



## Research Paper

# The phenomenology of nightmares in post-traumatic stress disorder and complex post-traumatic stress disorder

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## ABSTRACT

**Introduction:** Nightmares are a re-experiencing symptom of Post-Traumatic Stress Disorder (PTSD) and Complex PTSD (CPTSD). They are intrusive, involuntary and have a significant impact on wellbeing, suggesting they have substantial clinical relevance. However, little is known about the phenomenological features of post-traumatic nightmares and how they are associated with the severity of PTSD and CPTSD symptoms.

**Method:** Participants ( $N = 398$ ) who identified that they had experienced a lifetime trauma completed various self-report questionnaires related to PTSD symptoms, CPTSD symptoms and nightmare characteristics. Participants also described their sensory experiences and rated the emotional intensity and vividness of their post-traumatic nightmares.

**Results:** We found that elevated scores on various characteristics of nightmares including frequency of awakenings, nightmare severity, impact on wellbeing and the perceived realism of the nightmare were linked to more severe PTSD and CPTSD symptoms. Further, increased frequency, vividness, and emotional intensity of nightmares significantly predicted more severe PTSD symptoms but not CPTSD symptoms.

**Conclusions:** Our study was largely exploratory and was the first to identify that specific nightmare features are related to PTSD and CPTSD symptom severity. However, although nightmare features of frequency, vividness and intensity appear to be related to CPTSD symptom severity, other variables may better predict CPTSD symptoms. Possible explanations for our findings, implications for treatment and directions for future research are discussed.

## 1. Introduction

Post-Traumatic Stress Disorder (PTSD) may arise following exposure to, witnessing or learning about a significantly stressful event (American Psychiatric Association, 2013) such as combat exposure (Phillips et al., 2018), a natural disaster (Fernandez et al., 2017), sexual assault (Dworkin et al., 2021), or an accident (Beck & Coffey, 2007). It is a potentially chronic disorder which in the current International Classification of Diseases version-11 (ICD-11; World Health Organisation (WHO), 2019) is characterised by three symptom clusters of re-experiencing (e.g. intrusive memories through flashbacks and distressing dreams); avoidance of traumatic reminders (e.g. of internal or external reminders of the trauma) and a perceived sense of threat (e.g. disturbed sleep, hypervigilance and startle responses), which must be present for several weeks following the stressful event and cause

significant difficulties in daily functioning. Although most individuals (approximately 75%) experience a traumatic event during their lifetime (Mills et al., 2011) only a minority will develop PTSD, such that its global point-prevalence is 3.4% to 26.9% (Koenen et al., 2017; Schein et al., 2021). PTSD can have lifelong effects and result in significant health-costs and a high burden on society (Bothe et al., 2020).

A diagnosis of complex-PTSD (CPTSD) has recently been introduced to the ICD-11 (WHO, 2019). This is considered to be a more severe manifestation of PTSD that may occur after prolonged trauma that is typically interpersonal in nature such as captivity or sexual slavery. CPTSD has a lifetime prevalence of 0.5% to 3.8% worldwide (Ben-Ezra et al., 2018) and includes experiencing symptoms of disturbances in self-organisation (DSO) including affective dysregulation (e.g., problems calming down), negative self-concept (e.g. negative beliefs about oneself) and disturbed relationships (e.g. interpersonal difficulties) in

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addition to the aforementioned symptom clusters of PTSD (Giourou et al., 2018).

Nightmares fall under the re-experiencing cluster of PTSD symptoms. Typical (idiopathic) nightmares occur in 2% to 5% of the population and are defined as distressing dreams which awaken the sleeper (Li et al., 2010; Sandman et al., 2013). However, nightmares which are precipitated by a life-threatening event or a perceived harm to one's emotional or physical safety, referred to as post-traumatic nightmares, may present as recurrent and involuntary intrusive recollections of the trauma (Phelps et al., 2008). These negative, intrusive recollections elicit intense emotions, resulting in a sense of threat and lead to maladaptive coping strategies such as avoiding potential triggers which contributes to the maintenance of PTSD (Holmes et al., 2016). Over time, PTSD symptoms may result in persistent mental and emotional stress, aggression, poor concentration and poor quality of life (Giacco et al., 2013; Sevon et al., 2018).

Preliminary evidence suggests that sleep disturbances such as insomnia may commonly occur with CPTSD. Grossman et al. (2019) determined that the severity and functional impact of insomnia were perceived to be greater in those with CPTSD compared to those with PTSD and no-PTSD diagnosis. Moreover, elevated insomnia was associated with DSO symptoms (which are distinctive to CPTSD) beyond the typically reported PTSD elements of hyperarousal and reoccurring thoughts (Grossman et al., 2019). However, no known studies have examined the prevalence and characteristics of nightmares amongst people with CPTSD symptoms.

Nightmares are a specific form of mental imagery. Mental imagery is a sensory-perceptual experience and is critical in our ability to remember, plan, navigate and make decisions, but it can also occur as an involuntary experience in the form of intrusive images, which spontaneously enter our consciousness and have a significant emotional impact (Holmes, 2003). Although idiopathic and post-traumatic nightmares are not separated in most studies, it is commonly accepted that they are distinctly different. Compared to idiopathic nightmares, post-traumatic nightmares tend to be frequent, recurrent, involve mental images related to a traumatic memory, are emotionally intense and are more perceptually vivid (Phelps et al., 2011). These features have not been adequately explored but are important in understanding how nightmares may relate to overall PTSD symptom severity.

Nightmares are common following trauma and are thought to aid emotional processing of the event. They typically subside over time (Hackmann, 2011), however, approximately 70% of people with PTSD will experience frequent and persistent nightmares which remain even after treatment, suggesting they are of substantial clinical relevance (Barrett, 2001). In a study of 32 veterans who met criteria for PTSD, 88% of participants reported experiencing at least weekly nightmares (Harb et al., 2017). This was reinforced by Wakschal et al. (2018) who determined that more severe PTSD symptoms were associated with greater nightmare frequency, but not the level of distress associated with nightmares, highlighting a link between PTSD and nightmare frequency. However, no studies have examined whether nightmare frequency is associated with CPTSD symptoms.

Perceptual vividness describes how clear and "life-like" the individual perceives the nightmare image and is often linked to a sense that what is occurring in the intrusive memory is happening in the present, where the individual relives their trauma (Birrer et al., 2007). Michael et al. (2005) examined daytime intrusive memories in survivors of sexual assault and determined that the vividness of the intrusions such as the "here-and-now" quality as well as the severity of distress strongly predicted PTSD symptoms. There is a well-established continuity between waking-life and dreams (Wittmann et al., 2007). Like daytime mental intrusions, post-traumatic nightmares are described as especially vivid and distressing. However, only one study has investigated the vividness of mental imagery in PTSD nightmares. Phelps et al. (2018) examined via self-report questionnaires the vividness (determined by sharpness, clearness and detail) of nightmares in veterans diagnosed

with PTSD. It was found that the vividness of images and sensory experiences was greatest in the nightmares which depicted replay-content (direct replications of the traumatic event) compared to nightmares that displayed non-replay content (Phelps et al., 2018). This highlights a significant gap in the literature as there are currently no studies which link the vividness of nightmares to the severity of PTSD symptoms. Additionally, no studies have examined perceptual vividness in nightmares experienced by those with CPTSD.

Little is known about the affective nature of nightmares experienced by individuals suffering from PTSD. During post-traumatic nightmares, where an individual may re-experience their trauma, typical emotions which occur include grief, fear, anger, shame and guilt (Duval & Zadra, 2010; Harb et al., 2012). Highly vivid images such as those experienced in post-traumatic nightmares may be more compelling, and thus, highly linked with emotional intensity (Holmes & Hackmann, 2004). A study by Hartmann and Brezler (2008) found that when comparing dreams before and after the 9/11 terrorist-attacks there was an increase in the emotional intensity of the central image (an image that stands out by being powerful, vivid, bizarre, or detailed) of the dream, highlighting the link between trauma and the emotional intensity of night-time mental imagery. The emotional intensity of post-traumatic nightmares also leads to negative appraisals of the intrusions, exacerbating nightmare distress (Holmes & Hackmann, 2004). Further, nightmare intensity and frequency are often associated with daytime fatigue, irritability, feelings of helplessness, arousal, nocturnal awakenings accompanied by anxiety, insomnia, and suicide (Detweiler et al., 2012; Phelps et al., 2008; Sandman et al., 2017), which all negatively impact wellbeing. To date, no studies have examined the emotional intensity of nightmares experienced by those with CPTSD.

Our emerging understanding of nightmare frequency and the characteristics of nightmares has important implications for understanding the phenomenology of PTSD and CPTSD and for recognising opportunities for treatment. The current study sought to examine the frequency and characteristics of trauma-related nightmares amongst people who reported a lifetime exposure to a potentially traumatic event. Initially, the key features of nightmares were explored in relation to PTSD and CPTSD symptom severity. While CPTSD may simply reflect a more severe manifestation of PTSD, it remains unknown how core re-experiencing symptoms such as nightmares manifest in CPTSD. On the one hand, the conceptual distinction of CPTSD from PTSD emphasises interpersonal, self-concept and emotion regulation difficulties rather than simply a greater prominence of re-experiencing symptoms, such as nightmares. However, as CPTSD is thought to arise from more protracted and developmentally aligned traumas, re-experiencing symptoms such as nightmares could be expected to be more vivid, frequent, and emotional when compared to PTSD alone. We hypothesised that nightmares perceived as more frequent, vivid, and intense would be associated with more severe PTSD symptoms. Regarding CPTSD, our hypothesis was essentially exploratory given the dearth of previous research. Nonetheless, on the basis that PTSD is a pre-requisite for a diagnosis of CPTSD, and that CPTSD likely reflects a more severe manifestation of PTSD, we tentatively predicted that compared with PTSD alone, CPTSD would be associated with more frequent vivid and intense nightmares.

## 2. Materials and methods

### 2.1. Participants

A total of 450 respondents were recruited and commenced the survey. The final sample ( $N = 398$ ) included those who completed all relevant measures. Participants were English-speaking adults (199 Female,  $M = 37.00$ ,  $SD = 12.34$ ) who were 18-years-old or older and endorsed exposure to at least one traumatic event, equivalent to a DSM-V "Criterion A Stressor" (defined as an event which involves actual or threatened death, a serious injury or attempted/direct sexual violence).

Recruitment occurred via the Prolific academic online platform, which provided a diverse sample consisting of various age groups and cultural backgrounds (Wright, 2005). Participants were paid at the rate of GBP£5 per hour for their time.

## 2.2. Materials

Demographic information including age, sex and education was collected from each participant. Participants also completed the following questionnaires from a broader battery of measures.

The Trauma History Questionnaire (THQ; Green 1996) is a self-report measure consisting of 24-items which screen for lifetime exposure to potentially traumatic experiences meeting the DSM-5 “Criterion A stressor” for PTSD such as crime, general disaster, sexual and physical assault. The THQ has good test-retest reliability and construct validity as demonstrated by previous studies (e.g. Hooper et al., 2011).

The International Trauma Questionnaire (ITQ; Cloitre et al., 2018) was developed to screen for past-month ICD-11 symptoms of PTSD and CPTSD (with the DSO items corresponding to CPTSD-specific criteria). The ITQ is a self-report measure consisting of 18-items which are measured on a 5-point Likert scale from 0 (*not at all*) to 4 (*extremely*). It demonstrates good concurrent and discriminant validity as demonstrated by previous studies (e.g. Cloitre et al., 2018; Sele et al., 2020). It also has strong internal consistency for the PTSD items (Cronbach’s  $\alpha = 0.88$ ) and the DSO items (Cronbach’s  $\alpha = 0.91$ ) as determined in the current study.

The Nightmare Distress Questionnaire (Belicki, 1992) is a self-report measure consisting of 13-items which examine general nightmare distress, impact on daytime reality perception and impact on sleep, without reference to a particular time interval. Items are assessed on a 5-point Likert scale from 1 to 5, where higher scores indicate greater distress. It demonstrates criterion and divergent validity as indicated by previous studies (e.g. Böckermann et al., 2014). It also has strong internal consistency (Cronbach’s  $\alpha = 0.93$ ) as determined in the current study.

The Disturbing Dream and Nightmare Severity Index (Krakow et al., 2002) is a self-report measure consisting of five-items which assess frequency, intensity and severity of disturbing dreams and nightmares, as well as the frequency of nightmare-related awakenings, without reference to a particular time interval. It demonstrates good test-retest reliability, as well as convergent and divergent validity as determined by previous studies (e.g., Bolstad et al., 2021; Lee et al., 2021).

The Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001) is a self-report screener measure for depressive symptoms and consists of 9-items which assess the severity of depression over the last two weeks. Each item is rated on a 4-point Likert scale from 0 (*not at all*) to 3 (*nearly every day*) where higher scores indicate greater depression. The PHQ-9 total score ranges from 0 to 27 (scores of 5–9 is classified as mild; 10–14 as moderate; 15–19 as moderately severe;  $\geq 20$  as severe). It demonstrates good criterion and construct validity as determined by previous studies (e.g. Kroenke et al., 2001; Rahman et al., 2022). It also has excellent internal consistency (Cronbach’s  $\alpha = 0.91$ ) as determined in the current study.

The General Anxiety Disorder Questionnaire (GAD; Spitzer et al., 2006) is a self-report screener measure for generalised anxiety and consists of 7-items which assess the severity of anxiety over the last two weeks. The GAD-7 total score ranges from 0 to 21 (scores of 0–4 is classified as minimal, 5–9 as mild, 10–14 as moderate, 15–21: as severe). The items are rated on a 4-point Likert scale from 0 (*not at all*) to 3 (*nearly every day*) where higher scores indicate greater anxiety. It demonstrates good criterion and construct validity as indicated by previous studies (e.g. Löwe et al., 2008). It also has excellent internal consistency (Cronbach’s  $\alpha = 0.93$ ) as determined in the current study.

Participants were also asked to provide a written description of their most upsetting trauma-related nightmare in the past month and were prompted to describe the sensory features of the trauma-related

nightmare in their description (what they could see, smell, taste, hear and touch). The presence and absence of sensory features in each description were rated by two independent researchers. The percentage agreement rate ranged from 85% to 99% and the Cohen’s Kappa ranged from 0.75 to 0.92 indicating “substantial” to “almost perfect” levels of agreement between the two-raters (Landis & Koch, 1977, p.165). Participants also rated the vividness and emotional intensity of their trauma-related nightmares on a scale from 0 to 10.

## 2.3. Procedure

Research was approved by the University of Technology Sydney Human Research Ethics Committee (ETH21–6653) and all participants provided informed consent. Individuals who were registered on Prolific were able to participate in the study. Those who met the inclusion criteria were then redirected to the Qualtrics online survey platform to complete the questionnaires.

## 2.4. Data analysis

Data was exported from Qualtrics into Version-27 of Statistical Package for Social Sciences (SPSS) for analysis. Descriptive statistics were used to summarize the demographic characteristics of participants. To compare the characteristics of nightmares at particular levels (e.g., “severe”; “always”) to the severity of PTSD and CPTSD symptoms, independent sample t-tests were conducted with a Bonferroni correction to adjust for 20 multiple comparisons ( $0.05/20 = 0.0025$ ;  $0.01/20 = 0.0005$ ). Independent samples t-tests were also conducted to compare levels of PTSD/CPTSD symptoms for participants who did and did not include reference to each respective sensory characteristic in their nightmare descriptions. Pearson’s correlations were calculated to examine associations between nightmare characteristics and PTSD/CPTSD total symptom scores respectively. Six separate linear regression analyses were performed to examine the connections between the features of nightmares, including frequency, vividness, and intensity, and the extent of symptoms for PTSD and CPTSD respectively. In line with our study hypotheses, we predicted the dimensional total-scores of PTSD and CPTSD symptoms (using ICD-11 total-scores) rather than a dichotomous presence/absence of PTSD and CPTSD on the basis that there is not yet a validated interviewer-based assessment for the diagnosis of CPTSD and given that the prediction of continuous variables provides greater sensitivity than the prediction of binary variables (Wright, 2003).

## 3. Results

A total of 52 responses were deleted from the study due to incomplete data which followed a monotonic missing data pattern across the questionnaires, thus precluding imputation approaches which assume data to be missing at random or missing completely at random (Graham, 2009). The final sample thus comprised 398 participants. The socio-demographic data of participants are outlined in Table 1. It is noteworthy that 46.7% of participants identified as female, the mean age of participants was 37 years old, 72.6% of participants were White, and 51.0% of participants had completed post-school education.

Nightmares were endorsed by a high proportion of the overall sample (92.2%) and 21.8% of the overall sample reported that they experience weekly nightmares. Of those who endorsed experiencing nightmares at least yearly ( $n = 367$ ), 87 (23.7%) endorsed experiencing at least weekly nightmares, 258 (70.2%) endorsed experiencing nightmares at least monthly, and 270 (73.6%) reported that they were “frequently” or “always” woken by their nightmares. Not all participants experiencing nightmares felt they needed professional help in managing their nightmares: only 141 (38.4%) reported that they would be “somewhat”, “very” or “extremely” interested in participating if a therapy program were available to help them stop or control their

**Table 1**  
Demographic characteristics.

Variable	n	%
Female	199	46.7
Race		
White	289	72.6
Black or African American	44	11.1
Asian or Pacific Islander	33	8.3
Native American or Alaskan	2	0.5
Multiracial or Biracial	19	4.8
Other	11	2.8
Hispanic ethnicity	16	4.0
Post school education completed	203	51.0
Experiences nightmares (at least weekly)	85	21.4
	Mean	SD
Age	37.00	12.34

Note. N = 398 which is the overall sample.

nightmares.

### 3.1. Independent samples t-test

Independent samples t-tests were performed to compare the means of PTSD and CPTSD symptoms respectively for various levels of nightmare characteristics (Table 2). Participants who reported being woken-up “frequently or always” (M = 9.80, SD=6.66) by their nightmares had more severe PTSD symptoms (t (195.96) = 4.34, p<.001) compared to those who reported being woken-up less than “frequently or always” (M

= 6.73, SD=5.71). Similarly, those who were woken up by their nightmares “frequently or always” (M = 12.04, SD=7.04) reported more severe CPTSD symptoms (t (365) = 3.89, p<.001) compared to those who were woken less than “frequently or always” (M = 8.84, SD=6.68).

Participants who reported that the severity of their nightmares was “severe or greater” (M = 16.17, SD=6.27) displayed more PTSD symptoms (t (365) = 9.77, p<.001) compared to those who reported their nightmares were “less than severe” (M = 7.75, SD=5.77). Further, those who reported that the severity of their nightmares was “severe or greater” (M = 17.44, SD=5.41) displayed more CPTSD symptoms (t (84.48) = 8.84, p<.001) compared to those who reported that their nightmares were “less than severe” (M = 10.11, SD=6.77).

Participants who reported that their nightmares affected their wellbeing “definitely or a great deal” (M = 16.04, SD=6.26) displayed more severe PTSD symptoms (t (365) = 8.79, p<.001) compared to those who reported that their nightmares affected their wellbeing “less than definitely or a great deal” (M = 7.93, SD=5.92). Also, those who reported that their nightmares impacted their wellbeing “definitely or a great deal” (M = 16.71, SD=5.86) displayed more severe CPTSD symptoms (t (68.04) = 6.83, p<.001) compared to those who reported that their nightmares impacted their wellbeing “less than definitely or a great deal” (M = 10.36, SD=6.88).

Participants who reported that their nightmares “often or always” seemed real (M = 13.35, SD=6.72) displayed more severe PTSD symptoms (t (141.51) = 7.50, p<.001) compared to those who reported that their nightmares seemed real “less than often or always” (M = 7.51, SD=5.80). Further, those who reported that their nightmares “often or

**Table 2**  
Nightmare characteristics amongst participants endorsing nightmares.

Variable and item response threshold	PTSD symptom total score			DSO symptom total score		
	Mean	SD	Independent samples t-test <sup>#</sup> t, df, p-value <sup>a</sup>	Mean	SD	Independent samples t-test <sup>#</sup> t, df, p-value <sup>a</sup>
Woken up by nightmares						
< “Frequently” or “always” (n = 97, 26.4%)	6.73	5.71	4.34, 195.96, <0.001**	8.84	6.68	3.89, 365, 0.00012**
“Frequently” or “always” (n = 270, 73.6%) <sup>†</sup>	9.80	6.66		12.04	7.04	
< “Always” (n = 273, 74.4%)	8.18	6.29	4.13, 365, <0.001**	10.61	6.90	2.71, 365, 0.0070
“Always” (n = 94, 25.6%)	11.35	6.75		12.88	7.35	
Severity of nightmares						
< “Severe”, “Very Severe” or “Extremely Severe” Problem (n = 313, 85.3%)	7.75	5.77	9.77, 365, <0.001**	10.11	6.77	8.84, 84.48, <0.001**
“Severe”, “Very Severe” or “Extremely Severe” Problem (n = 54, 14.7%)	16.17	6.27		17.44	5.41	
Nightmare impact on wellbeing						
< “Definitely” or “a great Deal” (n = 319, 86.9%)	7.93	5.92	8.79, 365, <0.001**	10.36	6.88	6.83, 68.04, <0.001**
“Definitely” or “a great Deal” (n = 48, 13.1%)	16.04	6.26		16.71	5.86	
Do your nightmares seem real						
< “Often” or “always” (n = 274, 74.7%)	7.51	5.80	7.50, 141.51, <0.001**	9.71	6.78	7.74, 174.54, <0.001**
“Often” or “always” (n = 93, 25.3%)	13.35	6.72		15.55	6.11	
Sensory characteristics						
No sound (n = 251, 68.4%)	8.35	6.35	2.78, 365, 0.0057	10.91	7.13	1.11, 365, 0.27
Sound (n = 116, 31.6%)	10.38	6.80		11.79	6.96	
No visual (n = 127, 34.6%)	8.06	6.73	2.00, 365, 0.046	10.53	7.39	1.31, 365, 0.19
Visual (n = 240, 65.4%)	9.49	6.42		11.54	6.90	
No olfactory (n = 323, 88.0%)	8.38	6.36	4.97, 365, <0.001**	10.79	7.01	2.95, 365, 0.0034
Olfactory (n = 44, 12.0%)	13.45	6.31		14.11	6.94	
No taste (n = 358, 97.5%)	8.92	6.53	1.29, 365, 0.20	11.23	7.10	-0.65, 365, 0.61
Taste (n = 9, 2.5%)	11.78	7.31		9.67	6.14	
No touch (n = 257, 70.0%)	8.59	6.44	1.81, 365, 0.071	11.05	7.14	0.58, 365, 0.56
Touch (n = 110, 30.0%)	9.94	6.75		11.52	6.96	

Note. n = 367.

DSO = Disturbances of Self-Organisation; PTSD = Post-traumatic Stress Disorder.

<sup>a</sup> t-test comparing PTSD/CPTSD symptoms for the presence versus absence of each respective characteristic or response threshold.

<sup>#</sup> In instances where the degrees of freedom are not an integer, Levene’s test of equality of variance was significant and equal variances were not assumed.

<sup>†</sup> The “Frequently” or “Always” item response threshold includes all participants who responded at the level of “Always” as well as all the participants who responded at the level of “Frequently”.

\* p<.05.

\*\* p<.01 after a Bonferroni correction for 20 comparisons (0.05/20 = 0.0025; 0.01/20 = 0.0005) – such that 0.0025 and 0.0005 become the critical thresholds for p < .05 and p < .01 respectively.

always” seemed real ( $M = 15.55, SD=6.11$ ) displayed more severe CPTSD symptoms ( $t(174.54) = 7.74, p < .001$ ) compared to those who reported their nightmares seemed real “less than often or always” ( $M = 9.71, SD=6.78$ ).

A series of independent t-tests were performed to determine differences in symptoms between narrative accounts of nightmares which did or did not include sensory characteristics (auditory, visual, olfactory, taste and/or touch). Those who reported olfactory sensory experiences ( $M = 13.45, SD=6.31$ ) displayed more severe PTSD symptoms ( $t(365) = 4.97, p < .001$ ) compared to those who did not endorse olfactory sensory experiences ( $M = 8.38, SD=6.36$ ). No other sensory-experience comparisons were significant after a Bonferroni correction ( $p > .05$ ).

### 3.2. Correlations

Pearson’s correlations were performed amongst participants who endorsed nightmares ( $n = 367$ ) to explore relationships between nightmare frequency, vividness, and emotional intensity on the one hand, and PTSD and CPTSD symptom severity on the other, as outlined in Table 3. There were significant small-to-medium-sized positive correlations between nightmare frequency, vividness and emotional intensity and PTSD ( $r$ 's = 0.48, 0.36 and 0.39, all  $p$ 's < 0.01 after Bonferroni-correction) and CPTSD ( $r$ 's = 0.36, 0.26 and 0.33, all  $p$ 's < 0.01 after Bonferroni-correction) symptoms.

### 3.3. Regression analysis

The results of multiple linear regression analyses investigating features of nightmares amongst participants who endorsed nightmares ( $n = 367$ ) are summarised in Table 4. Multicollinearity was not evident in that all variance inflation factor values were below 10 (Field, 2003).

Two regression analyses were used to test whether the frequency of nightmares per-month predicted ICD-11 PTSD symptom severity and CPTSD symptom severity (i.e., Disturbances in Self Organisation) in the context of age, sex, depressive symptoms, and anxiety symptoms. The results of the regression predicting PTSD symptoms indicated that collectively, the predictors explained 49% of the overall variance ( $F(5, 366) = 67.91, p < .001$ ). Participants with more frequent nightmares endorsed more severe PTSD symptoms (95% CI = 0.18, 0.35). However, nightmare frequency was not a significant predictor of CPTSD symptom severity (“DSO” total score; 95% CI = -0.07, 0.09), with the predictor variables collectively explaining 66% of the variance ( $F(5, 366) = 137.03, p > .05$ ).

Two further regression analyses tested whether nightmare vividness predicted PTSD and CPTSD symptom severity respectively. The results of the regression predicting PTSD symptoms indicated that collectively, the predictors explained 47% of the overall variance in PTSD scores ( $F(5, 366) = 63.37, p < .001$ ). Participants with more vivid nightmares endorsed more severe PTSD symptoms (95% CI = 0.29, 0.68). However, nightmare vividness did not independently predict CPTSD symptoms (95% CI = -0.04, 0.30), with the predictor variables collectively

**Table 3**  
Pearson’s correlations between nightmare characteristics and PTSD/CPTSD symptoms.

Variable	1	2	3	4
1 Monthly Nightmare Frequency	-			
1 Nightmare Vividness	.32**	-		
1 Nightmare Intensity	.41**	.79**	-	
1 PTSD Symptoms	.48**	.36**	.39**	-
1 CPTSD Symptoms	.36**	.26**	.33**	0.62**

Note.  $n = 367$  which consists of those who self-reported endorsing nightmares. PTSD = Post-traumatic Stress Disorder, CPTSD = Complex Post-traumatic Stress Disorder.

\* $p < .05$ .

\*\*  $p < .01$  after correction for 10 comparisons.

explaining 66% of the variance ( $F(5, 366) = 138.35, p > .05$ ).

A fifth and sixth regression analysis was used to test whether the emotional intensity of nightmares predicted PTSD and CPTSD symptom severity respectively. The results of the regression predicting PTSD symptoms indicated that collectively, the predictors explained 47% of the overall variance ( $F(5, 366) = 63.19, p < .001$ ). Participants with more emotionally intense nightmares endorsed more severe PTSD symptoms (95% CI = 0.30, 0.70). However, nightmare intensity was not a significant independent predictor of the severity of CPTSD symptoms (95% CI = -0.02, 0.33), with the predictor variables collectively explaining 66% of the variance ( $F(5, 366) = 138.84, p > .05$ ).

For the interested reader we also conducted additional analyses using proxy diagnoses derived from the recommended diagnostic algorithms for the ITQ, as outlined in Supplementary Table 1. Given the potential for overlapping content between the nightmares variables and nightmares-related items of the ITQ, we also re-ran the analyses for Tables 2–4 after re-calculating the ITQ PTSD total score without Item 1 (*Having upsetting dreams that replay part of the experience or are clearly related to the experience?*). The results of these analyses are reported in Supplementary Tables 2–4. In all instances, the pattern of relationships remained the same.

## 4. Discussion

Our study aimed to investigate the frequency and key features of trauma-related nightmares amongst adults who reported experiencing a potentially traumatic event during their lifetime. Although nightmares are a hallmark feature of PTSD, in most research studies they are listed as a symptom but not assessed in detail or acknowledged as having a potentially pivotal role in therapy. Consequently, no studies have examined whether specific features of nightmares are associated with PTSD symptom severity. In addition, CPTSD requires a PTSD diagnosis and thus, is typically considered a more severe manifestation of PTSD, but no studies have examined whether nightmares are an important feature in predicting CPTSD symptom severity. This exploratory study aimed to extend this literature.

Initially, key features of nightmares were explored. It was found that higher scores on self-reported frequency of being woken-up by nightmares, nightmare severity, impact on wellbeing and how ‘real’ nightmares were perceived to be were associated with more severe PTSD and CPTSD symptoms. However, overall, sensory features of nightmares were not associated with PTSD or CPTSD symptom severity. This indicates that similar features of nightmares are experienced across PTSD and CPTSD, however, it is noteworthy that those who endorsed more severe CPTSD symptoms also reported elevated experiences of the nightmare features, suggesting nightmares and their functional impact were perceived as being more debilitating. Due to the absence of literature in this area, it is unclear why nightmare features are more pronounced in those with more severe symptoms of CPTSD. One possibility is that CPTSD may be associated with higher rates of perceived difficulties with nightmares due to a greater level of functional impairment when compared to PTSD (Brewin et al., 2017). Additionally, perhaps it is due to CPTSD being a more severe manifestation of PTSD (Herman, 2012).

We then examined post-traumatic nightmare frequency and features of vividness and emotional intensity and how they relate to PTSD symptom severity. We found that more frequent nightmares predicted more severe PTSD symptoms, even after controlling for other related variables of depression, anxiety, gender and age. This was consistent with our hypothesis and the current literature which indicates more frequent nightmares are associated with PTSD symptom severity and daytime dysfunction (Krakow et al., 2002; Wakschal et al., 2018). Further, when PTSD treatment specifically focuses on nightmares there is a reduction in both the frequency and severity of nightmares as well as PTSD symptoms (Aurora et al., 2010) suggesting that there may be particular value in targeted treatment for nightmares.

**Table 4**  
Regression results.

	Predicting PTSD symptoms					Predicting DSO symptoms				
	B <sup>#</sup>	SE(B)	95% confidence interval		p-value	B <sup>#</sup>	SE(B)	95% confidence interval		p-value
			Lower	Upper				Lower	Upper	
Regressions 1 & 2: Nightmare frequency ( $R^2$ for PTSD = 0.49; $R^2$ for DSO = 0.66)										
Female gender	0.68	0.50	-0.30	1.66	.175	-0.27	0.44	-1.14	0.60	.542
Age	-0.04	0.02	-0.08	0.003	.067	0.005	0.02	-0.03	0.04	.796
GAD-7 total score	0.41	0.07	0.27	0.55	<0.001	0.20	0.06	0.08	0.32	.002
PHQ-9 total score	0.17	0.67	0.04	0.31	.010	0.74	0.60	0.63	0.86	<0.001
Nightmares per month	0.26	0.43	0.18	0.35	<0.001	0.01	0.04	-0.07	0.09	.792
Regressions 3 & 4: Nightmare vividness ( $R^2$ for PTSD = 0.47; $R^2$ for DSO = 0.66)										
Female gender	0.43	0.51	-0.58	1.43	.402	-0.33	0.44	-1.20	0.54	.460
Age	-0.03	0.02	-0.07	0.01	.150	0.004	0.02	-0.03	0.04	.820
GAD-7 total score	0.43	0.72	0.29	0.57	<0.001	0.19	0.06	0.07	0.32	.002
PHQ-9 total score	0.22	0.07	0.09	0.35	<0.001	0.74	0.06	0.62	0.85	<0.001
Nightmare vividness	0.49	0.10	0.29	0.68	<0.001	0.13	0.09	-0.04	0.30	.127
Regressions 5 & 6: Nightmare emotional intensity ( $R^2$ for PTSD = 0.47; $R^2$ for DSO = 0.66)										
Female gender	0.46	0.51	-0.54	1.47	.364	-0.33	0.44	-1.19	0.54	.461
Age	-0.04	0.02	-0.08	0.003	.065	0.001	0.02	-0.04	0.04	.951
GAD-7 total score	0.42	0.07	0.28	0.56	<0.001	0.19	0.06	0.07	0.31	.003
PHQ-9 total score	0.21	0.07	0.07	0.34	.002	0.73	0.06	0.62	0.85	<0.001
Nightmare intensity	0.50	0.10	0.30	0.70	<0.001	0.16	0.09	-0.02	0.33	.075

Note.  $n = 376$ .

DSO = Disturbances in Self-Organisation; PTSD = Post-traumatic Stress Disorder.

# Unstandardised co-efficients.

Further, we determined that increased levels of nightmare vividness and intensity predicted more severe PTSD symptoms, even after controlling for other related variables. To date, the dominant literature has focused on daytime intrusive images where the vividness of the intrusions such as the “here-and-now” quality and image sharpness has been shown to predict PTSD symptoms (Michael et al., 2005). There is an absence of literature on features of nightmares in the context of PTSD, however, there is a well-established continuity between waking-life and dreams (Wittmann et al., 2007), which is reinforced through our findings. Previously, perceptual vividness was found to be greater in nightmares which depicted traumatic-experiences (Phelps et al., 2018), which has also been linked with emotional intensity, arousal and impacted daily-functioning (Holmes & Hackmann, 2004). Therefore, it seems plausible that vividness and emotional intensity would also be associated with more severe PTSD symptoms.

Interestingly, nightmare frequency, vividness and intensity were positively correlated with CPTSD symptom severity. However, after controlling for other related variables, these characteristics did not predict CPTSD symptoms. This was somewhat surprising given that a). CPTSD is often considered a more severe manifestation of PTSD; b). previous research has found sleep disturbances such as insomnia – which co-occurs with nightmares (Kelly, 2022) – to be linked to CPTSD symptoms (Grossman et al., 2019); and c). previous latent class analyses found that 70.1% of people with CPTSD but only 45.8% of people with PTSD alone endorsed nightmares (Cloitre et al., 2014). In contrast, our findings underline that DSO symptoms, which are considered the prototypic and unique features of CPTSD may indeed be most reliable way of distinguishing it from PTSD, with nightmares and other re-experiencing symptoms only somewhat elevated amongst this group.

Our study had several limitations. The use of a cross-sectional design means we were not able to make inferences about how the relationship between the features of nightmares and symptoms of PTSD and CPTSD might change over time. Thus, future studies should utilise a longitudinal-design and aim to identify causal relationships. Also, there are no objective instruments to measure features of nightmares, and thus, we relied on subjective self-report retrospective questionnaires which are prone to subjective bias and restrict the ecological validity of the findings (El-Solh, 2018). However, these subjective responses provide important insights into people’s perceptions of their night-time

experiences, which are clinically valuable and often as predictive of associated psychopathology as physiological measures (Okun et al., 2009). Additionally, there are no validated questionnaires to assess the vividness and emotional intensity of nightmares and we relied upon single item measures of these constructs which have indeterminate reliability. The high correlations between some nightmare characteristics (e.g., 0.79 between nightmare vividness and intensity) also suggest that the construct validity of each of these variables may need to be better understood if participants are generally rating them in synonymous ways and this precluded us from considering their contributions relative to each other in the present study. However, this limitation is partially negated by our use of trauma-specific nightmare questionnaires in contrast to previous studies which used generic nightmare measures. Further, as there is no validated structured diagnostic-interview to diagnose ICD-11 CPTSD (Gelezelyte et al., 2022), we relied on the ITQ to assess symptom severity which is only able to determine proxy variables.

We found that nightmare features significantly predicted PTSD symptom severity, but found conflicting results for the impact of nightmare features on the severity of CPTSD symptoms. While nightmares assessed using generic nightmare tools have found features such as frequency of wakeups, perceived severity, impact on wellbeing and perceived ‘realness’ were more prominent in those with a greater severity of CPTSD symptoms, when we examined trauma specific nightmare characteristics (vividness and intensity), this relationship was not significant after controlling for other factors suggesting the severity of CPTSD symptoms is likely driven by other variables such as depression.

Further research should attempt to replicate and extend our findings. Also, research should seek to combine subjective assessments of nightmares with objective measures to confirm a convergence of findings across measurement approaches. However, nightmares occur infrequently in laboratory settings (Campbell & Germain, 2016) so such studies are challenging. Further, as we showed that features of nightmares are critical in PTSD and also related to CPTSD symptoms developing novel therapy interventions to target nightmares could be beneficial.

The phenomenology of nightmares in the context of PTSD and CPTSD is a relatively unexplored area. To our knowledge this was the

first study to explore features of trauma-related nightmares and their impact on the severity of PTSD and CPTSD symptoms. Trauma related nightmares and their characteristics are of undeniable clinical relevance although may be overshadowed by other, more prominent symptoms, when one considers CPTSD.

### CRedit authorship contribution statement

**Alyssia Simos:** Conceptualization, Methodology, Data curation, Formal analysis, Writing – original draft, Writing – review & editing.  
**David Berle:** Conceptualization, Methodology, Formal analysis, Writing – review & editing.

### Declaration of Competing Interest

None to declare.

### Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.ejtd.2023.100335](https://doi.org/10.1016/j.ejtd.2023.100335).

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