

Incidence and Clinical Features of Panic Related Posttraumatic Stress

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Abstract: The current study assessed the incidence and associated features of posttraumatic stress after the experience of panic. One hundred seventy-eight participants meeting diagnostic criteria for panic attacks (PAs) were assessed using standardized measures of posttraumatic symptoms and posttraumatic stress disorder (PTSD) in specific reference to their experience of panic. Sixty-three (35.4%) participants scored above the cutoff for PTSD in reference to the worst PA they had experienced. Adjusted means for the four PTSD symptom clusters indicate that panic-related posttraumatic symptoms are, on average, experienced “moderately” to “quite a bit.” Panic-related posttraumatic symptoms and PTSD were best predicted by specific features of the panic experience itself, including subjective levels of distress, fear of losing control, chest pain, agoraphobia, and number of PAs experienced. These findings are discussed in terms of the diagnostic, prognostic, and treatment implications for a subset of individuals presenting with panic who may also have panic-related PTSD.

Key Words: Panic attacks, panic disorder, posttraumatic symptoms, PTSD

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Studies have demonstrated significant comorbidity between posttraumatic stress disorder (PTSD) and panic attacks/disorder (PAs/PD) such that persons diagnosed with PTSD resulting from a traumatic experience are at increased risk for PAs/PD compared with the general population. PD incidence rates among males with PTSD range between 7% and 18% and between 12% and 17% for females, whereas PA incidence rates are as high as 53% and 62% for males and females with PTSD, respectively, rates significantly higher than in the general population (Brown et al., 2001; Feldner et al., 2009; Kessler et al., 1995; Leskin and Sheikh, 2002). Falsetti et al. (1995) reported an 18.3% rate of PAs in persons with a lifetime history of PTSD compared with a 5.5% rate among persons with no trauma history. PD rates among persons with PTSD were 9.8% compared with 3.2% among those with no trauma history.

The mechanisms accounting for the high rates of PA/PD after trauma cut across several dimensions. In terms of cognition, panic symptoms are commonly triggered by memories of the traumatic events for which a person seeks treatment (Falsetti and Resnick, 1997). On the somatic level, heightened sensitivity to anxiety and anxious responses to physiological arousal are core features of both PA/PD and PTSD Olthuis et al. (2014). Common neurobiological mechanisms in these disorders, involving the dynamic interaction of the amygdala, hippocampus, and cortex, have also been posited (Kent et al., 2000). Clinically, a study of the “Panic Attack–PTSD Model” focusing on how PAs worsen PTSD demonstrated that changes in PA/PD severity partially mediate changes in PTSD symptomatology (Hinton et al., 2008). In sum, the epidemiological, theoretical, and clinical literatures suggest pathways whereby PA/PD might be a sequela of PTSD.

Approaching this association from another direction, the question arises whether the experience of panic itself might result in PTSD. PAs are defined as a surge of intense fear or discomfort in which 4 of 13 symptoms develop abruptly and peak rapidly in less than 10 minutes from symptom onset (American Psychiatric Association [APA], 2013). These symptoms include abnormal and distressing somatic sensations (e.g., tachycardia, trembling, shortness of breath, chest pain, paresthesias) as well as the perception of existential threat (e.g., losing control, having a heart attack, going crazy). PD is characterized by recurrent, unexpected PA, the frequency of which can vary from several attacks per day to only a few attacks per year, as well as a) persistent concern or worry about additional PAs or their consequences and/or b) significant maladaptive change in behavior related to the attacks (e.g., behaviors designed to avoid having PAs, such as avoidance of exercise or unfamiliar situations). Criterion A in the diagnosis of PTSD requires that a) the person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others; and b) the person's response involved intense fear, helplessness, or horror (APA, 2013). That PAs are experienced as events that involve existential fears of threatened death or serious injury, or a threat to one's physical integrity, and that the person's response typically involves intense fear and helplessness (*i.e.*, PTSD criterion A) are clinically apparent and also evidenced by the high rates at which PA/PD present in hospital emergency rooms (ERs) (Belleville et al., 2010). Indeed, cognitive theorists (e.g., Clark, 1986) suggest that panic only occurs concurrent to the perception of immediate danger.

It is therefore plausible that the experience of panic itself can meet PTSD's criterion A and that it may result in PTSD, should the other diagnostic criteria be met, such as dissociative symptoms, reexperiencing, avoidance, and arousal. Ball et al. (1997) reported a 69% rate of derealization and depersonalization symptoms during panic in persons with PD. Hagenaaers et al. (2009a) reported similar rates of dissociative symptoms during initial experiences of both trauma and panic, as well as during recollection of such events. In the same study, comparable rates of intrusive memories, reexperiencing, and disorganization were found among persons with PD and those with PTSD resulting from traumatic events. With regard to avoidance, as noted above, PD is characterized by maladaptive changes in behavior designed to avoid having PAs, the most dramatic of which is manifested in agoraphobia. Finally, somatic symptoms, autonomic reactivity, and physiological vulnerability are, by definition, core features and diagnostic criteria of PA/PD (Brown and McNiff, 2009; Nixon and Bryant, 2003).

Our review of the literature revealed a single study that addressed the question of whether the experience of severe panic itself can be a traumatogenic event leading to posttraumatic symptoms and PTSD. McNally and Luckach (1992) found that 5 (17%) of 30 individuals with PD, as assessed by the Structured Clinical Interview for *DSM-III-R* (SCID), also qualified for a diagnosis of PTSD in reference to the most frightening PA they had experienced. The perception of the likelihood (0%–100%) of impending death related to their worst PA was significantly higher for those who had developed panic-related PTSD (72%) compared with those who had not (56%). Although the five individuals with panic-related PTSD were found to endorse somewhat fewer

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posttraumatic symptoms on the SCID than a comparison group of 30 individuals with combat- or rape-related PTSD, their scores on standardized measures of posttraumatic symptoms were comparable to a subgroup of 12 individuals with rape-related PTSD for whom data were available. Although limited by a small sample size, the study highlights the potentially traumatogenic nature of the panic experience and offers some initial indications as to what might increase the likelihood of panic-related PTSD.

The purpose of the current study was to examine the premise that the experience of a PA could be a traumatic event that might result in posttraumatic stress symptoms and PTSD. Should this premise be validated, it would suggest that persons presenting clinically with PAs might, in fact, represent two subgroups—those with panic-related posttraumatic distress and those without panic-related posttraumatic distress—a distinction with possible implications for diagnosis, prognosis, and treatment. The specific aims were as follows: a) to investigate the rates of panic-related posttraumatic symptoms and PTSD among a sample of persons with PAs; b) to compare the rates of panic-related posttraumatic symptoms and PTSD among persons with PAs to the rates associated with other traumatic events; and c) to identify individual and clinical factors that increase the likelihood of panic-related posttraumatic symptoms and PTSD in persons with PAs.

METHODS

Participants

The study sample included men and women, 18 years and older, who had experienced PAs, as defined by the occurrence of four or more panic symptoms listed among the diagnostic criteria of panic in *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5; APA, 2013)*. Participants were recruited from anxiety- and/or panic-related venues, including support groups, Internet forums and communities, and university students. Of the 191 participants originally recruited, 13 were excluded from analyses due to young age ($n = 5$), fewer than four panic symptoms ($n = 2$), and withdrawal before completion of the study measures ($n = 6$). The final sample of 178 participants included 148 women (83.1%) and 30 men (16.9%), reflecting the preponderance of women diagnosed with panic, as reported previously (e.g., Kessler et al., 2005). One hundred six (59.6%) participants were single, 62 (34.8%) were married, seven (3.9%) were divorced, and three (1.7%) did not report their personal status. Ages ranged between 18 and 53 years (mean = 28.3; SD = 7.5), and years of education ranged between 9 and 24 years (mean = 13.5; SD = 2.2).

Measures

Panic Disorder Self Report (PDSR) (Newman et al., 2006) is a measure of PD originally based on *DSM-IV (APA, 1994)* criteria and later adapted to meet *DSM-5 (APA, 2013)* criteria. Item 1 establishes that the individual had experienced a PA and when this last occurred. Items 2 to 4 confirm that the PA occurred “out of the blue,” whether the individual had more than one PA and, if so, how many in the past year. Items 5 to 17 ask the participant to indicate which of the *DSM-5*'s 13 panic-related symptoms they had experienced during their worst PA, 4 or more of which would be diagnostic of a PA. Items 18 to 20 assess persistent concern or worry about additional PAs or their consequences (e.g., losing control, having a heart attack, going crazy) as well as maladaptive changes in behavior related to the attacks (e.g., behaviors designed to avoid having PAs). Items 21 to 22 assess functional impairment and subjective distress associated with the panic experience using a 5-point (0 = not at all, 4 = extremely) Likert scale. Items 23 to 25 are designed to rule out alternative etiologies, such as the physiological effects of a substance (e.g., a drug of abuse, a medication) or of a general medical condition. Endorsement of at least two of items 26 to 30 establishes the presence of

agoraphobia. An additional five items relate to ER visits and/or professional treatment modalities undertaken, as well as the participant's subjective feeling (0%–100%) of impending death, loss of control, and/or going crazy after their worst PA. Newman et al. (2006) compared the PDSR to diagnostic clinical interviews and found it to have a 100% specificity rate and an 89% sensitivity rate for detecting PD. The PDSR has also been found to have high test-retest reliability and convergent and discriminative validity coefficients (Houck et al., 2002; Newman et al., 2006).

Posttraumatic Stress Disorder Checklist-Civilian Version (PCL-C-5) (Weathers et al., 2013) is a 20-item measure assessing symptoms of PTSD based on *DSM-5 (APA, 2013)* criteria. Participants were asked to endorse items on a 5-point (0–4) Likert scale, first in reference to their worst PA, and again in reference to other traumatic events they may have experienced. The 20 items reflect the four symptom clusters comprising PTSD—reexperiencing, avoidance, negative alterations in cognitions and mood, and hyperarousal—such that, in addition to a total score, symptom cluster scores are also derived. A total score of 38 or more is considered indicative of PTSD. The psychometric properties of the PCL-C have been demonstrated in terms of internal reliability and consistency, and concurrent validity (Conybeare et al., 2012).

Life Events Checklist (LEC) (Gray et al., 2004) is a 17-item inventory of potentially traumatic life events. For each of these life events, the participant is asked to indicate whether they personally experienced it, witnessed it, heard about it, was not sure, or whether it was not relevant to them. For the purposes of this study, and in accordance with *DSM-5* criteria, an event was considered as a trauma if the participant indicated that he or she had either experienced the event personally or had witnessed the event. In the current study, the LEC was included to ascertain whether the participants had experienced other trauma and, if so, whether they developed posttraumatic stress as a result (as assessed by the PCL-C-5) and how rates of panic-related PTSD compare to PTSD rates resulting from other forms of trauma. The psychometric properties of the LEC have been demonstrated previously in terms of internal reliability, test-retest reliability, and convergent validity (Gray et al., 2004).

A demographic questionnaire was administered to obtain data concerning sex, age, personal status, and education.

Procedure

The study was approved by the university's Institutional Review Board (Helsinki Committee) for its compliance with ethical standards and research procedures. The purpose of the study was presented as an investigation of the effects of panic on individuals with PA/PD. A description of the study requirements, participant rights, anonymity and confidentiality, and other relevant clauses were detailed in the informed consent. Consenting individuals were presented with the study protocol, beginning with the PDSR, to establish the presence of PA, PD, and agoraphobia, as well as their associated symptoms, features, and their severity. The PCL-C-5 was administered next, and participants were instructed to complete this measure in reference to their experience of panic. This was followed by the administration of the LEC. In cases where participants reported prior trauma, they were then asked to again complete the PCL-C-5 in reference to the traumatic events they endorsed on the LEC. Demographic data were collected, and the opportunity for debriefing and contact with the investigators was offered.

RESULTS

Descriptive Statistics

The number of panic symptoms reported in this sample ranged from 4 to 13 (mean = 8.7; SD = 2.3). As illustrated in Table 1, the most frequently reported symptoms were rapid heart rate (95.5%), shortness of breath (79.8%), and nausea (75.4%). Approximately two thirds of the

TABLE 1. Descriptive Statistics: PAs, PD, Agoraphobia, and Traumatic Life Events (N = 178)

	n (%)
Panic symptoms	
Palpitations	170 (95.5)
Shortness of breath	142 (79.8)
Nausea	132 (75.4)
Dizziness	131 (74.4)
Choking	129 (74.1)
Chest pain	128 (72.3)
Trembling	126 (70.8)
Fear of going losing control or going crazy	118 (67.4)
Chills/heat sensations	116 (65.9)
Fear of dying	105 (59.7)
Sweating	100 (57.5)
Derealization	89 (50.9)
Paresthesias	68 (38.9)
No. PAs	
1–2	48 (26.8)
3–5	62 (34.8)
6–10	28 (15.9)
>10	40 (22.6)
PD	
Met diagnostic criteria	153 (86)
Agoraphobia	
Met diagnostic criteria	67 (37.6)
Traumatic life events	
Physical assault	83 (46.6)
Assault with a weapon	22 (12.4)
Sexual assault	36 (20.2)
Unwanted/uncomfortable sexual experience	72 (40.4)
Combat or exposure to a war zone	46 (25.9)
Sudden violent death	22 (12.4)

sample reported fear of going crazy (67.4%) and fear of dying (59.7%). The greatest proportion of participants had experienced between 3 and 5 PAs (34.8%), with almost one (22.6%) in four having experienced 10 or more PAs. One hundred fifty-three (86%) participants met the diagnostic criteria for PD, with 125 (71.4%) reporting fear of recurrent attacks and 118 (66.3%) reporting significant maladaptive behavior changes. Sixty-seven (37.6%) participants met the diagnostic criteria for agoraphobia, the most common manifestations of which were fear of crowds (36.5%), fear of public transportation (36%), and fear of closed places (26.4%). Based on the LEC and for the comparative purposes of the current study, the frequencies of six types of severe trauma are also reported in Table 1.

Panic Related and Trauma Related PTSD

The primary aim of the current study was to determine the rates of posttraumatic symptoms and PTSD related to the experience of panic among persons with PAs. As illustrated in Table 2, 63 (35.4%) of the 178 participants scored above the cutoff (PCL-C-5 total scores, >38) for PTSD in relation to the worst PA they had experienced. By way of comparison, PTSD rates in reference to other serious traumatic life events reported in this sample are presented in Table 2.

Table 3 presents the PCL-C-5 scores for each of the four symptom clusters defined by DSM-5 criteria for PTSD. Given that PCL-C-5 items are rated on a 0 (“not at all”) to 4 (“extremely”) scale, it is evident from the adjusted means for the four clusters (range = 1.92–2.73) that

TABLE 2. PTSD Rates in Persons With Panic and Traumatic Life Events (PCL-C-5* ≥38)

	n (%)
Worst PA experienced	63 (35.4)
Physical assault	27 (32.5)
Assault with a weapon	8 (36.3)
Sexual assault	12 (33.3)
Unwanted/uncomfortable sexual experience	29 (40.2)
Combat or exposure to a war zone	17 (36.9)
Sudden violent death	12 (54.5)

panic-related PTSD symptoms are, on average, experienced “moderately” to “quite a bit.”

Factors Associated With Panic Related Posttraumatic Stress

An additional aim of the current study was to identify individual and clinical factors that increase the likelihood of panic-related posttraumatic stress and PTSD in persons with PAs. Panic-related PTSD (PCL-C-5 scores, >38) was significantly more likely to occur for individuals who reported derealization ($\chi^2[1] = 11.92, p < 0.01$), dizziness ($\chi^2[1] = 8.06, p < 0.01$), chest pain ($\chi^2[1] = 8.26, p < 0.01$), choking ($\chi^2[1] = 4.39, p < 0.05$), and fear of losing control or going crazy ($\chi^2[1] = 11.82, p < 0.01$) in association with their experience of panic. With regard to the latter, the participant's subjective feeling (0%–100%) of losing control or going crazy after their worst PA was significantly correlated to their total PCL-C-5 score ($r = 0.35; p < 0.01$). Endorsement of fear of dying did not distinguish between individuals scoring above or below the PCL-C-5 cutoff ($\chi^2[2] = 0.59, p > 0.05$), nor was the participant's subjective feeling (0%–100%) of impending death significantly correlated to their total PCL-C-5 score.

Total number of PAs experienced was significantly correlated with panic-referenced PCL-C-5 scores ($r = 0.22; p < 0.01$) as were the subjective levels of distress associated with their worst PA ($r = 0.38; p < 0.01$). Fear of recurrent PA ($\chi^2[2] = 9.29, p < 0.01$), medication use ($\chi^2[2] = 10.82, p < 0.01$), seeking professional help ($\chi^2[2] = 5.88, p < 0.05$), and a diagnosis of agoraphobia ($\chi^2[2] = 9.02, p < 0.01$) were all significantly related to scores above the PCL-C-5 cutoff for panic-related PTSD. ER visits did not distinguish between individuals above and below the PCL-C-5 cutoff for panic-related PTSD ($\chi^2[1] = 1.23, p > 0.05$).

To ascertain the relative contribution of these variables to the likelihood of panic-related PTSD, two stepwise multiple regression analyses were conducted—the first included a stepwise binary logistic regression where the PCL-C-5 cutoff scores for panic-related PTSD served as the dependent variable, and the second was a linear stepwise

TABLE 3. PTSD Symptom Clusters in Persons With Panic

PTSD Symptom Cluster	Score Range	Adjusted ^a Range	Adjusted ^a Mean (SD)
Reexperiencing	1–20	0.2–4	1.92 (0.95)
Avoidance	0–8	0–4	2.54 (1.05)
Negative alterations in cognitions and mood	8–24	1.14–4	2.74 (0.65)
Hyperarousal	10–24	1.67–4	2.73 (0.55)

^aCluster score range and mean (SD) adjusted for number of items in each cluster: reexperiencing (5), avoidance (2), negative alterations in mood and cognition (7), and hyperarousal (6).

TABLE 4. Stepwise Binary Logistic Regression Predicting Panic-Related PTSD (PCL-C-5 ≥ 38)

Predictor	Odds Ratio	Confidence Interval	<i>p</i>	Nagelkerke <i>R</i> ²
Subjective levels of distress	1.95	1.33–2.85	0.00	0.32
Worry of going crazy	3.10	1.39–6.93	0.00	
Chest pain	3.30	1.31–8.30	0.01	
Agoraphobia	2.38	1.13–5.01	0.01	

multiple regression using total PCL-C-5 scores as the dependent variable. Predictive variables entered into the analysis included those variables for which, upon univariate analysis, a significant association with the dependent variables was found. Tables 4 and 5 summarize these findings. Features of the panic experience itself, including subjective levels of distress, fear of going crazy, chest pain, and agoraphobia, accounted for 32% of the total variance in panic-related PTSD (PCL-C-5, ≥ 38) (Table 4). The same four variables with the addition of fear of losing control and the number of PAs accounted for 33% of the total variance in total PCL-C-5 scores (Table 5).

DISCUSSION

The primary aim of the current study was to investigate posttraumatic symptoms and PTSD in individuals with PAs in reference to their panic experience. Thirty-five percent of the study sample, all of whom had experienced PAs, scored above cutoff scores for PTSD in reference to their worst PA. By way of comparison, PTSD cutoff rates for participants in this sample referencing other forms of serious trauma in their lives (e.g., physical or sexual assault, combat) ranged from 33% to 55%. It should be noted that among those participants who reported other forms of serious trauma in their lives, there were some who did not meet PTSD cutoff scores in reference to those traumatic events, but who did meet PTSD cutoff scores for their PAs. In terms of posttraumatic symptoms, adjusted mean scores for the four PTSD clusters suggest that panic-related PTSD symptoms are, on average, experienced moderately to quite a bit.

An additional aim of this study was to investigate individual and clinical factors that are associated with an increased likelihood of panic-related posttraumatic symptoms and PTSD. Several features of the panic experience itself significantly distinguished between participants with and without panic-related posttraumatic symptoms and PTSD, including subjective levels of distress associated with PAs, fear going crazy or losing control, chest pain, choking, dizziness, and derealization. A common denominator of fear of losing control or going crazy, dizziness, and derealization is the feeling of disorientation and detachment from one's self and surroundings, which are common features of PTSD. Indeed, laboratory studies have shown similar rates of dissociative symptoms in persons with PA/PD and other forms of trauma during the event itself and during subsequent recollection of the

event (Hagenaars et al., 2009b). The relationship of panic-related posttraumatic symptoms and PTSD to subjective levels of distress associated with the worst PA may be related to the concept of anxiety sensitivity (Elwood et al., 2009; Nixon and Bryant, 2003) and the catastrophic attributions one makes to the somatic manifestations of anxiety. Whether anxiety sensitivity predates and predisposes the individual to severe reactions to PA/PD, or whether it is a result of PA/PD, cannot be determined by the current findings and awaits further study. Other manifestations of panic-related distress and disability (e.g., seeking professional help, agoraphobia) were also significantly associated with panic-related posttraumatic symptoms and PTSD, as was the total number of PAs experienced, pointing to the contribution of retraumatization to the development of posttraumatic stress (Pat-Horenczyk et al., 2007). Taken together, these features of the panic experience accounted for 33% of the total variance in panic-related posttraumatic symptomatology.

Several panic-related symptoms (e.g., trembling, chills, sweating, nausea) did not differentiate between individuals with and without panic-related posttraumatic symptoms and PTSD, possibly due to the fact that these sensations are more common in the normal course of life and are therefore experienced as less ominous and existentially threatening. Of particular interest is the finding that among the panic-related symptoms, fear of dying and the subjective feeling (0%–100%) of impending death were not significantly related to the development of panic-related posttraumatic symptoms and PTSD. This stands in contrast to McNally and Luckach (1992), who found, albeit with a small sample, the perception of the likelihood (0%–100%) of impending death to be significantly higher for those with panic-related PTSD (72%) compared with those without panic-related PTSD (56%). Similarly, panic-related ER visits did not distinguish between individuals with and without panic-related posttraumatic symptoms and PTSD. Further analysis did, however, reveal a significant association between fear of dying and ER visits ($\chi^2[1] = 20.08, p < 0.01$). It is feasible that for individuals who perceive their symptoms as life-threatening and who visit the ER, the ER visit may serve a protective function due to the reassurance and intervention provided there. This too remains a matter for further study.

The current findings may have diagnostic, prognostic, and treatment implications for persons presenting with PA/PD. In terms of diagnosis, these findings suggest that up to one third of persons presenting with PAs may also have panic-related PTSD. In terms of dual diagnosis, *DSM-5* criteria for PD preclude such a diagnosis if the symptoms are restricted to, and in the context of, other mental disorders, including PTSD (e.g., in response to stimuli associated with a traumatic event) (APA, 2013). Presumably, the PD in such cases is a secondary feature of the PTSD that results from a traumatic life event. The current findings suggest an alternative pathway whereby panic-related posttraumatic symptoms and PTSD may appear as secondary features of PA/PD. Thus, the traumatogenic nature of the panic experience, leading in some cases to panic-related PTSD, may qualify for dual diagnosis. For the clinician evaluating persons presenting with PA/PD, the current

TABLE 5. Stepwise Multiple Regression Predicting Total Panic-Related PCL-C-5 Scores

Predictor	β	<i>B</i>	SE – <i>B</i>	<i>t</i>	VIF	Tolerance	<i>R</i> ²
Subjective levels of distress	0.26	4.61	1.19	3.86**	1.10	0.90	0.33
Chest pain	0.20	8.39	2.77	3.02**	1.04	0.95	
Fear of going crazy	0.17	6.69	2.71	2.46*	1.16	0.85	
Agoraphobia	0.15	6.02	2.62	2.30*	1.07	0.92	
Fear of losing control	0.15	6.19	2.87	2.15*	1.18	0.84	
No. PAs	0.14	1.78	0.79	2.24*	1.05	0.95	

p* < 0.05, *p* < 0.01.

findings point to several panic-related symptoms (*e.g.*, fear going crazy or losing control, chest pain, choking, dizziness, and derealization) and associated features (*e.g.*, subjective levels of distress, number of PAs experienced, agoraphobia) that would warrant further evaluation to rule out the presence of panic-related PTSD.

Future research should also examine the clinical implications of meeting diagnostic criteria of both PD and panic-related PTSD. The current findings draw attention to a prevalent trend in psychiatric nosology to differentiate and reify some groups of diagnoses that share more similarities than differences. It may be that PD and PTSD share overarching clinical features that justify a transdiagnostic model for anxiety disorders with its concomitant transdiagnostic intervention model (Norton and Paulus, 2016). Barlow et al. (2004) have presented evidence suggesting that the similarities and comorbidities between anxiety and depressive disorders, for example, overshadow the differences.

The subsets of individuals with PA/PD who do and do not exhibit panic-related posttraumatic symptoms and PTSD might also represent two separate prognostic groups owing to symptom severity and complexity, retraumatization from multiple PAs, the presence of agoraphobia, dissociative symptoms, etc. For those with panic-related posttraumatic symptoms and PTSD, treatment may be more challenging due to the fact that a) repeated PAs and subsequent retraumatization pose an ongoing threat, and b) unlike trauma resulting from external events, the internal/somatic symptoms of panic are constant reminders that may trigger posttraumatic symptoms and are harder to avoid.

The current findings may have common, as well as differential, treatment implications for those with PD who do and do not exhibit panic-related PTSD. The symptoms of both PD and panic-related PTSD can be conceptualized as resulting from conditioning processes (Barlow, 2002). Indeed, a large body of evidence-based literature has documented the efficacy and effectiveness of cognitive behavioral therapy (CBT) in both disorders (Barlow et al., 2015; Najavits and Andersen, 2015). Consequently, the application of CBT techniques is highly pertinent in singular instances of PD and PTSD and would be expected to be applicable in comorbid diagnoses such as panic-related PTSD. In PD, these techniques typically focus on education about the nature of anxiety and panic, exposure and habituation to interoceptive sensations, cognitive restructuring aimed at correcting misconceptions about anxiety and at examining automatic cognitions (*e.g.*, overestimation of current threat and danger), imaginal and in vivo exposure to external stimuli and situations that trigger anxiety, and coping skills acquisition (*e.g.*, mindfulness, breathing techniques, relaxation training). Evidence-based CBT techniques for PTSD also include psychoeducation, cognitive therapy aimed at correcting negative assumptions (*e.g.*, threat appraisal, self-blame), coping skills acquisition (*e.g.*, seeking safety), and stress inoculation training. The common treatment features in these two disorders lend support to a transdiagnostic approach to intervention for related disorders that should include a) psychoeducation, b) antecedent cognitive reappraisal strategies, c) prevention of emotional avoidance strategies, and d) facilitation of emotional approach action tendencies (Barlow et al., 2004).

The present-focused treatment models in PTSD described above place less emphasis on working through the traumatic event while aiming to improve current interpersonal, cognitive, and behavioral functioning. However, as in the treatment of other traumatic events, past-focused approaches may have a place in the treatment of panic-related PTSD. Evidence-based past-focused treatment approaches to PTSD ask the client to explore past events in detail, leading the client through the trauma narrative to promote working through and processing of painful memories and emotions. In cases of panic-related PTSD, this might refer to the worst PA ever experienced. A significant body of research has established the efficacy of cognitive processing therapy (Koucky et al., 2013), eye movement desensitization and reprocessing (Bisson et al., 2013), accelerated resolution therapy (Kip et al., 2013), and prolonged exposure (Foa, 2011; McLean and Foa, 2014), as well

as other approaches in a broad range of PTSD samples. These approaches may differ in certain respects (*e.g.*, the degree to which the trauma narrative is explicitly expressed); however, they share the common feature of encouraging the client to face traumatic memories fully, after which they are guided back to the safety of the present. Although these past-focused approaches are well established in the treatment of PTSD, they are not mainstays of PD treatment per se, although they may have a place in cases of panic-related PTSD.

Several limitations of this preliminary study, as well as the questions it raises, could guide future research on the traumatogenic properties of panic. Standardized self-report measures, as used here, might be supplemented by clinical interviews to provide more definitive diagnostic validation as well as more refined evaluation of the experience and associated features of panic-related posttraumatic symptoms and PTSD. Research using convenience samples from within large pools of persons with PA/PD, as in the current study, should be augmented by consecutive sampling techniques. In addition, although PA/PD is more prevalent among women by a ratio of approximately 2:1 (Kessler et al., 2005), the current sample included a much higher women-to-men representation of approximately 5:1. The cross-sectional nature of the current study, examining variable relationships at a single point in time, has inherent limitations for reaching cause-and-effect conclusions. Seeking to provide some preliminary indication, the current study asked participants specifically to rate their posttraumatic symptoms in reference to their worst PA. Future studies might follow individuals presenting with PA/PD longitudinally over multiple measurement points to track the development of panic-related PTSD. Studies of persons with PA/PD will also likely yield a significant proportion of participants with other, prior traumatic experiences, presenting the challenge of attributing posttraumatic symptomatology differentially to the PA/PD versus other traumatic experiences. The current study addressed this by assessing posttraumatic symptoms separately in reference to the worst PA and in reference to other traumatic events. Finally, the clinical and individual variables studied here accounted for about one third of the variance in the likelihood of panic-related posttraumatic symptoms and PTSD, leaving other individual (*e.g.* autonomic reactivity, personality characteristics) and clinical (*e.g.*, early intervention, psychiatric history) factors to be examined. Given the possible diagnostic, prognostic, and treatment implications of panic-related posttraumatic symptoms and PTSD, this would appear to be a worthwhile direction for further study.

CONCLUSIONS

Given that PAs are often experienced as events involving feelings of impending death, loss of control, or threat to one's physical integrity, and typically involve intense fear and helplessness, the current study found a high incidence of panic-related posttraumatic symptomatology after the experience of panic, with up to one third of the current sample scoring above the cutoff for PTSD. Specific features of the panic experience itself were found to contribute to the likelihood of panic-related posttraumatic symptoms and PTSD. These findings may have diagnostic, prognostic, and treatment implications for a subset of individuals presenting with PAs who may also have panic-related PTSD.

DISCLOSURE

The authors declare no conflict of interest.

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