SCIENTIFIC INVESTIGATIONS

Nightmares and Suicide in Posttraumatic Stress Disorder: The Mediating Role of Defeat, Entrapment, and Hopelessness

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Study Objectives: Although nightmares appear to be related to suicidal behaviors, the mechanisms which underpin this relationship are unknown. We sought to address this gap by examining a multiple mediation hypothesis whereby nightmares were predicted to have an indirect effect on suicidal behaviors through perceptions of defeat, entrapment, and hopelessness.

Methods: Data were collected from 91 participants who had experienced trauma and symptoms of posttraumatic stress disorder (PTSD). Nightmares were measured by summing the frequency and intensity ratings of relevant items on the Clinician-Administered PTSD Scale. Participants also completed questionnaire measures of suicidal behavior, hopelessness, defeat, and entrapment. Given the interrelations between insomnia, PTSD, and suicide, a measure of insomnia was included as a covariate. Furthermore, analyses were conducted with and without those participants who had comorbid depression.

Results: Suicidal behaviors were higher in those participants who experienced nightmares (62%), in comparison to those who did not (20%). Bootstrapped analyses provided support for the hypothesized multistep mediational model. Specifically, nightmares were both directly and indirectly associated with suicidal behaviors, through perceptions of defeat, entrapment, and hopelessness, independent of comorbid insomnia and depression.

Conclusions: For the first time we show that the relationship between nightmares and suicidal behaviors is partially mediated by a multistep pathway via defeat, entrapment, and hopelessness. Clinically, our work highlights the importance of monitoring and targeting nightmares and perceptions of defeat, entrapment, and hopelessness when working with clients who have experienced trauma.

Commentary: A commentary on this article appears in this issue on page 289.

Keywords: nightmares, suicidal ideation, posttraumatic stress disorder, defeat, entrapment; hopelessness, insomnia, depression

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INTRODUCTION

Suicide is a major public health concern accounting for approximately 800,000 deaths worldwide each year.[1] In order to develop effective clinical prevention strategies, it is crucial to understand how risk factors and psychological mechanisms interact within suicidal pathways. Sleep problems, have been identified as a modifiable risk factor for suicidal behaviors, such as, suicidal thoughts, plans, and attempts.[2] While there is a growing body of research reporting robust associations between sleep problems and suicidal behaviors,[2] such work has not elucidated the psychological mechanisms which underpin this relationship.

One specific type of sleep problem that is associated with suicidal behaviors is the experience of nightmares.[3–11] A recent meta-analysis based on 14 studies, including both clinical and non-clinical samples, indicated that individuals who experienced nightmares were 2.61 times more likely to experience suicidal behaviors than those who did not experience nightmares.[2] Moreover, a longitudinal study of people who had previously attempted suicide found that having frequent nightmares at both baseline and two months later, was associated with a greater risk of a subsequent suicide attempt within the following two-year period.[6] While nightmares have been associated with a range of mental illnesses, they appear to be particularly prevalent in

BRIEF SUMMARY

Current Knowledge/Study Rationale: Empirical evidence indicates that nightmares are a risk factor for suicidal behaviors, yet no study to date has examined the psychological mechanisms underpinning the association between nightmares and suicidal behaviors in those experiencing PTSD. This study tested a theoretically-based multi-step mediational pathway whereby nightmares are related to suicidal behavior, through defeat, entrapment and hopelessness.

Study Impact: Analyses supported the hypothesis that the relationship between nightmares and suicidal behavior, partially operates via defeat, entrapment and hopelessness. Clinically, these findings highlight the importance of incorporating assessment and interventions targeting nightmares and perceptions of defeat, entrapment and hopelessness, when working with suicidal clients.

those with posttraumatic stress disorder (PTSD). Estimates indicate that up to 90% of individuals experience nightmares in the acute phase following trauma.[12] Nightmares and sleep disturbance are included within the DSM-5 diagnostic criteria for PTSD and are repeatedly referred to as core or hallmark symptoms of PTSD.[13–15] Furthermore, PTSD substantially increases the risk of suicidal thoughts or behaviors,[16] with one large population-based study indicating that individuals with PTSD were almost three times more likely to experience suicidal thoughts or behaviors than those without PTSD.[17] Surprisingly, despite

the interrelationships between nightmares, PTSD, and suicide, no study to date has examined the psychological mechanisms underpinning the association between nightmares and suicidal behaviors in those experiencing PTSD.

So far, research investigating psychological mechanisms is confined to one study that examined the extent to which the relationship between nightmares and suicide could be explained by Joiner's[18] Interpersonal-Psychological Theory of Suicide (IPTS).[5] Data from two different samples of college students consistently indicated that nightmares were significantly associated with suicide attempts, independent of depression and constructs identified by the IPTS, namely perceived burdensomeness, thwarted belongingness, and acquired suicide capability. Therefore, it is important to examine the role of explanatory psychological processes, or factors, within the context of the relationship between nightmares and suicide.

Three plausible factors are defeat, entrapment, and hopelessness, which feature across different contemporary psychological models of suicidal behaviors.[19–22] Defeat and entrapment stem from an evolutionary model of depression, whereby defeat is purported to refer to a feeling of failed struggle which is associated with a loss of social status.[23] Entrapment is thought to be associated with a desire to escape, especially when there is a perception that escape routes are blocked.[23] Indeed, Baumeister's early work highlighted that suicide may represent an escape from the self.[24] When applied to suicide, theoretical accounts provide a broadly similar postulation; that detrimental perceptions of defeat and entrapment drive suicidal behaviors as a means of escaping from extreme negative feelings and distress.[19–21] This is supported by the extant literature, which has reported associations between defeat and entrapment, and suicidal behaviors in those with PTSD.[25,26]

Hopelessness is a robust risk factor for suicidal behaviors, representing pessimism for the future.[27] The Cry of Pain model theorized a suicidal pathway whereby defeat triggers entrapment, which in turn elicits hopelessness when perceptions of thwarted escape are projected into the future.[19,20] Based on the Cry of Pain model, nightmares may be related to suicidal behavior indirectly through defeat, entrapment, and hopelessness. From this perspective, nightmares act as a stressor and directly trigger perceptions of defeat. In lieu of any empirical evidence examining the relationship between defeat and nightmares, it can be posited that nightmares may trigger perceptions of defeat due to their trauma-related content. Within the context of PTSD, nightmares are often based on the initial traumatic event that the individual experienced, and consequently individuals may re-experience the emotions associated with this trauma.[28] It is possible that nightmares may reactivate perceptions of defeat, entrapment, and hopelessness. Alternatively, it is possible that negative appraisals of the ability to cope with, or manage, these ongoing nightmares may give rise to defeat.[21]

The current study had two main aims. The first was to investigate whether nightmares were associated with suicidal behaviors. The second aim was to examine possible multistep indirect pathways of the association between nightmares and suicidal behaviors through (i) defeat, (ii) entrapment, and (iii) hopelessness (as depicted in **Figure 1**). Specifically, it was hypothesized that nightmares would be associated with suicidal

behavior. Furthermore, this association was hypothesized to operate via an indirect pathway whereby nightmares would lead to defeat, defeat would lead to entrapment, entrapment would lead to hopelessness, and hopelessness would lead to suicidal behavior (as illustrated in bold in **Figure 1**). Finally, it was hypothesized that indirect and direct pathways would pertain, even when controlling for depression and insomnia.

METHODS

Participants

Data were collected as part of an earlier study examining the associations between suicidal behavior, hopelessness, defeat, and entrapment, in people experiencing PTSD symptoms.[25] Inclusion criteria were: (a) have experienced a serious traumatic event in the past and meet criterion A of the Posttraumatic Stress Diagnostic Scale,[29] which refers to the severity of a traumatic event and its consequential impact; (b) aged 18–65 years; (c) English-speaking. Participants with dementia, organic brain disorder, or an active psychotic disorder were excluded from the study. Data from 4 participants were excluded because they did not complete the defeat and entrapment scales. The remaining sample of 91 participants (mean age = 28.87, standard deviation [SD] = 10.64), included 66 females (73%, mean age = 28.56, SD = 10.75), 24 males (26%, mean age = 30.08, SD = 10.56), and one participant who did not specify gender. Participants reported a range of PTSD symptoms, with the sample comprised of 50 participants who met criteria for a clinical diagnosis of PTSD.
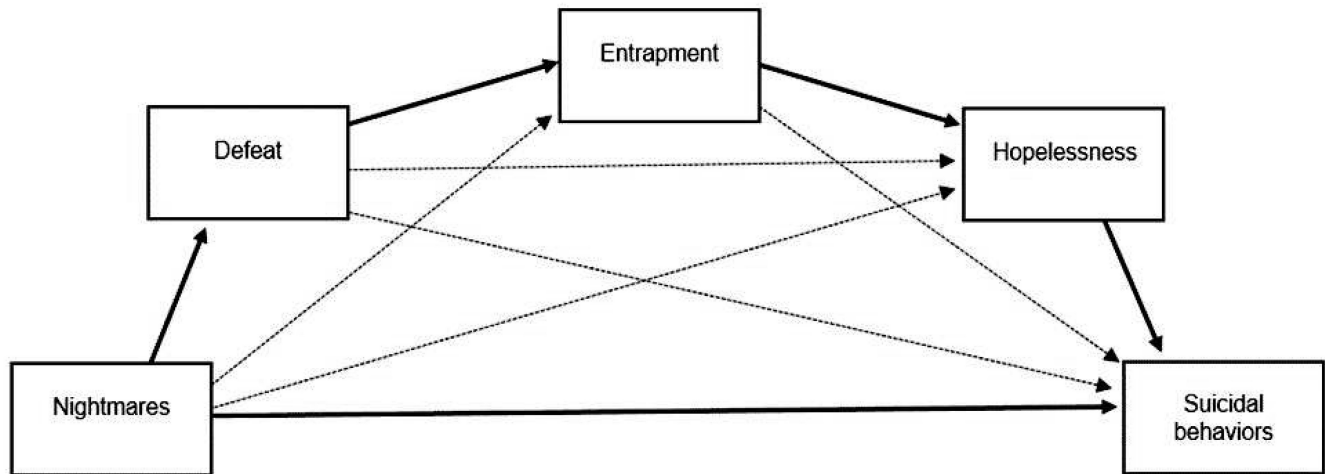
Measures

Nightmare severity was measured by summing the 2 recurrent or distressing dreams items within the Clinician-Administered PTSD Scale for DSM-IV (CAPS).[30] The first item measured the amount of distress the dreams caused by asking whether the dreams caused the individual to wake up, on waking what feelings they had, and subsequent problems returning to sleep related to distress caused by the dream. The second item refers to the frequency of nightmares over the past month.

Suicidal behaviors were measured by the 4-item Suicidal Behaviors Questionnaire-Revised (SBQ-R).[31] This questionnaire assesses lifetime level of suicidal behaviors, level of suicidal thoughts within the past year, communication of suicidal intent to others, and likelihood of a future suicide attempt. Possible total scores range from 3 to 18, with higher scores reflecting more suicidal behaviors. In the current sample, the α coefficient was 0.87.

Defeat was assessed by a 16-item scale,[23] designed to measure the extent to which participants have felt defeated during the previous week (e.g., "I feel that I have not made it in life"). Total scores range from 0 to 64, with higher scores indicating greater levels of defeat. Cronbach α for the current sample was 0.96.

Entrapment was measured with a 16-item scale that assesses feelings of entrapment (e.g., "I would like to get away from other more powerful people in my life").[23] The total score ranges from 0 to 64, with higher scores indicating greater levels of entrapment. In this current study Cronbach α for the entrapment scale was 0.95.

Figure 1—Multiple mediation model for nightmares and suicidal behavior, via defeat, entrapment, and hopelessness (controlling for insomnia).

Predicted mediational pathway highlighted in bold.

Hopelessness was measured with the 20-item Beck Hopelessness Scale (BHS) which assesses perceptions of pessimism for the future.[32] Participants score each statement true or false to indicate whether the given statement reflects their experiences across the past week (e.g., "I look forward to the future with hope and enthusiasm"). Possible total scores range from 0 to 20, with higher scores indicating greater levels of hopelessness. In the current sample, the α coefficient was 0.89.

Insomnia was measured by summing the 2 difficulty in falling or maintaining sleep items within the CAPS, in accordance with the scoring procedure for the full scale.[30] The first item assesses how frequently participants had problems falling or maintaining sleep within the past month. The second item measures the intensity of the sleep problem, including amount of sleep lost.

Comorbid depression was based on whether participant reported a previous diagnosis of depression. Responses to this question were used to allocate participants to a comorbid depression group within the exploratory analyses.

Procedure

The CAPS interview was administered first, by the third author (MP), to confirm a clinical diagnosis of PTSD. Participants completed a battery of questionnaire measures in a specified order, namely, defeat, entrapment, hopelessness, and suicidal behavior. On completion of the study, participants were provided with a debriefing sheet including contact information for appropriate support services. Furthermore, participants who met the specified criteria for suicidal risk (i.e., SBQ-R item $1 \geq 3$; item $2 \geq 3$; item $3 \geq 2$; item $4 \geq 4$) were referred to their healthcare contact, provided they had earlier given consent for this protocol. Ethics approval for this study was obtained from the relevant NHS research ethics committee.

Analysis Strategy

Prior to testing the hypotheses the normality of the data was assessed by calculating the Z score for skew and kurtosis values,

which indicated that the suicidal behavior data were positively skewed, and the nightmare data was negatively skewed. Transformations failed to normalize the data. Therefore, a nonparametric resampling technique, known as bootstrapping was applied in all analyses (correlations, regression, and mediation models) as an appropriate statistical technique.[33] Bootstrapping refers to the repeated re-sampling from the initial dataset to generate the statistic of interest for the additional number of subsamples.[33] In this study, bootstrapped confidence intervals were calculated based on 5,000 bootstrap replications.

Descriptive statistics and Pearson product-moment correlational analyses were calculated for all study variables. Hierarchical regression analyses were conducted to test the first hypothesis, that nightmares would be associated with suicidal behaviors, independent of insomnia and depression. The predictor variable, nightmares, and control variable, insomnia, were standardized prior to entry into the hierarchical regression models. Suicidal behaviors was entered as the outcome variable. Insomnia was entered into the first step of the model, followed by nightmares which was entered into the second step.

Serial multiple-mediational analyses were performed given the hypothesized relationships between the 3 mediating variables, whereby perception of defeat was postulated to trigger entrapment, which subsequently may lead to the development of hopelessness. As the model includes 3 mediator variables, there are 8 possible pathways in which nightmares may be associated with suicidal behaviors, 1 direct and 7 indirect (as illustrated in **Figure 1**). All mediational analyses were conducted using the SPSS macro PROCESS,[34] with bias-corrected bootstrap replications to generate 95% confidence intervals. Indirect effects were interpreted as significant when zero was not included within the 95% CIs.[34]

Effects of comorbid depression were examined by removing the data of participants with a diagnosis of depression (n = 27) and then recalculating the hierarchical regression

Table 1—Means (with standard deviations in parenthesis), ranges and Pearson product-moment correlational coefficients for nightmares, suicide, defeat, entrapment, hopelessness, and insomnia

	Mean (SD)	Min	Max	2	3	4	5	6
1. Nightmares (CAPS Q)	3.37 (2.36)	0	7	0.48***	0.53***	0.48***	0.48***	0.54***
2. Suicide (SBQR)	5.95 (4.01)	3	18		0.52***	0.55***	0.62***	0.34***
3. Defeat	43.87 (17.03)	3	64			0.82***	0.83***	0.45***
4. Entrapment	41.40 (17.85)	3	64				0.80***	0.45***
5. Hopelessness (BHS)	12.64 (5.92)	0	20					0.44***
6. Insomnia (CAPS Q)	4.14 (2.12)	0	8					

***$p < 0.001$.

Figure 2—Multiple mediation model for nightmares and suicidal behavior, via defeat, entrapment and hopelessness (controlling for insomnia).
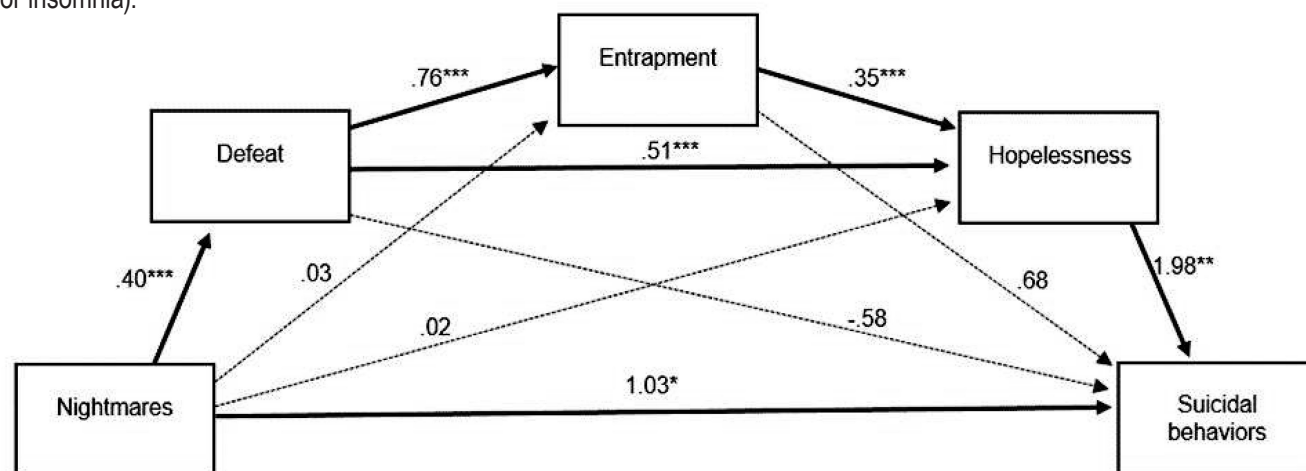
Significant pathways highlighted in bold. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

and mediation analyses. Data management and analyses were performed using SPSS 22.0 (2013).

RESULTS

Sample Characteristics

Although participants were recruited based on their experience of trauma, 51 reported a current diagnosis of PTSD and a further 24 participants stated that they had a past diagnosis of PTSD. Presence of a comorbid mental illness was also reported by 36 participants (depression n = 27, bipolar disorder n = 4, borderline personality disorder n = 3, other n = 2). A total of 63% of participants experienced nightmares at least once a week during the past month. A χ^2 test indicated that suicidal thoughts, plans, or attempts were significantly higher among those who experienced nightmares within the past month (62%) than participants without nightmares (20%; $\chi^2(1) = 12.87$, $p < 0.001$).

Preliminary Analyses

Descriptive statistics and correlational analyses are presented in **Table 1** for all study variables. Correlation coefficients between all variables were positive and significant.

A hierarchical regression model indicated that after controlling for insomnia, nightmares explained an additional 12.8%

of the variance in suicidal behaviors ($R^2 = 0.24$, $\Delta R^2 = 0.13$, F(change)$_{1, 88} = 14.91$, $p < 0.001$). In line with the first prediction, nightmares significantly predicted suicidal behaviors, independent of insomnia ($\beta = 0.43$, $t = 3.86$, $p < 0.001$, B = 1.71 [95% CI = 1.05–2.45]). Participants with a comorbid diagnosis of depression were then removed from the sample, and the regression model was then recalculated. The pattern of findings remained the same (after controlling for insomnia, nightmares explained an additional 11.5% of the variance in suicidal behaviors [$R^2 = 0.18$, $\Delta R^2 = 0.12$, F(change)$_{1, 61} = 8.56$, $p < 0.01$]), indicating a positive association between nightmares and suicidal behaviors ($\beta = 0.38$, $t = 2.93$, $p < 0.01$, B = 1.22 [95% CI = 0.50–1.97]).

Multiple Mediation Analyses

The total effect for the entire model was significant (point estimate = 1.71; 95% CI: 0.83–2.58). Direct effect point estimates are presented for the full mediational model in **Figure 2**. Point estimates and bootstrapped 95% CI for the total indirect effect and 7 specific indirect pathways are provided in **Table 2**. The mediational analysis indicated that the total indirect effect and 2 specific indirect effects were significant. First, nightmares were associated with suicidal behaviors indirectly through defeat, to entrapment, to hopelessness. Second, nightmares were associated with suicidal behaviors indirectly through defeat, to hopelessness.

Table 2—Point estimates for indirect effects and 95% bias-corrected confidence intervals for multiple mediational analysis in which defeat, entrapment, and hopelessness were represented as mediators in the association between nightmares and suicidal behavior (controlling for insomnia).

Path	Estimate	Lower	Upper
Nightmares > Defeat > Suicidal behaviors	−0.23	−0.95	0.13
Nightmares > Defeat > Entrapment > Suicidal behaviors	0.21	−0.03	0.70
Nightmares > Defeat > Hopelessness > Suicidal behaviors	0.41	0.14	1.04
Nightmares > Defeat > Entrapment > Hopelessness > Suicidal behaviors	0.21	0.05	0.65
Nightmares > Entrapment > Suicidal behaviors	0.02	−0.09	0.20
Nightmares > Entrapment > Hopelessness > Suicidal behaviors	0.02	−0.10	0.16
Nightmares > Hopelessness > Suicidal behaviors	0.05	−0.28	0.36
Total indirect effects	0.68	0.27	1.22

Finally, the mediational analysis was recalculated, after removing participants with a comorbid diagnosis of depression, which produced the same patterns of results. Significant effects reported as follows, total effect (point estimate = 1.22; 95% CI: 0.39–2.05), total direct effect between nightmares and suicidal behaviors (point estimate = 0.84; 95% CI: 0.03–1.65), total indirect effect (point estimate = 0.38; 95% CI: 0.06–0.99), indirect effects for nightmares to defeat, to entrapment, to hopelessness to suicidal behavior (point estimate = 0.13; 95% CI: 0.01–0.52), indirect effects for nightmares to defeat, to hopelessness to suicidal behavior (point estimate = 0.14; 95% CI: 0.02–0.61).

DISCUSSION

The current study sought to advance the understanding of the association between nightmares and suicidal behaviors in people with symptoms of PTSD, by examining theoretically based mediational pathways.[19–21] Analyses supported the predicted four-step indirect pathway, whereby nightmares have an indirect effect on suicidal behaviors through perceptions of defeat, entrapment, and hopelessness. Furthermore, this pathway operated independent of comorbid insomnia, and of a comorbid diagnosis of depression.

In line with the first prediction, and corroborating earlier research,[3,7] nightmares were associated with suicidal behaviors independent of the effects of comorbid insomnia and depression. Moreover, suicidal behavior was more frequent among those people who reported experiencing nightmares than in those who did not experience nightmares. These findings further validate the extant literature which suggests that nightmares are a risk factor for suicidal behavior.[3–11]

Results from the mediational analyses indicated that the association between nightmares and suicidal behaviors operated both directly and indirectly via a four-step mediational pathway of (i) defeat, and (ii) entrapment, and (iii) hopelessness, supporting our second prediction. The indirect pathway was based on the hypothesis that nightmares may trigger defeat, which in turn may be associated with entrapment and hopelessness based on perceptions of the inability to escape from defeat.[19,20] Suicide may then be considered as a possible escape strategy.[19–21,24] As this is the first study to examine the role of defeat, entrapment and hopelessness in the context of the nightmares/suicide association, replication is important. Furthermore, research should seek to examine the nature of the relationship between nightmares and defeat. It is possible that defeat may emerge from the actual content of the nightmare. This may be particularly relevant in instances where nightmares, based on the memory of the traumatic event, reactivate associated emotions and symptoms.[28] For example, where nightmare content is based on an instance of abuse, as a victim the individual may consequently feel that they have been defeated by the perpetrator of the abuse as re-experienced through the nightmare. Alternatively, negative self-appraisals may mediate the relationship between nightmares and defeat, whereby an individual negatively appraises their ability to cope or manage nightmares, which triggers defeat. Indeed, proponents of the Schematic Appraisals Model of Suicidal behavior (SAMS), emphasize the deleterious nature of negative self-related appraisals which give rise to defeat and entrapment.[21] This suggestion is supported by findings from research investigating rapid eye movement (REM) sleep, the sleep stage where nightmares generally occur.[35] Specifically, individuals with depression and anxiety show a bias towards negative self-appraisals when woken from REM sleep, in comparison with self-appraisals following non-REM sleep awaking.[36]

It is important to note that within the full mediational model presented in this paper, nightmares maintained a direct association with suicidal behaviors. This finding points towards the likelihood of additional pathways which underpin this relationship. Subsequent research may build on the current study, and that conducted by Nadorff and colleagues,[5] by integrating the underlying psychological and neurobiological processes to identify candidate mediators suitable for hypotheses testing. In addition to the suggested role of negative cognitive appraisals, the frequent re-experiencing of the traumatic event via nightmares as typified in PTSD, may also hinder emotional and mood regulation as a consequence of disrupted REM sleep.[37] Moreover, emotional dysregulation,[38] and disturbed REM sleep are both associated with suicidal behaviors.[39] Accordingly, research should examine the role of emotional regulation and self-appraisals, within the context of the nightmares/suicide relationship.

Findings from the current study have two important clinical implications. First, results further corroborate the association

between nightmares and increased suicidal risk.[3–5,7–11] Hence, clinicians should explore the presence and effects of nightmares routinely with individuals who are experiencing symptoms of PTSD. Furthermore, levels of defeat, entrapment and hopelessness should also be monitored in those who report nightmares. Second, it may be insufficient to solely administer interventions for PTSD, given that research indicates that sleep problems may persist post-intervention.[40] Rather, clinicians may consider incorporating sleep-targeted interventions into treatment provision.[41] For example, there is strong empirical evidence to support the efficacy of Imagery Rehearsal Therapy (IRT) in treating nightmares.[41] IRT alleviates nightmares by asking the patient to recall the nightmare and then rescript it into something less distressing. This new content is then rehearsed with the aid of supporting imagery. Alternatively, prazosin is the leading pharmacological agent advocated for use to treat PTSD-related nightmares.[41] However, there is currently insufficient evidence to suggest whether these sleep-focused psychological or pharmacological treatments may generate additional positive outcomes in associated levels of suicidal behaviors, defeat, entrapment, and hopelessness.

The current pattern of results should be viewed within the context of four limitations. First, the cross-sectional nature of the data prevents causal interpretations. Future studies should examine the identified mediational pathways using longitudinal designs. Second, the sample size within the current study is relatively small, which may limit the extent to which these findings generalize to more widely to people with symptoms of PTSD. However, bootstrapping was applied as the most appropriate technique for mediation analysis with small sample sizes.[33] Third, details regarding use of psychotropic medication were not collected. This should be routinely included in future studies given that certain types of psychotropic medication may impact sleep architecture and in particular REM sleep. Fourth, as this study is based on an analysis of existing data, measures of nightmares and insomnia were drawn from frequency and intensity items within the CAPS. Therefore, it is appropriate for these findings to be replicated using specific validated measures of nightmares and insomnia. This may also permit a finer analysis of the specific aspects of nightmares, such as frequency versus distress, which are often only weakly correlated.[35] Moreover, nightmares within the context of this study were specific to the traumatic event. Therefore, it is possible that findings from this study may not generalize more widely to idiopathic nightmares. In addition, we did not assess for other sleep disorders within our sample, such as sleep disordered breathing or other parasomnias; thus, future work should incorporate more comprehensive sleep measurement in future studies of the sleep-suicide relationship. Finally, depression diagnosis was based on responses to a single question, future studies should account for this limitation with use of validated measures.

CONCLUSIONS

In conclusion, the present study is novel and important in that it is the first to report that the association between nightmares

and suicidal behaviors, operates via defeat, entrapment, and hopelessness. However, nightmares maintained a direct effect on suicidal behaviors, independent of the specified indirect pathways. Therefore, it is imperative that future research focuses on identifying additional pathways which account for this association. Furthermore, it is worth noting that both the direct and indirect association between nightmares and suicidal behaviors operated independent of comorbid insomnia and depression. From a therapeutic perspective, clinicians should consider targeting interventions at co-occurring nightmares and suicidal behaviors, while monitoring levels of defeat, entrapment, and hopelessness.

ABBREVIATIONS

BHS, Beck Hopelessness Scale
CAPS, Clinician-Administered PTSD Scale for DSM-IV
IPTS, Interpersonal-Psychological Theory of Suicide
IRT, Imagery Rehearsal Therapy
PTSD, posttraumatic stress disorder
REM, rapid eye movement
SAMS, Schematic Appraisals Model of Suicidal behavior
SBQ-R, Suicidal Behaviors Questionnaire-Revised

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SUBMISSION & CORRESPONDENCE INFORMATION

DISCLOSURE STATEMENT