Bryant, 2013) data reduction strategies that balance between extreme diversity and treating PTSD as though it has a uniform presentation are needed.

The revisions to PTSD reflected in the DSM-5 include separating the prior avoidance symptom cluster into an effortful avoidance cluster (i.e., willful avoidance of trauma-related thoughts and tangible reminders) and a cluster of symptoms including negative emotionality and maladaptive appraisals of the self, others, and the world. A new symptom of reckless behavior was added to the “alterations in arousal

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and reactivity” symptom cluster. Although there is empirical support for these changes (see [Friedman, 2013](#)), there has also been criticism of the DSM-5 model of PTSD and its high comorbidity and symptom overlap with other disorders, such as Major Depressive Disorder (MDD) ([Hoge et al., 2014](#)). In contrast to the DSM-5 approach of expanding symptom clusters, the World Health Organization (WHO) has adopted a six-symptom conceptualization of PTSD for International Classification of Diseases-11 (ICD-11). These symptoms are categorized into three clusters (Re-experiencing, Avoidance, and Hyperarousal), each containing two symptoms ([Morina et al., 2014](#)). The ICD-11 conceptualizes PTSD as an anxiety disorder and focuses primarily on re-experiencing and arousal-based symptoms. Initial data suggest that focusing on six core symptoms may reduce comorbidity while preserving diagnostic validity, with 87.5% of individuals meeting ICD-11 criteria for PTSD also meeting DSM-IV-TR criteria ([Morina et al., 2014](#)).

Importantly, existing treatments for PTSD are based on identification of the disorder using stringent criteria that was more clearly characterized by autonomic arousal and subsequent avoidance (e.g., Prolonged Exposure; [PE] [Foa et al., 2007](#)), in keeping with the ICD and DSM-IV-TR diagnostic approaches. Expanding the range of symptoms included in the diagnosis PTSD may capture more individuals struggling with diverse presentations of trauma-related psychopathology, but could also hinder efforts to precisely target a coherent set of symptoms as therapeutic foci. The extant literature and recent changes to the conceptualization of PTSD have fueled debate regarding the utility of identifying unique PTSD subtypes (e.g., [Stein et al., 2016](#)). [Dalenberg et al. \(2012\)](#) proposed three categories of evidence to justify the existence of a psychological disorder subtype, namely (a) reliability and clarity of subtype definition, (b) distinction of structure, and (c) clinical meaningfulness. These authors recommend statistical data reduction techniques such as Latent Class Analysis to accomplish these goals.

Latent Class Analysis (LCA) is a statistical method commonly used to identify subsets of unique individuals within a larger identified group. (e.g., [Nylund et al., 2007](#)). LCA based on the DSM-IV-TR (APA, 2000) PTSD criteria (e.g., [Horn et al., 2016](#); [Pietrzak et al., 2014](#)) identified qualitatively distinct PTSD symptom profiles termed High Symptom (high symptom scores across all symptom clusters), Threat-Reactivity (high levels of fear, anxious distress, and avoidance), and Dysphoric (dysphoric arousal and emotional numbing symptoms). More recently, LCA has also been used to identify PTSD symptom classes with a dichotomous measure of DSM-5 PTSD criteria in a sample of refugees in Australia ([Minihan et al., 2018](#)) and in a sample of U.S. military Veterans ([McLafferty et al., 2019](#)). (Of note, other research exploring latent classes or profiles within DSM-5 criteria for PTSD have incorporated additional measures to assess dissociative subtypes, and are thus not discussed here, e.g., [Hansen et al., 2016](#); [Frewen et al., 2015](#)). Notably, in the Minihan and colleagues study using DSM 5, found a 4-class solution, in contrast to the 3-class solutions found with DSM-IV-TR criteria. The authors named their classes High PTSD (similar to “High Symptom” in [Horn et al., 2016](#) and [Pietrzak et al., 2014](#)), High Re-experiencing/Avoidance, Moderate PTSD, and no PTSD ([Minihan et al., 2018](#)). In contrast to prior PTSD LCA studies (e.g., [Horn et al., 2016](#); [Pietrzak et al., 2014](#)), [Minihan et al. \(2018\)](#) included all individuals who had been exposed to trauma, rather than restricting to those diagnosed with PTSD. While this is helpful for understanding potential presentations of all trauma-exposed individuals, for the purposes of precision mental health care, it may be useful to restrict LCA to those who have already been diagnosed in order to identify distinct presentations among those found to have met criteria for a disorder (e.g., [Pietrzak et al., 2014](#)).

There is preliminary evidence in support of identifiable, symptom-based (rather than severity-based) subtypes of PTSD (e.g., [Horn et al., 2016](#), [Pietrzak et al., 2014](#)). However, the majority of the studies finding qualitatively distinct profiles among diagnosed individuals were conducted using the DSM-IV-TR symptom criteria or combined PTSD

symptoms with additional items such as adverse childhood experiences ([McLafferty et al., 2019](#)). Furthermore, the one study that examined these profiles using the DSM-5 criteria used a relatively small sample ([Byrne et al., 2019](#)). Further exploration of the additional DSM-5 symptoms such as negative cognitions may be essential in identifying a more cognitively-based dysphoric presentation rather than an anxious-distress response to trauma. Moreover, there may be significant clinical utility in being able to rapidly assess and specifically target these distinct profiles. The present study therefore aims to evaluate whether it is possible to identify distinct, symptom-based classes of PTSD in a large, nationally representative sample using DSM-5 diagnostic criteria. Despite the inclusion of additional symptoms, we hypothesize that we will replicate the 3-class solution (e.g., High Symptom, Threat-Reactivity, Dysphoric) found in previous studies when restricting analyses to those with a PTSD diagnosis (e.g., [Horn et al., 2016](#); [Pietrzak et al., 2014](#)). In addition to identifying potential PTSD subtypes through LCA, we sought to descriptively characterize differences between subtypes on features beyond symptoms. Given the exploratory nature of LCA of PTSD subtypes and relatively scant prior research suggesting ways in which PTSD subtypes may differ, we evaluated a variety of potentially relevant demographic, social functioning, and psychiatric comorbidity indicators. These analyses were done in the spirit of exploratory data analysis ([Behrens and Yu, 2003](#); [Tukey, 1977](#)) and should therefore be interpreted as such and confirmed in future studies.

## 2. Methods

### 2.1. Participants and procedure

Full details regarding the sampling for the National Epidemiological Survey on Alcohol and Related Conditions –III (NESARC III) can be found elsewhere ([Grant et al., 2014](#)). In brief, the NESARC- III is a cross sectional survey designed to collect information regarding alcohol and drug use disorders as well as other mental health and physical difficulties. Participants are non-institutionalized adults age 18 and over in households and group homes across the United States. The full sample included 36,039 respondents. For the purposes of this study, only a subsample of 2,365 individuals with diagnoses of lifetime PTSD were selected for analyses. Racial/ethnic minorities (Asian, Black, and Hispanic individuals) were oversampled compared to non-Hispanic Whites. Within the subsample used in the present analyses, 56.1% were White, 29.5% were non-Hispanic Black, 18.1% were Hispanic, 3.3% were Native American, and 1.8% were Asian/Pacific Islander. The majority (71.0%) were women. Average age was 43 years ( $SD = 15.10$ , range 18–90). Reported relationship statuses include married (30.1%), living as if married (8.3%), widowed (6.4%), divorced (19.8%), separated (7.2%), and never married (28.3%).

Participants were selected via multistage probability sampling. Sampling units included primary (e.g., individual or groups of counties), secondary (including groups of Census-defined blocks) and tertiary (households in groups of blocks, with randomly selected adults within households), and data were adjusted for nonresponse and weighted to reflect the US Civilian population, per the 2012 American Community Survey ([Bureau of the Census, 2013](#)). Participants completed face-to-face interviews between April 2012 and June 2013, and the overall response rate was 60.1%. Participants provided informed consent and were paid \$90.00 for their participation. All procedures for NESARC-III data collection were approved by the Institutional Review Boards of the National Institutes of Health and Westat, Inc. Procedures for the present study were approved by the Institutional Review Board at VA Puget Sound Health Care System.

### 2.2. Measures

All mental health and substance use disorders were measured using the NIAAA Alcohol Use Disorder and Associated Disabilities Interview

**Table 1**  
Trauma type.

Trauma (self)	Low Symptom (n = 386)	Dysphoric (n = 563)	Threat-Reactivity (n = 618)	High Symptom (n = 798)	Low Symptom AOR [95% CI]	Dysphoric AOR [95% CI]	Threat-Reactivity AOR [95% CI]	High Symptom AOR [95% CI]
<b>Personally experienced war/ combat</b>	n (%) 6 (1.09)	8 (1.09)	20 (5.26)	26 (3.96)	0.22 [0.07, 0.68]**	0.3 [0.13, 0.72]**	1.75 [0.92, 3.33]	2.26 [1.2, 4.27]*
<b>Personally experienced illness or injury</b>	55 (14.94)	64 (11.96)	74 (13.13)	83 (9.96)	1.39 [0.93, 2.07]	0.96 [0.66, 1.38]	1.09 [0.75, 1.56]	0.75 [0.54, 1.05]
<b>Sexual assault as an adult</b>	11 (3.07)	18 (3.04)	33 (5.98)	50 (5.72)	0.57 [0.27, 1.2]	0.6 [0.32, 1.11]	1.49 [0.84, 2.64]	1.33 [0.8, 2.22]
<b>Seen dead bodies</b>	28 (8.36)	44 (8.36)	61 (8.80)	65 (7.55)	0.99 [0.57, 1.73]	0.96 [0.62, 1.48]	1.21 [0.81, 1.8]	0.89 [0.59, 1.33]
<b>Childhood sexual abuse</b>	57 (14.77)	143 (23.77)	94 (14.7)	234 (28.89)	0.58 [0.4, 0.84]**	1.18 [0.9, 1.55]	0.59 [0.44, 0.8]**	1.77 [1.37, 2.29]**
<b>Childhood physical abuse</b>	15 (3.80)	26 (6.19)	18 (3.08)	38 (5.00)	0.79 [0.4, 1.55]	1.49 [0.78, 2.82]	0.6 [0.32, 1.15]	1.2 [0.72, 1.99]
<b>Intimate partner violence</b>	38 (7.87)	59 (8.18)	59 (7.68)	75 (9.09)	1.01 [0.65, 1.57]	1.04 [0.71, 1.52]	0.91 [0.63, 1.32]	1.03 [0.72, 1.47]
<b>Adult physical assault</b>	4 (1.02)	7 (1.09)	9 (1.27)	11 (1.15)	1.06 [0.23, 4.83]	0.85 [0.33, 3.02]	1.26 [0.53, 3.02]	0.89 [0.35, 2.25]
<b>Natural disaster</b>	4 (0.82)	5 (0.66)	17 (3.12)	1 (0.54)	0.58 [0.14, 2.41]	0.46 [0.14, 1.59]	4.99 [1.66, 15.06]**	0.3 [0.04, 2.34]
<b>Juvenile Detention</b>	9 (2.39)	9 (0.91)	5 (0.72)	11 (1.44)	2.58 [0.99, 6.74]	0.57 [0.24, 1.38]	0.52 [0.17, 1.56]	1.13 [0.48, 2.69]
<b>Mugged</b>	15 (3.12)	11 (1.79)	19 (2.70)	12 (1.52)	1.62 [0.79, 3.31]	0.76 [0.36, 1.63]	1.33 [0.65, 2.71]	0.61 [0.29, 1.31]
<b>Stalked</b>	11 (1.83)	8 (1.20)	14 (2.32)	15 (1.96)	0.9 [0.42, 1.92]	0.67 [0.28, 1.63]	1.24 [0.57, 2.71]	1.12 [0.55, 2.31]
<b>Other trauma</b>	24 (5.77)	29 (5.75)	41 (5.73)	36 (4.56)	1.01 [0.58, 1.78]	1.12 [0.66, 1.88]	1.08 [0.69, 1.69]	0.84 [0.52, 1.38]
<b>Trauma (other)</b>								
<b>Natural disaster</b>	1 (0.67)	0 (0.00)	4 (0.62)	2 (0.22)	2.2 [0.31, 15.72]	0 [0, 0]**	1.94 [0.3, 12.79]	0.56 [0.09, 3.48]
<b>Illness or injury</b>	54 (14.81)	70 (14.36)	96 (17.12)	72 (8.78)	1.12 [0.76, 1.66]	1.11 [0.78, 1.58]	1.45 [1.05, 2.01]*	0.56 [0.39, 0.8]**
<b>Other trauma</b>	54 (16.25)	60 (11.43)	53 (7.45)	63 (8.79)	1.91 [1.29, 2.84]**	1.19 [0.81, 1.75]	0.61 [0.42, 0.91]*	0.76 [0.53, 1.1]

Note. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ ; Percentage is weighted to represent prevalence of each sociodemographic level within each latent class. AOR = adjusted odds ratio, accounting for age, sex, education, income, marital status, race/ethnicity, and sampling weight.

Schedule – 5 (AUDADIS-5; Grant et al., 2015), a diagnostic interview created to measure DSM-5 PTSD, substance use disorders, and select mood, anxiety, eating, and personality disorders. All participants completed face to face interviews conducted by trained field test interviewers. Detailed information regarding the specific methods utilized by the NESARC-III researchers can be found on their website (Grant et al., 2014).

### 2.2.1. PTSD and related clinical characteristics

Respondents were asked about 19 potentially traumatic events they may have personally experienced and 13 events they either witnessed, learned about, or to which they had repeated exposure of details, for a combined total of 32 potential traumatic events. For simplicity of presentation, the present study included 16 distinct trauma categories based on prior research (Lehavot et al., 2018; Pietrzak et al., 2014), and frequency of occurrence within the sample (see Table 1). To qualify for a PTSD diagnosis, respondents must have endorsed  $\geq 1$  potentially traumatic event. If participants endorsed  $>1$  event, they responded to the remaining symptom questions based on the trauma they reported was worst. Lifetime diagnoses established in the NESARC dataset consisted of  $\geq 1$  symptom of intrusion (Cluster B),  $\geq 1$  symptom of avoidance of trauma-related stimuli (Cluster C),  $\geq 3$  symptoms of negative alterations in cognitions and mood (Cluster D), and  $\geq 3$  symptoms of alterations in arousal and reactivity (Cluster E), along with endorsing a minimum of one-month duration along with clinically significant distress or impairment. These questions differ somewhat from traditional assessments of PTSD in that the responses options are dichotomous and the items are worded differently from the PTSD Checklist (PCL-5; Weathers et al., 2013) or Clinician Administered PTSD Scale for DSM-5 (CAPS; Weathers et al., 2018).

Within the NESARC-III dataset, past-year and prior-to-past-year diagnoses were combined into a “lifetime PTSD” category. Prior research has demonstrated the fair test-retest reliability of past-year and prior-to-past-year PTSD ( $K = 0.41$ ), good reliability of dimensional PTSD criteria scale ( $ICC = 0.69$ ), and fair-to-moderate procedural validity across timeframes ( $K = 0.34 - 0.46$ ; Grant et al., 2015; Hasin et al., 2011; Hasin et al., 2015).

Of note, NESARC criteria for lifetime PTSD are more stringent than the DSM-5 PTSD criteria, which specify  $\geq 2$  symptoms each from Clusters D and E. Consequently, the original NESARC investigators created a separate “Broad PTSD” variable after the publication of the DSM-5. Consistent with the DSM-5 definition, the “Broad PTSD” variable requires  $\geq 2$  symptoms in clusters D and E to meet criteria for the disorder. However, “Broad PTSD” neglects to account for DSM-specified distress, impairment, or duration of illness. To investigate the differences in prevalence based on the NESARC lifetime PTSD definition and the DSM-5 PTSD definition, for the purposes of the present study we created a variable that precisely replicated the DSM-5 PTSD definition. The NESARC lifetime PTSD definition and our DSM-5 PTSD variable were nearly identical ( $r = 0.98, p < 0.001$ ). Thus, we used our modified lifetime PTSD variable for all relevant analyses as it is the only variable that is directly derived from DSM-5 diagnostic criteria for PTSD. This variable is dichotomized to represent the presence or absence of lifetime PTSD.

NESARC-III also includes information on the age of onset for the PTSD related to the selected traumatic event, duration of the only or most recent span of PTSD symptoms, and PTSD –related treatment seeking, including psychotherapy, medication, and inpatient hospitalization.

### 2.2.2. Sociodemographic characteristics

The NESARC III dataset includes information on binary sex (male/female), age, marital status, education, income, and race/ethnicity.

### 2.2.3. Other psychiatric disorders

NESARC staff conducted interviews using the AUDADIS-5

(Grant et al., 2015) to assess for a variety of DSM-5 diagnoses. To be consistent with prior research (e.g., Pietrzak et al., 2014), the present study included measures of major depressive disorder, dysthymia, bipolar I, bipolar II, panic disorder, agoraphobia, social phobia, specific phobia, and generalized anxiety disorder. A different selection of personality disorders was assessed in NESARC III, preventing direct comparison to research with NESARC II. Personality disorders assessed included borderline personality disorder, schizotypal personality disorder, and antisocial personality disorder. All psychiatric diagnoses excluded substance-induced and medically-induced disorders. AUDADIS-5 psychiatric diagnoses have demonstrated fair to moderate concordance with other measures of DSM-5 diagnoses in prior research (Hasin et al., 2015). All diagnostic variables were dichotomized to represent the presence or absence of a lifetime version of the diagnosis.

### 2.2.4. Substance use disorders

Although NESARC III included individual diagnoses for a wide variety of substances, for the present analyses we included lifetime diagnoses of alcohol use disorder, nicotine use disorder, cannabis use disorder, and other drug use disorder, which comprised an aggregate variable that included all other drug use disorder diagnoses in NESARC-III (including sedative, amphetamine, cocaine, non-heroin opioid, heroin, hallucinogen, club drug, and solvent/inhalant use disorders). Prior research has demonstrated fair to excellent test-retest reliability and concordant validity for the above drug use disorders (Grant et al., 2016). Substance use disorder variables are dichotomized to represent the presence or absence of a lifetime diagnosis.

### 2.2.5. Suicide attempts

The presence or absence of lifetime suicide attempts was assessed with the question “Have you ever attempted suicide in your entire life?” and was scored dichotomously.

### 2.2.6. Social instability

Social instability was measured by assessing past year homelessness, receipt of any form of public assistance, possession of health insurance, and current unemployment, coded as separate dichotomous variables.

### 2.2.7. Mental and physical health-related quality of life

Mental/physical health-related quality of life was measured with the 12-item Short Form Health Survey, version 2 (SF-12v2; Kosinski et al., 2007). The SF-12v2 is commonly used in survey research, and includes both mental and physical health summary scales. Consistent with the scoring methods described in the development manual (Kosinski et al., 2007), SF-12v2 scores range from 0–100, with a mean of 50 and  $SD$  of 10. Higher scores represent better functioning.

## 2.3. Data analysis

We conducted Latent Class Analysis (LCA) using Mplus Version 8 (Muthén and Muthén, 1998–2017) to identify the main typologies of individuals with PTSD present in the NESARC-III. We assessed model fit for unconditional models estimating 1 to 6 classes, inclusive, on the basis of individual symptom-level data. Numerous fit indices were assessed, including bootstrapped Likelihood Ratio Test (BLRT), Aikake Information Criterion (AIC), Bayesian Information Criterion (BIC), entropy, and Lo-Mendel-Rubin adjusted likelihood ratio test (LMR  $p$ ). In a recent simulation study, the BIC and, specifically, sample-size adjusted BIC proved most accurate at identifying the appropriate number of classes, thus we considered these statistics more heavily in our model selection (Morgan, 2015; Nylund et al., 2007). With all information-based criteria, (e.g., AIC, BIC, sample-size adjusted BIC) lower values indicate better fitting models (Morgan, 2015). We followed the procedures outlined in Asparouhov and Muthén (2012) to assess improvement in fit between  $k$  and  $k - 1$  classes. Finally, we considered theory, parsimony, and interpretability in selecting the number of classes, given

that fit indices are sometimes agnostic in differentiating between various class solutions. Given the complex sampling structure of the data, we estimated classes with both weighted and unweighted solutions. Of note, the BLRT is only available for unweighted estimates (Nylund et al., 2007). Each respondent was assigned to the single class having the greatest posterior probability.

Following selection of the optimal number of classes, we conducted a series of exploratory analyses to compare the different PTSD classes with respect to socio-demographic characteristics, clinical characteristics including PTSD treatment and type of worst trauma, co-occurring psychiatric diagnoses, and lifetime suicide attempts using cross-tabulations and logistic regressions (accounting for age, sex, education, income, marital status, and race/ethnicity). We further assessed the associations of PTSD class membership with age of onset following worst trauma, duration of PTSD symptoms, and health-related quality of life using linear regressions. All regression and descriptive analyses accounted for the complex survey design by incorporating appropriate sampling weights using R (R Development Core Team, 2017). We elected to not correct for multiple comparisons given the exploratory nature of these analyses (Behrens and Yu, 2003; Tukey, 1977) and following the precedent set by similar studies (e.g., Pietrzak et al., 2014; Horn et al., 2016).

### 3. Results

Fit statistics for the LCAs are provided in Table 2. Based primarily on the sample-size adjusted BIC and BLRT fit statistics, we selected a 4-class solution. Note that, although we conducted analyses using both weighted and unweighted samples (in order to produce the BLRT fit statistic), the two sets of analyses both recommended the 4-class solution. Thus, we report fit statistics for the weighted models (fit statistics for unweighted models are available in Supplementary Table 1).

Fig. 1 shows plots of the probability of endorsing each symptom by latent class assignment. The first class, labeled “Dysphoric” ( $n = 563$ , 23.8%), was characterized by high levels of intrusive thoughts, cognitive/affective and situational avoidance, negative cognitions, negative affect, feelings of isolation, numbing, irritability, and sleep/concentration difficulties, with 15.23 of the 20 symptoms endorsed. The second class, labeled “Threat” ( $n = 618$ , 26.1%), was characterized by high levels of all Cluster B (re-experiencing) symptoms, moderately high self-blame and negative affect, comparatively low levels of lack of interest, isolation, numbing, and irritability, and high levels of hyperarousal, with 14.49 of 20 symptoms endorsed. The third class, labeled “High Symptom” ( $n = 798$ , 33.7%) was characterized by high levels of all symptoms with the exception of trauma-related amnesia and risky behavior, with 18.64 of 20 symptoms endorsed. The fourth class, labeled “Low Symptom” ( $n = 386$ , 16.3%) was characterized by comparatively low levels of all symptoms except intrusive thoughts, negative affect, and hypervigilance, with 11.47 of 20 symptoms endorsed.

Type of trauma exposure characteristics for each class are shown in Table 1. Demographic characteristics of each class are shown in Table 3. Trauma-exposure-related, co-occurring diagnosis, and functional characteristics of each class are shown in Table 4. No class was

deemed appropriate to be the designated reference class, so planned contrasts evaluated the odds of being in each class using logistic regression.

#### 3.1. Exploratory analyses of demographic characteristics and social stability indicators

Due to the substantial number of exploratory analyses, only significant contrasts are highlighted here. All *ns*, percentages, and odds ratios (ORs) are listed in Table 3. Those more likely to be in the Low Symptom class than another class were more likely to have income above \$60,000 per year and less likely to have income below \$20,000 per year. Those more likely to be in the Dysphoric class than another class were more likely to be in the three younger age groups, and less likely to be 65 and older. They were also less likely to be female. Those more likely to be in the Threat-Reactivity class than another class were less likely to be in the three younger age groups, more likely to be 65 and older, and less likely to report unemployment and past year homelessness. Those more likely to be in the High Symptom class than another class were more likely to be female, have less than high school education, income under \$20,000, and were less likely to be White, have income above \$60,000 per year and have completed some college or more. They also had higher likelihood of past year homelessness, receipt of public assistance, and unemployment.

#### 3.2. Exploratory analyses of trauma, PTSD onset, and Co-Occurring diagnoses

Again, only significant contrasts are highlighted here, though all *ns*, percentages, and odds ratios (ORs) are listed in Table 4. Those in the Low Symptom class were more likely to have reported traumatic events occurring to a close other as the worst trauma, less likely to report personally experiencing war/combat, significantly older age of onset and shorter symptom duration ( $M = 62.89$  months,  $SE = 7.02$ ). They also reported better mental and physical health (using the SF-12). Those in the Dysphoric class were less likely to report having experienced combat. Those in the Threat-Reactivity class were more likely to report having personally experienced natural disasters and illness or injury occurring to close others, less likely to report experiencing childhood sexual abuse as a worst trauma, and better mental health (using the SF-12). The High Symptom class was more likely to have personally experienced combat and childhood sexual abuse as their worst trauma, less likely to report illness/injury to others as their worst trauma, significantly younger age of onset, longer duration of symptoms ( $M = 114.44$  months,  $SE = 6.99$ ), higher numbers of comorbid diagnoses and worse mental and physical health.

Compared to the other classes, the High Symptom class was more likely to report receiving counseling, inpatient treatment, and medication for PTSD (ORs = 1.78, 3.16, 1.94, respectively). In contrast, compared to other classes, the Low Symptom class was less likely to receive these same treatments (ORs = 0.57, 0.41, 0.51, respectively). The Dysphoric class was less likely to receive medication for PTSD (OR = 0.73), while the Threat class was somewhat less likely to receive

**Table 2**

Fit Statistics of latent class analysis using weighted estimates.

# of Classes	Log Likelihood	AIC	BIC	Entropy	LMR P	% Sample in smallest class
1	-23,882.489	47,808.978	47,935.886/47,865.988	-	-	-
2	-22,688.543	45,465.086	45,718.901/45,579.104	0.743	2374.002/0.0000	0.43987
3	-22,466.029	45,064.058	45,444.781/ 45,235.085	0.688	442.439/ 0.7501	0.22169
4	-20,735.247	41,642.495	42,138.589/ 41,865.349	0.667	303.353/ 0.2400	0.18825
5	-22,218.268	44,656.537	45,291.076/44,941.583	0.691	189.365/0.7392	0.05909
6	-22,143.163*	44,550.325	45,311.772/44,892.380	0.684	115.041/ 0.7630	0.05476
7	-22,091.857*	44,491.714	45,380.068/44,890.778	0.682	89.287/0.7739	0.04078

Note. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; LMR P = Lo-Mendell-Rubin adjusted likelihood ratio test.

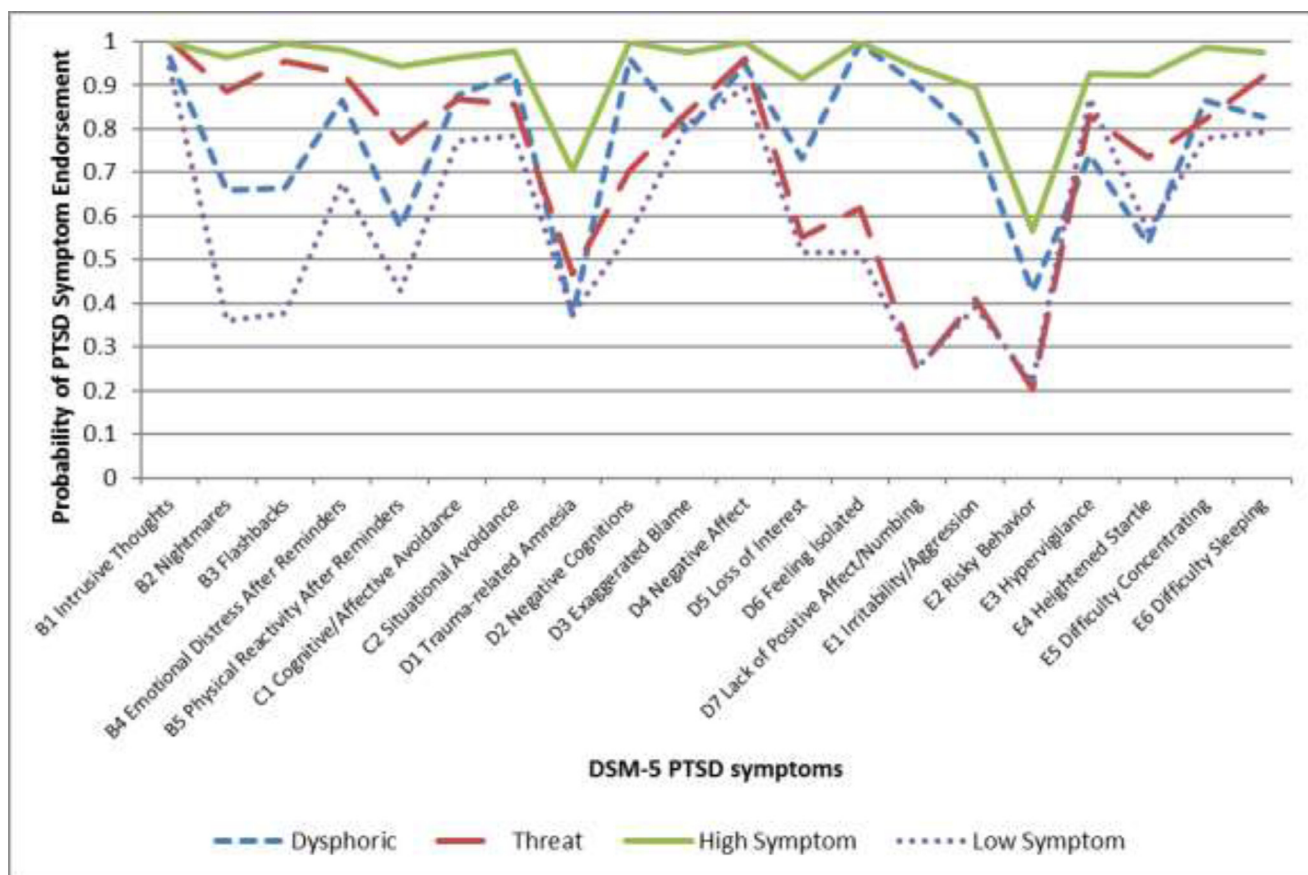


Fig. 1. Probability of DSM 5 PTSD symptom endorsement for the four-class model.

inpatient treatment (OR = 0.49).

Regarding co-occurring diagnoses, those in the Low Symptom class had lower overall numbers of co-occurring diagnoses, were less likely to report co-occurring anxiety and mood disorders (with the exception of Bipolar I), and were less likely to have co-occurring personality disorders. Members of the Dysphoric class were more likely to report MDD and Dysthymia, less likely to report Panic Disorder and Agoraphobia, and comparatively more likely to report Nicotine Dependence. Those in the Threat class had overall lower numbers of comorbid diagnoses, and were less likely to report MDD, Social Phobia, Bipolar I, all substance use disorders, BPD, and Schizotypal personality disorder. Those in the High Symptom group were more likely than any other class to report having anxiety disorders, Bipolar I, Dysthymia, AUD, Cannabis Dependence, general Drug Use Disorder, BPD, Schizotypal personality disorder, and Antisocial personality disorder. With regards to lifetime suicide attempts, those in the High Symptom class were significantly more likely to report a lifetime suicide attempt, while those in the Threat and Low Symptom classes were significantly less likely to report such behavior.

#### 4. Discussion

The purpose of this study was to identify distinct classes of individuals with PTSD based on their responses to the 20 DSM-5 PTSD criteria using data from a large, nationally representative sample. We aimed to build upon comparable work conducted using DSM-IV-TR criteria for PTSD (e.g., Bryne et al., 2019; Horn et al., 2016; Pietrzak et al., 2014). Additionally, the relationships between these symptom classes and various socio-demographic and clinical variables were examined to more fully characterize PTSD subtypes. Although we had anticipated a 3-factor solution based on prior research with adult

samples with PTSD using DSM-IV-TR (e.g., Horn et al., 2016; Pietrzak et al., 2014) and DSM-5 (Bryne et al., 2019) criteria, our fit statistics indicated that a 4-class solution best characterized the overall sample. While this number of classes is consistent with a recent LCA study of PTSD symptoms using DSM-5 criteria, the classes are qualitatively different from those of Minihan et al. (2018). Based on the probability of symptom endorsement in each latent class, we labeled the classes in our sample High Symptom (33.7%), Low Symptom (16.3%), Dysphoric (23.8%), and Threat-Reactivity (26.1%).

Even though the diagnostic criteria for PTSD were significantly revised between DSM-IV-TR and DSM 5, our findings echo previous studies using DSM-IV-TR criteria of PTSD. Namely our results replicate the previously identified Dysphoric, Threat-Reactivity, and a High Symptom classes (Horn et al., 2016; Pietrzak et al., 2014). In addition to these symptom classes, our study also identified a Low Symptom class that was characterized by relatively lower symptoms of PTSD, consistent with other research using DSM-5 criteria (Minihan et al., 2018).

Having determined an acceptable LCA solution, we next sought to provide evidence for the potential clinical utility of these subtypes by identifying differences in demographics, socio-economic characteristics, trauma etiology, and diagnosis comorbidity. Given the exploratory nature of work in this area, we evaluated these potentially relevant characteristics without *a priori* hypotheses; findings should thus be interpreted as exploratory and evaluated in future research. Nonetheless, a number of potentially meaningful differences emerged that may highlight informative qualitative differences and support the clinical utility of these subtypes. Based on several demographic variables (i.e., income, education, employment, housing, etc.), individuals in the High symptom class tended to have lower general socioeconomic attainment when compared to individuals in other classes. In contrast, individuals in the Threat class tended to be less likely to endorse past

**Table 3**  
Demographic characteristics.

Age Categories	Low Symptom (n = 386)	Dysphoric (n = 563)	Threat-Reactivity (n = 618)	High Symptom (n = 798)	Low Symptom AOR [95% CI]	Dysphoric AOR [95% CI]	Threat-Reactivity AOR [95% CI]	High Symptom AOR [95% CI]
<b>n (%)</b>								
20-29	87 (23.97)	140 (25.97)	118 (20.25)	188 (25.24)	1.01 [0.73, 1.39]	2.19 [1.34, 3.57]**	0.43 [0.28, 0.66]***	1.34 [0.87, 2.06]
30-44	129 (28.96)	194 (35.55)	179 (25.79)	259 (29.32)	0.95 [0.72, 1.26]	2.59 [1.61, 4.16]***	0.43 [0.29, 0.65]***	1.27 [0.83, 1.93]
45-64	130 (37.97)	195 (33.02)	246 (40.52)	293 (37.61)	1.03 [0.78, 1.36]	1.65 [1.03, 2.63]*	0.59 [0.4, 0.88]**	1.32 [0.87, 1.99]
65 +	40 (9.11)	34 (5.45)	75 (13.44)	58 (7.83)	1.02 [0.66, 1.56]	0.61 [0.38, 0.97]*	1.68 [1.14, 2.48]**	0.76 [0.5, 1.15]
<b>Sex</b>								
Female	263 (67.73)	387 (63.99)	440 (66.31)	585 (71.22)	1.01 [0.76, 1.33]	0.77 [0.6, 1.1]*	0.94 [0.73, 1.21]	1.3 [1.03, 1.64]*
<b>Race/Ethnicity</b>								
White, non-Hispanic	223 (69.86)	325 (69.37)	361 (71.1)	414 (64.6)	1.05 [0.74, 1.49]	1.1 [0.8, 1.52]	1.02 [0.75, 1.38]	0.88 [0.67, 1.16]
Black, non-Hispanic	72 (11.65)	102 (10.07)	126 (11.21)	189 (14.43)	1.1 [0.72, 1.69]	0.78 [0.53, 1.14]	0.94 [0.65, 1.35]	1.19 [0.86, 1.65]
American Indian/Alaska Native	12 (3.85)	23 (4.43)	16 (2.84)	25 (4.65)	1.04 [0.45, 2.41]	1.21 [0.63, 2.34]	0.64 [0.31, 1.3]	1.18 [0.61, 2.29]
Asian/Native-Hawaiian/Pacific Islander	6 (2.28)	16 (2.37)	11 (2.11)	9 (1.79)	0.99 [0.37, 2.65]	1.5 [0.69, 3.27]	0.87 [0.37, 2.01]	0.82 [0.33, 2.05]
Hispanic, other Education	73 (12.36)	97 (13.76)	104 (12.75)	161 (14.53)	1.01 [0.38, 2.72]	0.67 [0.31, 1.46]	1.15 [0.5, 2.67]	1.22 [0.49, 3.04]
Less than High School	49 (11.75)	99 (15.66)	99 (15.99)	164 (20.04)	0.7 [0.46, 1.05]	0.99 [0.7, 1.38]	0.88 [0.62, 1.23]	1.4 [1.05, 1.87]*
High School or equivalent	77 (17.27)	121 (22.99)	110 (16.57)	164 (20.85)	0.82 [0.59, 1.15]	1.32 [0.97, 1.8]	0.74 [0.55, 1.01]	1.16 [0.88, 1.53]
Some College or more	260 (70.98)	343 (61.35)	409 (67.44)	470 (59.12)	1.22 [0.87, 1.71]	0.76 [0.56, 1.03]	1.34 [0.99, 1.82]	0.86 [0.65, 1.14]
<b>Social Stability</b>								
Past Year Homelessness	17 (5.05)	33 (5.99)	15 (2.22)	66 (7.7)	1.21 [0.65, 2.25]	0.96 [0.57, 1.6]	0.37 [0.15, 0.88]*	1.68 [1.08, 2.61]*
Public Assistance	167 (39.33)	283 (44.69)	312 (45.54)	469 (54.75)	0.81 [0.59, 1.12]	0.88 [0.68, 1.14]	0.83 [0.63, 1.08]	1.49 [1.16, 1.91]**
Any Health Insurance	315 (81.71)	445 (79.46)	522 (85.63)	648 (81.64)	0.79 [0.55, 1.13]	0.94 [0.7, 1.28]	1.18 [0.86, 1.62]	1.07 [0.81, 1.43]
Unemployed	80 (19.72)	146 (24.71)	142 (20.52)	268 (32.06)	0.82 [0.57, 1.18]	0.92 [0.68, 1.26]	0.73 [0.54, 0.98]*	1.55 [1.21, 1.99]***
<b>Annual household income (\$US)</b>								
≤\$19,999	107 (22.50)	215 (32.36)	227 (29.16)	345 (34.54)	0.61 [0.45, 0.83]**	1.12 [0.88, 1.43]	0.92 [0.73, 1.16]	1.32 [1.06, 1.64]*
\$20,000-\$34,999	79 (17.33)	135 (21.55)	119 (17.68)	165 (21.97)	0.82 [0.59, 1.13]	1.14 [0.87, 1.49]	0.82 [0.62, 1.09]	1.21 [0.93, 1.56]
\$35,000-\$59,999	95 (25.85)	110 (21.08)	137 (23.36)	154 (21.36)	1.24 [0.91, 1.68]	0.89 [0.67, 1.18]	1.06 [0.81, 1.38]	0.9 [0.69, 1.16]
≥\$60,000	105 (34.31)	103 (25.01)	135 (29.80)	134 (22.12)	1.53 [1.14, 2.06]**	0.87 [0.65, 1.17]	1.21 [0.93, 1.57]	0.68 [0.53, 0.89]**
Married/Partnered	158 (51.43)	221 (49.27)	238 (49.26)	294 (45.54)	1.16 [0.89, 1.51]	1.04 [0.83, 1.32]	1.04 [0.83, 1.31]	0.84 [0.68, 1.04]

Note. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ ; Percentage is weighted to represent prevalence of each sociodemographic level within each latent class. AOR = adjusted odds ratio, accounting for age, sex, education, income, marital status, race/ethnicity, and sampling weight.

**Table 4**  
Clinical characteristics.

	Low Symptom (n = 386)	Dysphoric (n = 563)	Threat-Reactivity (n = 618)	High Symptom (n = 798)	Low Symptom AOR [95% CI]	Dysphoric AOR [95% CI]	Threat-Reactivity AOR [95% CI]	High Symptom AOR [95% CI]
PTSD Age Onset	$\bar{x}$ (SE) 26.31 (0.89)**	$\bar{x}$ (SE) 22.32 (0.67)	$\bar{x}$ (SE) 25.74 (0.70)	$\bar{x}$ (SE) 21.26 (0.58)**	-	-	-	-
SF-12 MH	45.27 (0.71)**	42.05 (0.65)	44.47 (0.55)**	39.92 (0.55)**	-	-	-	-
SF-12 PH	47.66 (0.73)**	46.73 (0.68)	45.01 (0.65)	43.14 (0.62)**	-	-	-	-
# of Comorbidities	2.54 (0.15)**	3.62 (0.13)	2.71 (0.12)**	4.41 (0.12)**	-	-	-	-
# of Comorbidities w/ depression	3.14 (0.16)**	4.45 (0.14)	3.37 (0.12)**	5.2 (0.13)**	-	-	-	-
n (%)								
<b>Diagnoses</b>								
GAD	86 (22.78)	176 (30.55)	171 (29.68)	304 (41.25)	0.55 [0.4, 0.76]**	0.88 [0.68, 1.12]	0.84 [0.65, 1.09]	1.86 [1.48, 2.34]**
Specific Phobia	57 (13.25)	113 (19.5)	114 (18.03)	194 (25.39)	0.58 [0.39, 0.85]**	0.94 [0.7, 1.25]	0.9 [0.67, 1.22]	1.57 [1.2, 2.04]**
Social Phobia	37 (9.28)	97 (18.65)	69 (11.52)	165 (23.04)	0.49 [0.31, 0.76]**	1.15 [0.84, 1.58]	0.61 [0.43, 0.85]**	1.91 [1.44, 2.52]**
Panic Disorder	51 (13.58)	106 (19.02)	124 (21.79)	271 (36.06)	0.44 [0.3, 0.65]**	0.62 [0.47, 0.84]**	0.88 [0.66, 1.17]	2.46 [1.92, 3.14]**
Agoraphobia	19 (5.94)	48 (8.06)	42 (7.04)	137 (18.03)	0.49 [0.27, 0.91]*	0.64 [0.43, 0.96]*	0.59 [0.39, 0.91]*	2.82 [2.02, 3.92]**
MDD	177 (47.44)	316 (58.2)	300 (48.02)	426 (53.66)	0.75 [0.57, 0.98]*	1.44 [1.13, 1.82]**	0.8 [0.63, 1]	1.11 [0.89, 1.38]
Bipolar I	28 (8.10)	58 (10.41)	46 (7.21)	141 (19.58)	0.63 [0.39, 1.01]	0.72 [0.49, 1.06]	0.51 [0.34, 0.77]**	2.66 [1.93, 3.66]**
Dysthymia (PDD)	55 (13)	137 (24.99)	115 (17.89)	197 (24.5)	0.53 [0.36, 0.78]**	1.39 [1.06, 1.82]*	0.78 [0.59, 1.04]	1.34 [1.04, 1.72]*
Bipolar II	7 (1.9)	8 (1.31)	13 (1.64)	17 (2.73)	0.95 [0.37, 2.45]	0.51 [0.22, 1.2]	0.84 [0.4, 1.76]	1.88 [0.85, 4.18]
AUD	185 (49.43)	309 (55.37)	277 (45.51)	441 (56.23)	0.87 [0.66, 1.14]	1.08 [0.85, 1.38]	0.73 [0.58, 0.93]**	1.38 [1.1, 1.72]**
Nicotine Dep.	165 (44.3)	320 (59.99)	264 (44.31)	427 (54.96)	0.76 [0.58, 1]	1.49 [1.16, 1.91]**	0.69 [0.55, 0.87]**	1.22 [0.98, 1.52]
Cannabis Dep.	53 (14.02)	111 (20.55)	78 (12.35)	156 (21.03)	0.76 [0.51, 1.13]	1.18 [0.87, 1.61]	0.65 [0.46, 0.91]**	1.45 [1.08, 1.94]*
Drug Use Dis.	60 (18.05)	120 (23.14)	87 (13.94)	188 (22.93)	0.94 [0.65, 1.36]	1.19 [0.88, 1.62]	0.62 [0.45, 0.85]**	1.32 [1.01, 1.73]*
Borderline PD	131 (33.61)	305 (54.37)	239 (36.41)	502 (62.95)	0.5 [0.38, 0.66]**	1.21 [0.95, 1.55]	0.55 [0.43, 0.71]**	2.32 [1.85, 2.91]**
Schizotypal PD	53 (13.31)	162 (29.69)	101 (13.30)	311 (40.67)	0.41 [0.28, 0.59]**	1.18 [0.9, 1.54]	0.37 [0.27, 0.51]**	2.86 [2.26, 3.63]**
Antisocial PD	26 (6.25)	64 (11.42)	53 (8.63)	127 (16.5)	0.48 [0.29, 0.81]**	0.89 [0.62, 1.29]	0.72 [0.48, 1.07]	2.06 [1.49, 2.85]**
Lifetime Suicide Attempt	45 (11.12)	145 (28.36)	105 (16.32)	302 (39.54)	0.32 [0.21, 0.48]**	1.12 [0.84, 1.49]	0.51 [0.38, 0.68]**	2.7 [2.12, 3.44]**

Note. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ ; Percentage is weighted to represent prevalence of each sociodemographic level within each latent class. AOR = adjusted odds ratio, accounting for age, sex, education, income, marital status, race/ethnicity, and sampling weight. PTSD = posttraumatic stress disorder; SF-12 = Short Form 12 Health Survey; lower scores indicate poorer health-related quality of life; MH = mental health; PH = physical health; GAD = generalized anxiety disorder; MDD = major depressive disorder; PDD = persistent depressive disorder; AUD = alcohol use disorder; Dep. = dependence; Dis. = disorder; PD = personality disorder.



year homelessness and unemployment. This may be because socioeconomic variables are impacted by the functional impairment that can be associated with a greater number of PTSD symptoms, perhaps in conjunction with the extensive additional psychiatric burden among those in the High symptom class. This observation – that members of the High Symptom class appear more socioeconomically disadvantaged – may also be relevant for treatment utilization, as those in the High Symptom class were significantly more likely to receive a variety of treatment modalities (i.e., medication and counseling). This additional treatment receipt could be due to greater treatment referrals as a result of additional contact with social service agencies subsequent to socioeconomic strain, or as a result of independent efforts to address distress stemming from the high PTSD symptom burden and concomitant psychiatric profiles. Although the relationship between high and low symptoms and socioeconomic attainment may be intuitive, these relationships do support the potential predictive nature of these subtypes and the potential for symptom classes to be related to qualitatively different clinical presentations. Future research should explore reasons for treatment seeking/receipt among the High Symptom class in greater detail, as the current data do not afford examination of these hypotheses.

The identified differences in trauma exposure characteristics by latent class membership also support potentially meaningful distinctions between classes and possible differences in PTSD etiology. Individuals in the High Symptom class tended to have a younger age of onset relative to the other classes, consistent with literature indicating greater severity of symptoms for those with younger age of onset (Ehring and Quack, 2010; Van der Kolk, Roth, Pelcovitz, Sunday and Spinazzola, 2005). Consistent with literature identifying proximity to the trauma as an indicator of symptom severity (e.g., Adams and Lehnert, 1997; Blanchard et al., 2005; Neria et al., 2008), individuals in the High Symptom class were more likely to endorse personally experiencing combat or childhood sexual trauma as their “worst event” and individuals in the Low Symptom class were more likely to endorse traumas occurring to “a close other” rather than to themselves directly. Given the relatively greater functional impairment among those in the High Symptom class, childhood trauma or combat may be more broadly impactful and damaging. In contrast, the collective trauma of experiencing a natural disaster, which was the most endorsed trauma in the Threat-Reactivity class, may be associated with less overall impairment.

Potentially providing more insight into the distinction between PTSD subtypes, and the potential for the clinical utility of these subtypes, are differences in the number and type of endorsed comorbidities. For example, those in the Dysphoric class were more likely to endorse depressive comorbidities such as Major Depressive Disorder and Persistent Depressive Disorder (consistent with Horn et al., 2016), as well as Nicotine Dependence. These individuals appear to be characterized by the significant overlap in some symptoms between PTSD and depression, and their presence as a distinct class may help account for the substantial comorbidity between PTSD and MDD (e.g., Pietrzak et al., 2011). Consistent with our findings regarding treatment utilization, socioeconomic impairment, and diverse symptom endorsement, the High Symptom class was generally more likely to endorse a variety of diagnostic comorbidities, lifetime suicide attempts, and relatively lower mental and physical health (i.e., higher SF-12 scores).

The findings regarding the High Symptom class comorbidities and trauma exposure are consistent with LCAs related to the ICD-11 conceptualization of Complex PTSD, in which individuals with Complex PTSD are more likely to endorse childhood trauma and greater functional impairment than those with “classic PTSD” (e.g., Ben-Ezra et al., 2018; Karatzias et al., 2017). As the High Symptom class was generally associated with more personality pathology, it is possible that this class is capturing individuals with difficulties extending beyond the PTSD criteria and possibly associated with CPTSD. In contrast, the Low Symptom or Threat-Reactivity classes may more closely resemble the classic PTSD diagnosis found in ICD-11, with higher probability of

endorsing only the symptoms required for diagnosis via that classification system.

Despite the strengths of this study, such as its use of a large and diverse sample, there are limitations. Perhaps the largest limitation is the method used to assess PTSD symptoms. Although the questions asked in the AUDADIS-5 (Grant et al., 2011) were conceptually similar to those in traditional measures of PTSD (e.g., PCL-5; Weathers et al., 2013), and the measure has since demonstrated good psychometric properties (Hasin et al., 2015), the measure had not been validated prior to its use in the NESARC-III. Additionally, the study was cross-sectional and retrospective, and did not allow for examination of change in symptom presentation over time. The retrospective nature of these questions may have also impacted the validity of the lifetime PTSD diagnosis. Although the NESARC-III PTSD questions were informed by existing measures, many measures of PTSD are not designed for long-term retrospective assessment and participants may have had difficulty establishing the temporal proximity of symptoms. Future longitudinal research that can more accurately capture the appearance of psychiatric comorbidity and functional impairment subsequent to trauma exposure would add further useful distinctions among these classes.

Despite these shortcomings, this is one of the first studies to examine latent classes with the DSM-5 criteria for PTSD and the only study, to our knowledge, that restricts the sample to those who meet diagnostic criteria for PTSD. Furthermore, this study replicates the identification of the High-Symptom, Dysphoric, and Threat-Reactivity classes that have now been identified across samples, study design, and additional diagnostic criteria (e.g., Horn et al., 2016; Pietrzak et al., 2014). The identification of a fourth class found in this and one other study (Minihan et al., 2018), is not in opposition to previous research, but appears to provide a more detailed and nuanced picture of potential symptom profiles.

Although, the replication of previously identified symptom profiles in a large, nationally representative sample is an important finding, this study also provided evidence for qualitative difference in variables related to clinical presentation such as socioeconomic attainment, psychiatric comorbidity, and trauma characteristics. For example, the High, Dysphoric and Threat symptom, classes were more likely to experience proximal traumas, whereas only the High symptom group was more likely to experience interpersonal trauma in addition to experiencing greater psychiatric comorbidity, and more signs of functional impairment. These relationships provide context for the differences in symptom configuration between symptom profiles and speaks to the potential clinical utility of these profiles in identifying risk and protective factors.

In addition to providing information regarding clinical presentations associated with PTSD subtypes, these profiles may also inform future research attempting to implement precision mental health treatment. For example, future research may wish to explore whether membership in a symptom class moderates treatment response with regards to dropout rates, treatment acceptability, symptom change, or changes in functional impairment. This precision medicine approach may provide useful information on how to best match individuals with PTSD to existing evidence-based treatments such as PE (Foa et al., 2007) and Cognitive Processing Therapy (Resick et al., 2010) that seem to theoretically align with the Threat and Dysphoric symptom classes respectively. Offering treatments tailored to precise clinical presentations may help remedy the existing challenges in PTSD treatment, such as non-response (Loerinc et al., 2015) and drop-out (Imel et al., 2013), and may inform the development of treatments better suited to individuals who do not respond to existing treatments.

## 5. Conclusions

The current study was among the first to use DSM-5 PTSD criteria to form the basis of a LCA in a nationally representative sample of

American adults. Fit indices recommended a four-class solution to the data, revealing classes characterized by Dysphoric symptoms, Threat-Reactivity symptoms, low levels of most symptoms ("Low Symptom"), and high levels of most symptoms ("High Symptom"). Exploratory linear and logistic regression analyses supported distinct associations between classes and socio-demographic variables, trauma type, and psychiatric comorbidities. Among these exploratory analyses, the largest effects were observed in the categories of trauma type and co-occurring diagnoses. While the study is limited by cross-sectional design, it supports prior LCA research using DSM-IV-TR PTSD criteria and extends it by revealing a fourth class. Furthermore, it provides evidence for symptom typologies developing in response to specific trauma types, within specific demographic profiles, and with qualitatively distinct psychiatric comorbidities. These relationships not only further support the potential uniqueness of these subtypes, but may enable early identification of likely symptom profiles and potential avenues for precision treatment.

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## Declaration of Competing Interest

None.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2020.112779.

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