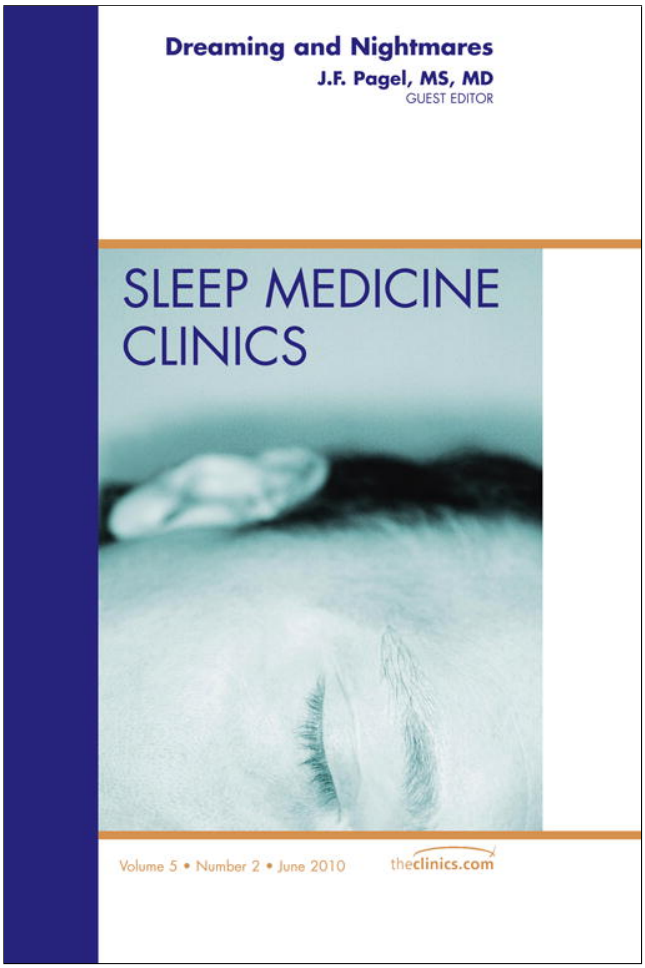

Frequency and Content of Dreams Associated with Trauma

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KEYWORDS

• Dreaming • Dream frequency • Dream content
• Nightmares • Trauma • Posttraumatic dreams

According to the Diagnostic and statistical manual of mental disorders, fourth edition—text revision (DSM-IV-TR),[1] traumatic events can occur when an individual experiences or witnesses an event that involves a threat to the integrity of self or others, accompanied by intense fear, helplessness, or horror. Rape, physical assaults, war exposure, severe automobile accidents, the sudden unexpected death of a loved one, and natural disasters constitute examples of traumatic experiences. Depending on how traumatic events are defined, epidemiologic studies indicate that the lifetime prevalence of exposure to at least one traumatic event in the general population ranges from more than 50% to almost 90%.[2–4] Exposure to such events can lead to a variety of physical, behavioral, emotional, and cognitive sequelae, and a small but significant subset of trauma victims (fewer than 10%) will develop posttraumatic stress disorder (PTSD).[3–5]

Sleep disturbances and dream-related disorders are some of the most frequently reported and persistent symptoms shown by trauma victims,[6–8] and nightmares have been described as a hallmark of PTSD.[9–11] Recurrent distressing trauma-related dreams are one of the ways an individual may reexperience a traumatic event, and they are considered a core symptom of PTSD (Cluster B) in the DSM-IV-TR manual.

The prominent role of sleep disturbances and dream-related disorders in trauma victims' clinical profiles has been highlighted in research on survivors of abuse and sexual trauma,[12–14] natural disasters,[15–18] war victims or veterans,[19,20] and victims or witnesses of sudden deaths, violent acts, and accidents.[21–23]

Although there has been a growing interest in the role of sleep mechanisms and nightmares in the development, maintenance, and treatment of PTSD,[24–27] little is known about the actual content of trauma-related dreams and nightmares associated with PTSD and with trauma in general. In their recent review of dreaming in PTSD, Wittmann and colleagues[24] concluded that "we have alarmingly little reliable information characterizing the phenomenology of the disturbing dream in PTSD" (page 36). Moreover, little effort has been made to integrate empirical and clinical findings on the dreams of trauma victims that do not necessarily meet the diagnostic criteria for PTSD.

This article reviews and synthesizes findings on the frequency and content of trauma-related dreams, beyond the boundaries of posttraumatic nightmares associated with PTSD. Methodological issues that complicate data comparisons across studies are examined. Findings on dream recall frequency following trauma exposure are reviewed and factors believed to impact dream

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recall over time are highlighted. The incidence of dream-related disorders is then examined as a function of trauma characteristics and personality variables. Findings on the relationship between dream content and specific types of traumas are subsequently reviewed. Finally, the clinical importance of furthering the knowledge of dream-related disorders in trauma victims is discussed.

METHODOLOGICAL ISSUES

Terminology

A wide range of phenotypic and phenomenological expressions and disagreements exist among researchers and clinicians on the concepts and nosologic terms best suited to describe and categorize trauma-related dreams. Similarly, differing views exist on how traumatic experiences as well as trauma severity are defined. Regarding sleep mentation, there is no consensus on how dreams should be defined, and there exist important discrepancies and variations in how nightmares are operationalized in both clinical and research settings.[26]

Schreuder and colleagues[28] proposed a classification system to distinguish between a range of dream experiences, including those related to trauma (**Table 1**), but this system has rarely been used. However, Schreuder and colleagues' definition of a nightmare is consistent with DSM-IV-TR criteria for nightmare disorder, and their use of the term "anxiety dream" corresponds to what some investigators commonly refer to as bad dreams.[29] Taking a different approach and based on their comprehensive and integrative conceptual framework, Levin and Nielsen[26] proposed a typology of dreaming, ranging from normal dreaming to replicative posttraumatic nightmares, which is organized by increasing affect load (ie, fluctuations in current levels of affect), affect distress (ie, a disposition to experience events with distressing, highly reactive emotions), and trauma severity (**Fig. 1**). As in Schreuder and colleagues' classification, awakenings from sleep distinguish dysphoric and bad dreaming from nightmares. Although such developments are conceptually valuable and promising, only their wider adoption will allow for an increasingly unified and more easily comparable framework across studies.

Frequency Measurement

Traditionally, nightmare frequency has been assessed with retrospective questionnaires that require participants to estimate the number of nightmares experienced in the past, usually using binary, nominal, ordinal, or open-ended choices. When compared with daily logs, however, retrospective self-reports significantly underestimate nightmare frequency.[29,30] Prospective daily logs have supplanted retrospective questionnaires as the gold standard for nightmare frequency estimation, but this method of data collection is not always used owing to costs and time requirements. Recent findings[31] indicate that prospective studies of dream recall and nightmare frequency should take the type of log used (ie, narrative form or

Table 1
Classification and definition of dreams and nightmares

Dream Type	Definition
Dream	Reportable mental activity that occurs during sleep
Anxiety dream	Frightening dream that does not awaken the dreamer but recalled only after waking up in the morning
Nightmare	Frightening dream that awakens the sleeper
Posttraumatic dream	Dream content is associated with traumatic events by the dreamer
Posttraumatic anxiety dream	Frightening posttraumatic dream recalled only after waking up in the morning
Posttraumatic nightmare	Frightening posttraumatic dream that awakens the sleeper
Replicative posttraumatic nightmare	Dream content is a replication of the original traumatic event
Nonreplicative or symbolic posttraumatic nightmare	Dream content can be trauma-related but not a replay of the traumatic event

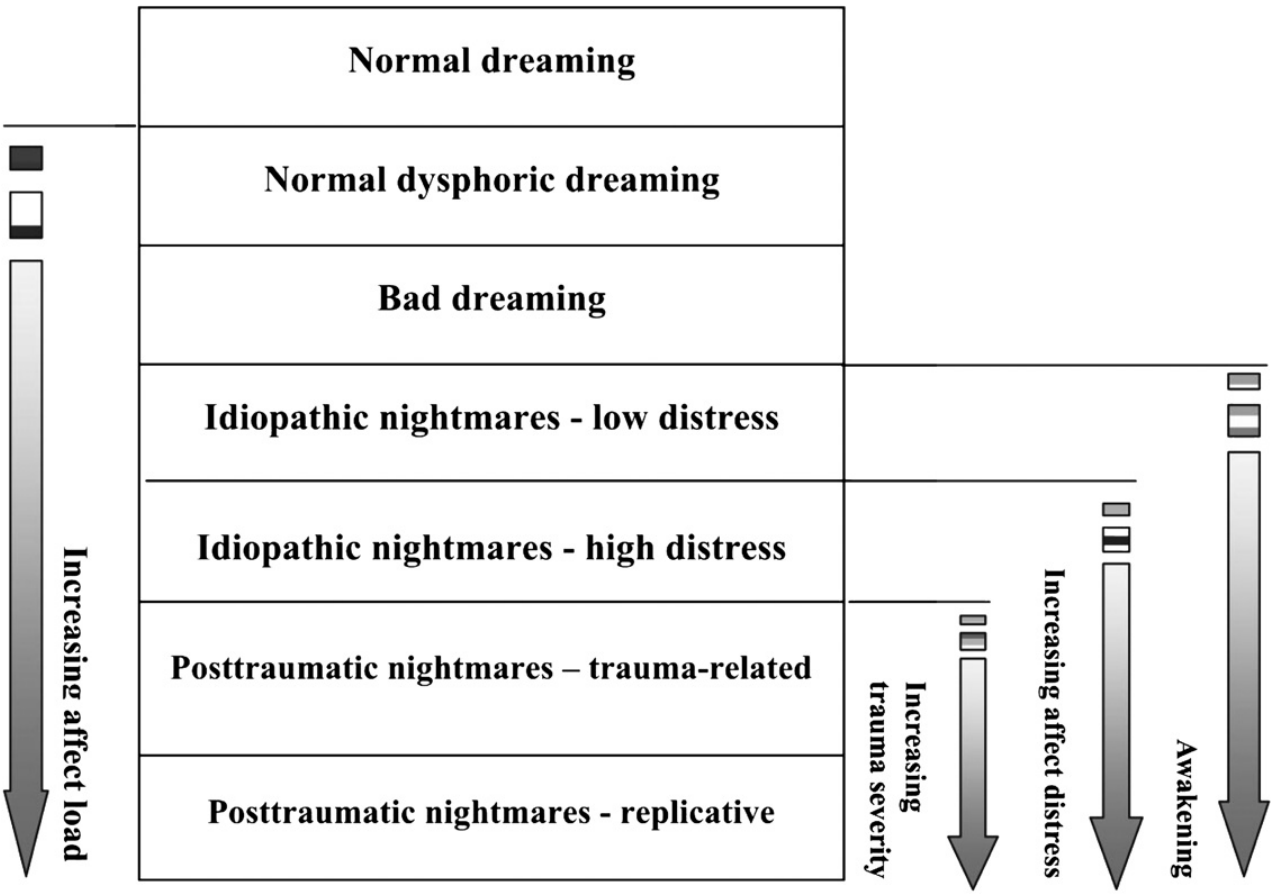

Fig. 1. Typology of dreaming organized by increasing affect load, affect distress, and trauma severity. Normal dreaming, dysphoric dreaming, bad dreaming, and idiopathic nightmares with low distress are all considered to be nonpathological in that trauma precursors are absent and participants report low levels of associated distress. Awakenings from sleep distinguish dysphoric and bad dreaming from idiopathic nightmares with low distress. Idiopathic nightmares with high distress, posttraumatic trauma-related nightmares, and posttraumatic replicative nightmares are all considered pathologic because of the subjective affect distress associated with them. Posttraumatic nightmares produce even more distress in step with the number and severity of trauma precursors. (*From* Levin R, Nielsen TA. Disturbed dreaming, posttraumatic stress disorder, and affect distress: a review and neurocognitive model. Psychol Bull 2007;133(3):482–528; with permission.)

simple checklist), its duration, and the participants' level of motivation over time into account, because these factors can influence the log-based reporting of dreams and nightmares. Finally, regarding trauma-related nightmares, the amount of time elapsed between the occurrence of a traumatic event and the assessment of nightmares potentially associated to the event is an important variable that is not always taken into account or even explicitly reported in research and clinical articles.

TRAUMA AND DREAM RECALL FREQUENCY

Increases in dream recall have been reported in normal individuals facing a stressful situation,[32] and analogous findings have been found in people exposed to traumatic events.[19,33,34] In a study of children exposed to war, Valli and colleagues[34] found that severely traumatized children reported a significantly greater number of dreams when compared with less traumatized or nontraumatized children. Investigating a similar population, Helminen and Punamaki[19] found that Palestinian children living under conditions of military violence and war in Gaza reported a greater number of dreams than children living in the more peaceful areas of Galilee. Within this study's trauma group, the number of dreams reported was greater in children exposed to higher levels of trauma. Taken together, these studies indicate that increased dream recall frequency is positively associated to trauma severity or to more direct exposure to a traumatic event. Dream recall may also be facilitated by the intensity, affective charge, and references to the victims' trauma as depicted in their dreams.[11,34–36]

Other studies, however, report a significant reduction in dream recall following exposure to stressful situations,[6,7,37–39] but these findings are largely based on retrospective assessments conducted months, or even years, following trauma

exposure. It is possible that dream recall increases immediately following exposure to trauma and diminishes subsequently over time.

A comparison[39] of well-adjusted Holocaust survivors, less-adjusted Holocaust survivors, and controls found that the well-adjusted survivors reported fewer dreams from rapid eye movement (REM) sleep (33.7%) compared with the less-adjusted survivors (50.5%) and controls (80.8%). A reduction in dream recall may thus reflect improved posttrauma adaptation.

Finally, sleep laboratory investigations of patients suffering from PTSD[40–42] suggest that disruption of REM sleep—as indicated by increased sleep stage transitions, awakening threshold and arousal, and increased sympathovagal tone—is associated with increased PTSD symptom severity and may increase the likelihood of developing PTSD at follow-up assessments. Thus, REM sleep disruption and increased arousal during REM sleep may amplify one's vulnerability to experience more vivid and hostile dreams following trauma exposure and to develop PTSD.

TRAUMA AND DREAM-RELATED DISTURBANCES

Exposure to traumatic events can give rise to a range of dream-related disturbances, including a higher prevalence of posttraumatic dreams, nightmares, bad dreams, and recurrent dreams. The emergence and frequency of such dream-related disturbances can be mediated by characteristics associated with the traumatic event itself as well as to the individual exposed to it. These variables are reviewed in turn.

Trauma-Related Variables

Observed differences across studies investigating the frequency of dream-related disorders in trauma victims seem to be caused by, at least in part, variations in the trauma's severity, the degree of exposure to the event, and to the amount of time elapsed between the investigation and the trauma's original occurrence.

In a study of 598 female victims of sexual assault, Krakow and colleagues[43] found that the degree of severity of the trauma was associated with nightmare frequency. Specifically, women who reported suffering the most severe sexual aggressions were the most likely to report experiencing frequent nightmares.

Similarly, the degree of exposure to the trauma is another important factor affecting the experience of distressing dreams. Among the children who were victims of a school shooting, 63% of those who were in the school yard directly at the scene of the shooting reported experiencing bad dreams, compared with 56% of the children who were inside the school, 43% of those who were not at school (eg, at home), and 33% of those who were not in the geographic area where the shooting occurred (eg, away on holidays).[44] Comparable results were found by Wood and colleagues,[17] who collected prospective measures of dream recall (including nightmares) from college students for 3 weeks following the Loma Prieta earthquake. Results showed that the students who witnessed direct impacts of the earthquake (eg, injuries, material losses, imminent threats) reported twice as many nightmares than college students living in a nearby state.

A positive relationship between frequency of dreams with threatening themes and degree of trauma exposure was also found in investigations of more chronic traumatic environments. In their study of victims of war, Valli and colleagues[34] found that 80% of Kurdish children directly exposed to armed conflict reported experiencing threatening dreams in a 1-week dream journal, compared with 56% of children living in a more peaceful zone of the same region and 31% of children not exposed to war.

Although dream-related disorders can persist for varying periods of time following trauma exposure, the amount of time elapsed since the traumatic event's occurrence can also impact their duration and frequency. One study[45] of rape victims found an increased rate of nightmares (31%) immediately after the trauma, in comparison with a decrease of 21% 1 year after the event. Terr's[46,47] longitudinal investigations of a group of children who had been kidnapped revealed that 96% of them were still experiencing repeated terror dreams 4 years after the kidnapping. A reduction in nightmare frequency in people exposed to an earthquake was similarly obtained by Wood and colleagues[17] in the weeks following the earthquake.

Although trauma victims tend to experience a reduction in nightmares and other forms of distressing dreams after the acute phase of trauma exposure, dream disturbances can persist for years or even decades, sometimes with little to no change in their content.[48]

Individual-Related Variables

Following trauma exposure, individual-related variables including psychological reaction to trauma (eg, level of anxiety, distress), psychopathology, and personality characteristics can sometimes play a key role in determining the frequency of dream-related disorders.

The impact of individual psychological reactions during the acute phase of trauma on the frequency of dream-related disorders was investigated in several studies. Wood and colleagues[17] showed that people's nightmare frequencies following an earthquake were related to the individuals' assessments of their anxiety levels during the event but not to the earthquake's objective level of danger (eg, risk of death or serious injury) nor to the individuals' general levels of anxiety as retrospectively estimated for the 24 hours preceding the event.

The initial psychological response (including the occurrence of nightmares) experienced by some people in reaction to a traumatic event can persist over time and affect the frequency of dream-related disorders while contributing to the development of psychopathology. Mellmann and colleagues[49] found that the victims of Hurricane Andrew who went on to develop PTSD reported a higher frequency of bad dreams than the victims who did not develop it. Similarly, a study[50] of patients reporting posttraumatic symptoms revealed that individuals who suffered from chronic nightmares experienced higher levels of depression, anxiety, and posttraumatic stress. Furthermore, in their investigation of control subjects and sexually abused women 10 years after disclosure of the substantiated abuse, Noll and colleagues[14] showed that after taking the levels of comorbid psychopathology (eg, depression, PTSD) into account, sexually abused women reported significantly greater rates of sleep disturbances, including nightmares, than did the control participants.

TRAUMA AND DREAM CONTENT

Trauma Replication and Repetition in Dreams

Trauma-related dreams may depict a replication of the traumatic event, its modified versions, or metaphorical representations that may evolve over time. However, various terms have been used to describe such dream experiences, and no consensus exists on how best to categorize them. Two dream-related indicators of the severity of a trauma's impact on the victim stand out in the literature, namely, the traumatic replication, which refers to the similarities between posttrauma dream content and the actual traumatic event,[11,20,26,46] and the traumatic repetition, which refers to the recurrence of the traumatic dream imagery.[11,46] Both indicators exist on a continuum. Because some traumatic dreams may contain a high level of distress, sometimes in the absence of actual trauma-related imagery, Levin and Nielsen[26] also suggest the use of a continuum for distress related to traumatic dreams. Whether or not the dreamer awakens from the disturbing dream can also be used as a criterion for differentiating nightmares from bad dreams that contain traumatic elements.[26,28]

Dreams that, to varying extents, replicate traumatic events have been documented in various populations including war veterans,[20,42,51] people exposed to war,[39] child witnesses of violence and abuse,[44,47,52,53] burn victims,[54] individuals exposed to natural disasters,[16,17] and more recently, in US residents following the 9/11 terrorist attacks.[55]

Trauma victims can report both exact and modified replicas of the traumatic event in their dreams.[47,51,53,56] In a study[56] of 316 Vietnam War veterans, 304 veterans reported combat-related nightmares. An examination of their dream narratives showed that more than 50% of the veterans reported realistic combat dreams, 21% reported plausible war sequences that they nevertheless had not experienced, and 26% reported dreams that alluded to the war but included fantastical and everyday elements among others. In addition, a laboratory study of war veterans found that only 21% of dreams exactly replicate the traumatic event whereas 79% contain distortions of the traumatic event.[51] Similarly, a study[21] of patients hospitalized following an accident or assault found that 48% of the reported dreams replicated the traumatic event, of these, 33% were dissimilar to the traumatic event while containing high levels of distress. Finally, a study of battered women[57] found modified memories of the abuse in the women's dreams but none that exactly replicated the trauma.

Trauma victims may also experience nightmares whose contents do not show direct links or references to the original trauma.[47,57,58] Waiess,[57] for instance, noted several spontaneous reports of nightmares or ''symbolic or metaphoric'' dreams among battered women who described these particular dreams as having the same terror quality as that experienced when facing their aggressor, although the dream's content was not linked to the actual event. These results suggest that although the nonaffective content of such dreams may not show any clear relations to the original trauma, they may nevertheless contain significant trauma-related emotional distress.

Finally, Hartmann's[11,59] clinical investigations of dream series collected from patients immediately after their exposure to trauma as well as afterward indicate that dreams recalled soon after a traumatic experience generally contain direct references to the actual event, although only a minority of the dreams depict exact replicas of the trauma. The dreams' contents then change

progressively over time, becoming dissimilar to the actual event while dealing more exclusively with contextualizing images associated with a succession of traumatic emotions, including fear, guilt, and grief. Although the PTSD status of these patients is not reported, this pattern is consistent with other findings highlighting the central role of traumatic or intense emotions related to trauma in dream imagery following a traumatic event.

Heightened exposure to trauma can also augment the likelihood of intrusion of trauma-related memories into dream imagery, as shown in children exposed to a school shooting,[44] victims of an earthquake,[17] and former combatants and individuals exposed to war.[20,60] More severe, intense, and directly experienced stressors thus seem to give rise to greater levels of intrusion of traumatic images in victims' dreams.

Intrusion of traumatic imagery in victims' dreams may reflect or contribute to difficulties with posttraumatic adaptation and psychological adjustment. One study[39] of Holocaust survivors showed that those whose dreams contained direct references to the Holocaust had lowered postwar levels of adaptation. Similar results have been reported in other populations diagnosed with PTSD.[15,42,61] For example, Mellman and colleagues[42] found that 65% of veterans suffering from PTSD reported nightmares of combat at least once a week, compared with only 5% of veterans without PTSD.

Taken together, these findings indicate that traumatic dreams with realistic trauma scenes are not present among all trauma victims, and that the intrusion of an exact replica of a traumatic event in dreams is generally not a frequent or long-lasting phenomenon. The acute phase associated with severe trauma tends to be accompanied by higher levels of posttraumatic dreams replicating the trauma, although the frequency of these dreams subsequently diminishes over time.[46,47,53,55] Dreams that initially include some degree of replication of an experienced trauma also tend to be followed by dreams more likely to contain symbolic representations or distortions of the trauma as well as references to the dreamer's daily waking life. These changes in dream content can parallel improvements in the posttrauma reaction[39,61,62] and thus may serve as indicators of clinical progress in trauma victims' responses to trauma.

Dreamlike Versus Ordinary Quality of Dream Content

Findings from studies in younger populations suggest that when compared with the dream reports from controls, dreams recalled by trauma victims tend to be more ordinary and realistic and less salient, bizarre, and imaginative. For instance, a lack of so-called dreamlike qualities (referring to properties associated with daydreaming, imagination, and distortion) has been observed in the dreams of children living in violent environments.[33,63,64] A more direct and chronic exposure to violent environments is related to more realistic or ordinary dreams in children.[63] It is not clear, however, if such differences in the dreamlike quality of dream reports are maintained over time. Studies of adult students reporting a history of childhood abuse reveal no differences in the length or the dreamlike quality of dream reports provided by victims of abuse versus controls.[36]

Turning to trauma-exposed adults, although one study[35] of a dream series collected from US residents (not from New York) both before and after the 9/11 terrorist attacks found no differences in their levels of intensity and bizarreness, another study[55] focusing on students living in the New York area found that the sooner after the 9/11 attacks a dream was collected, the more intense and bizarre it tended to be. In their investigation of Holocaust survivors, Lavie and Kaminer[38] found that the dreams of less-adjusted survivors contained similar features to those from nontraumatized controls, whereas well-adjusted survivors had shorter, less complex, more imaginative, vivid, and salient dreams.

All these findings suggest that the "ordinary" quality of trauma victims' dreams may reflect an alteration in the process of dream construction or may be related to a protective mechanism that keeps traumatic images from intruding into their everyday dreams. Ordinary or realistic aspects of survivors' dreams may thus be associated with more adaptive ways of coping with trauma,[37,38,63] although increases in the dreamlike quality of survivors' dreams can occur with the passage of time.

Emotions

Emotions are viewed by many dream theorists as a key player in structuring dream content.[65] Hartmann and colleagues[11,59,66] proposed a model suggesting that dreams may regulate emotions by contextualizing the dreamer's primary emotional concern or dominant emotion in a central image (eg, a tidal wave). In addition, the intensity of trauma-related emotions may be represented by the dream's central image's strength or power. In line with the model's predictions, one controlled study[36] found that dreams of abused victims contained more intense central

images than the dreams of control participants. Similarly, one investigation of people's dreams before and after the 9/11 terrorists attacks found that the emotional intensity of the dreams' central images increased after 9/11.[67]

The representation of emotional intensity in dreams' central images was also investigated in children exposed to traumatic events. In a study of dream reports from Palestinian children living in a militarized area, 90% of the dreams were found to contain a central image that contextualized an emotion, whereas such central images occurred in only 74% of dream reports provided by children living in a more peaceful region.[19] The dreams of children exposed to war were more likely to incorporate more intense and negative emotional images than the dreams of children without trauma exposure.

Several studies have observed that the dreams of trauma victims often contain trauma-related dysphoric emotions, thereby suggesting continuity between waking emotional states and the valence of emotions experienced in dreams. For example, children exposed to multiple traumatic events within the environmental context of war report more negative valence in their dreams' emotional images than children exposed to less severe traumas.[19] Children experiencing traumatic events are also more likely to report feelings of anxiety and hostility in their dreams.[63,68] Similarly, clinical and empirical reports indicate that victims of sexual abuse or aggression tend to report emotions of fear, terror, sadness, and helplessness in their dreams and nightmares,[69–71] whereas emotional themes involving anxiety, hostility, guilt, and persecution have been documented in the dreams of Holocaust survivors.[37] These findings suggest that the emotional content of trauma victims' dreams can be related to the emotional reaction to their traumatic event.[72]

Finally, there is evidence to suggest that emotional preoccupations before bedtime may also play a role in the affective content experienced during subsequent sleep. One study[33] of 413 dream journals collected from Palestinian children exposed to chronic conditions of war showed that going to sleep in a negative mood (eg, scared, angry, worried) was associated with positive dreams, whereas going to sleep in a good mood was associated with dysphoric dreams. The finding that one's mood prior to sleep is inversely related to a positive or negative dream affect supports the idea that dreams may have a restorative function by helping regulate emotional equilibrium in traumatized individuals.[11,73] It is also possible that dream-mediated processes of trauma integration protect individuals from overwhelming intrusions of traumatic imagery into their dreams,[64] whereas a disturbance dream's restorative function could account for the occurrence of replicative nightmares associated with high levels of psychological distress.

RELATIONSHIP BETWEEN DREAM CONTENT AND SPECIFIC TYPES OF TRAUMAS

A few studies have focused attention on identifying specific features of dream content in relation to specific types of traumas, notably in combatants and victims of natural disasters, physical and sexual abuse, and war and violence. This literature, beyond being of interest in itself, might also help to clarify how trauma is possibly integrated into dreams.

Victims of Physical and Sexual Abuse

Abuse, whether physical or sexual, always involves a threat to the individual's physical and psychological integrity. Not surprisingly, dreams of victims of abuse can contain high proportions of violent themes.[13,69–72,74] For example, themes of attack and pursuit are more often reported by victims of sexual abuse than by control participants,[52,69,70,74] and themes of being threatened, directly confronting an attacker, or obtaining revenge have been reported in dreams of children having witnessed their mother's rape.[52]

Although themes of violence and aggression are ubiquitous in people's dreams, empirical investigations reveal increased levels of physical aggression in the dreams of female victims of abuse.[70,71] Fernandez and colleagues[75] found more episodes of verbal and physical abuse in the dreams of physically abused women (88% verbal; 75% physical) as compared with the dreams of a control group (25% verbal; 33% physical). Dreaming about one's own death is also more frequent in sexually abused women than in control participants,[69–71,74,75] and victims of sexual abuse are more likely to report nightmares that include blood and dismemberment.[13,71,76]

In addition, dreams of victims of sexual abuse are more likely to contain references to negative sexual activity[69–72,77] while their nightmares are characterized by increased frequencies of negative sexual themes including lack of trust, shame, guilt, jealousy, anger, and violence.[13,70,71] In addition, one study[77] of female victims of rape, incest, or sexual abuse found that their dreams contained themes of aggression and sexuality where the sexuality was unpredictable and resulted in fear.

There is also evidence indicating that characters represent a distinguishing dimension in abused women's dreams. Nightmares reported by

sexually abused women are more likely to contain unknown male characters, sometimes depicted as being faceless or more like shadows or demons, than nightmares of nonabused women.[13,71,76] Abused women are also more likely than nonabused women to report feeling a "presence" in their dreams.[13,70,71,76] Victims of sexual abuse have also been described as reporting the presence of serpents or worms, and these references are more frequently found in the dreams of sexually abused women than in those of physically abused women.[12] References in abused women's dreams to both sexual and nonsexual body parts have also been noted.[12,69] Finally, one study of battered and nonbattered women[57] revealed that unpleasant dreams about husbands represented 4% of the total number of dreams recorded by the nonbattered women but 14% of that recorded by the battered women. By contrast, unpleasant or violent dreams about husbands were as infrequent in the dream records of the nonbattered women as pleasant dreams about the batterers were infrequent in the dream records of the battered women.

Combatants and Victims of War and Violence

War trauma constitutes a serious risk factor in the development and increase of posttraumatic depressive and anxiety symptoms.[78] Valli and colleagues[34] showed that when compared with children living in a peaceful area, children exposed to war report a greater number of threatening events per dream and a higher percentage of dreams that include a threat. Exposure to an environment of war or violence is also associated with dreams depicting increased aggressive and hostile human interactions.[33,37,64,68] The study of Holocaust survivors by Kaminer and Lavie[37] revealed that dreamed aggression was often self-directed in the dreams of the survivors, whereas it was usually directed toward others in the dreams from controls. Finally, Bilu[68] observed that the dreams of Arab and Israeli children represent the conflict and negative interactions between these two populations and often contain various manifestations of violence and aggression.

Victims of violence have more dreams with anxious content compared with a control group, including themes involving danger to one's own life, being physically attacked, or attempts to escape to save one's life.[39] Some war veterans also report that their traumatic dreams often entail being killed in the place of their compatriots.[61] In a study of children by Valli and colleagues,[34] the self was the most often threatened person in the dreams of both the traumatized and the control group, but the threats to the self reported by the trauma group were more dangerous (eg, death of self or parents, severe injury to self). More than half of the threats reported by the Finnish children were everyday misfortunes, rather trivial for the dream self, whereas the trauma and control groups reported life-threatening and socially, psychologically, or financially severe threats much more frequently. Similarly, a study[33] on war-exposed Palestinian children found that traumatized children had more dreams involving threatening strangers. Their dreams often comprised attacks, anxiety, persecution, hostility, and nondesirable endings. In addition, nontraumatized children reported more dreams of school and their peers than did traumatized children.[33,64] Exposure to trauma may thus increase the severity of threatening events in victims' dreams.[34]

Conflicting results have also been reported. For example, Punamäki[33] found that in addition to reporting more dreams of threatening strangers, victims of violence had more dreams referring to their family, house, affiliation, and human connections than did control participants. One study[79] of Israeli children exposed to either war or peaceful conditions found more frequent manifestations of anxiety, stress, and aggression in the dreams of children living in a peaceful climate. The finding that one's mood before sleep is inversely related to a positive or negative quality of dream content[33,64] suggests that dreams may have the function of restoring an emotional equilibrium to traumatized individuals.[11,73]

Victims of Natural Disasters

A natural disaster is an unpredictable event that generally impacts a large number of individuals. Its repercussions are noteworthy on personal, social, and economic levels. The environment that provides people with a habitat suddenly becomes a threat and a risk to one's life and physical integrity.

One investigation of victims of the East Bay Firestorm (San Francisco Bay)[16] distinguished between the dreams of 2 groups differentially affected by a forest fire that destroyed their neighborhood. Fire survivors (who lost their home and commodities) reported more dreams with general themes of loss, finding valuables, and events out of their control, as opposed to fire evacuees (who lived in the burn zone but whose homes were not destroyed by the fire), who reported more dreams with specific themes of loss and grief.

Themes of loss, grief, death, and dying were also more frequently found in the dreams of both groups than among controls. The most salient

subthemes in the fire evacuees' dreams were their own deaths, the presence of someone who died, or the presence of someone actually alive who appeared dead in their dream. Both survivors' and evacuees' dreams had themes of dead animals as opposed to individuals in the control group.

Natural disasters were also more frequent in survivors' and evacuees' dreams than in the control group. Specific images included damage caused by heat and fire, floods, earthquakes, and other calamities. Fire victims also had dreams of searching for essential commodities (ie, food, clothing, and roof) and dreams regarding financial difficulties.

ARE POSTTRAUMA DREAMS ADAPTIVE?

Many contemporary dream theorists suggest that dreaming is functionally significant and may subserve a biologically important function, especially in emotional adaptation.[26,59,80] There is considerable evidence indicating that REM sleep benefits emotional processing and emotional memory consolidation[81] and that dreaming occurs preferentially during REM sleep. Regarding trauma-related dreams and nightmares, dreaming may serve as a function of emotional adaptation to emotionally salient and traumatic events. For instance, Stickgold[82] proposed a REM sleep model of the neurobiological substrates potentially subserving emotional processing and integration of trauma-related memories. Central to the model is the idea that REM sleep provides a unique neurochemical and neurobiological brain state that allows the transfer of hippocampally mediated episodic traumatic memories and amygdala-dependent salient affect into cortically distributed semantic networks.

More recently, Levin and Nielsen[26,83] proposed a comprehensive neurocognitive model of nightmare production (including bad dreams, idiopathic nightmares, and posttraumatic nightmares) emphasizing the adaptive function of fear memory extinction during dreaming. Their affect network dysfunction model, grounded on the neurophysiological roles of the amygdala, medial prefrontal cortex, hippocampus, and anterior cingulate cortex, posits that fear extinction memories can be created or maintained during dreaming via 3 key imagery processes, namely, memory element activation, memory element recombination, and emotional activation. Variations in the expression and evolution of trauma-related dreams reviewed in this article may reflect differential activations of these imagery processes and their underlying neural correlates.

Although dreaming and REM sleep may play an important role in emotional adaptation and memory integration, trauma-related dysphoric dreams and nightmares that persist over time and continue to generate distress, including in individuals who develop PTSD, may reflect a failure of these mechanisms. The repeated recall of trauma-related nightmares that awaken the sleeper (and thus do not allow habituation to physiologic arousal elicited by these memories) exposes victims to their past trauma, and may even induce retraumatization and sensitize them to trauma memories.

This literature review reveals that the systematic investigation of the content, evolution, and correlates of trauma-related dreams can give rise to a wealth of information of interest to clinicians and researchers alike. However, the paucity of research on the categorical or dimensional interrelations between various types of trauma-related dreams[26,28] and with normal dreaming severely limits our conceptual and empirical understanding of their roles and underlying processes. Similarly, much work remains to be done to clarify which specific dimensions of posttrauma sequelae and waking life functioning are most robustly associated to which kind of dream content, and the nature of these relationships over time. Recently proposed multilevel models of dysphoric dreaming[26,83] based on the integration of clinical and neurophysiological findings are promising, and represent an important step toward achieving these goals.

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