Emotion Dysregulation Mediates the Association between Acute Sleep Disturbance and PTSD Symptoms in Trauma Exposed Patients

M. McDaniel[1], N. Christ[1]., H. Xie[1], M. T. Tull[1], J. Elhai[1], J. J. Mathews[1], R. V. N. Boddapati[1], I. Liberzon[2], & Xin Wang[1]
[1]University of Toledo , Toledo, Ohio; [2]Texas A&M University, College Station, Texas

INTRODUCTION

- Sleep is one of the most restorative processes available for various aspects of health (Brinkman & Sharma, 2019).
- The relationship between sleep disturbance and PTSD is well-established (for review see Lamarche & De Koninch, 2007; Gilbert, Kark, Gehrman, & Bogdanova, 2015). In fact, approximately 70% of individuals with PTSD have co-occurring sleep problems (Babson & Feldner, 2010). Research has suggested that poor sleep disrupts cognitive processes critical to most evidence-based treatments for PTSD, such as the consolidation of emotional memories., thereby reducing their overall effectiveness (van Liempt, 2012).
- At its core, PTSD can be considered a disorder of emotion (Lanius & Frewen, 2006). As such, PTSD is characterized by deficits in the experience and expression of affect (Litz & Gray, 2002). Specifically, the use of some strategies of emotion regulation are uniquely associated with PTSD symptoms (Boden et al., 2013; Seligowski, Lee, Bardeen, & Orcutt, 2015).
- Independently, sleep disturbance and emotion dysregulation are uniquely associated with PTSD (Fairholme et al., 2013). Additionally, while these are transdiagnostic constructs that interact, it appears that good reported sleep quality is a protective factor against anxiety-related psychopathology in individuals with PTSD regardless of emotion regulation (Mantua et al., 2018). More evidence is needed to understand the complex relationship of poor sleep and emotion regulation and how they together relate to PTSD symptoms.
- The aim of the current study is to evaluate the relationship of sleep disturbances and subsequent development of PTSD symptoms following an acute trauma. Our second objective is to assess the role of emotion dysregulation in the relationship between sleep disturbances and PTSD symptoms.

METHOD

Participants

- All participants were adults recruited from local hospital emergency departments within 48hrs of experiencing at post traumatic experience (PTE). Interested individuals gave informed consent to participate in the longitudinal study including post-trauma follow-up timepoints of: 2 weeks, 3 months, 6 months, 9 months, and 12 months.

Measures

- The Pittsburgh Sleep Quality Index Addendum for posttraumatic stress disorder (PSQI-A; Germain et al., 2005) is a brief, seven-item self-report questionnaire designed to assess the frequency of seven disruptive nocturnal behaviors. Specifically this questionnaire has proved useful in detecting sleep disturbances for individuals with PTSD.
- The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) is a multidimensional measure used to assess difficulties in emotion regulation in adults. Psychometric examinations have consistently found high internal consistency (Cronbach's α= .93, current study α= .95) and factor analysis reliably provides six distinct subscales: Nonacceptance of Emotional Responses, Difficulties Engaging in Goal-Directed Behavior, Impulse Control Difficulties, Lack of Emotional Awareness, Limited Access to Emotion Regulation Strategies, and Lack of Emotional Clarity.
- The PTSD Checklist for DSM-5 (PCL-5; Weathers et al., 2013) is a 20-item self-report measure that assesses DSM-5 PTSD symptoms.

METHOD-CONT.

Data Analysis:

- First, total scores were derived from summing item responses after reverse coding applicable DERS items. Participants were then grouped into those with clinically significant sleep disturbance at the initial timepoint, indicated by a total PSQI-A score of four or more (Insana et al., 2013), and those without initial sleep disturbance. These groups were used to conduct preliminary group difference tests on all measures (i.e., PCL-5, PSQI-A, and DERS) using independent sample t-tests (see Table 1). We then examined if there were severity differences in sleep disturbance and in PTSD symptoms at initial and 3-month follow-up (see Table 2).
- Next, we conducted mediation analyses to test further proposed hypotheses. All mediation models were conducted as path analysis models using Mplus v.8. First, an overall model was conducted using total scores from all primary measures (Figure 1). Next, mediation models were conducted with each DERS subscale acting as the mediator independently (Table 3). Finally, all subscales were modeled together as multiple mediators to adjust for other subscales' shared variance in the model. (Figure 2).

RESULTS

Individuals with initial sleep disturbance endorsed significantly more severe symptoms of emotion dysregulation and sleep disturbance initially, and significantly more severe PTSD symptoms at both initial and 3-month follow-up.

Table 1. Group differences between clinically significant sleep disturbance and non-significant sleep disturbance

Outcome Measure	Sleep Disturbance (Mean)	No Sleep Disturbance (Mean)	t-test	p-value
Initial	N= 129	N= 34		
PCL-5	49.15	22.7	8.389	<.001
PSQI-A	10.34	1.53	20.24	<.001
DERS	101.8	80.91	4.067	<.001
3-Month	N= 86	N= 10		
PCL-5	40.73	14.02	7.205	<.001

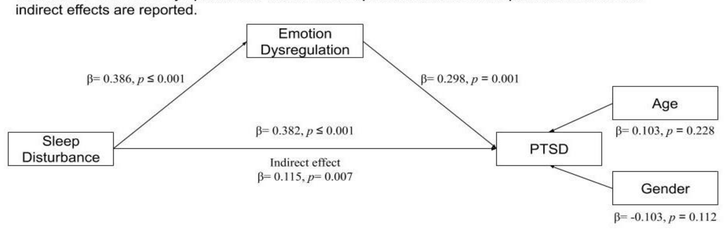
Average symptoms of sleep disturbance and PTSD were significantly lower at 3-month follow-up than at the initial timepoint.

Table 2. Group differences between acute and 3-month timepoints

Outcome Measure	Acute (Mean)	3-month (Mean)	t-test	p-value
PSQI-A	9.91	8.28	3.10	.003
PCL-5	49.46	36.99	7.51	<.001

There was a significant mediation (i.e., indirect) effect of overall emotion dysregulation on the relationship between sleep disturbance and PTSD symptoms, shown in Figure 1. The model demonstrated good fit (CFI= 0.977, TLI= 0.921; SRMR= 0.040; RMSEA= 0.083, 90% CI [0.000, 0.235]). Although age and gender were both adjusted for as covariates, neither was significant in our model.

Figure 1. Mediating effect of emotion dysregulation on relationship between initial sleep disturbance and PTSD symptoms at 3-month follow-up. Standardized direct path coefficients and indirect effects are reported.



RESULTS-CONT.

Mediation results of each DERS subscale when modeled individually are displayed below in Table 3. Specifically, we found DERS subscales of Non-accept (β=0.067, p=0.033), Goals (β=0.098, p=0.043), and Strategies (β=0.145, p≤0.001) accounted for significant variance in the relationship between sleep disturbance and PTSD symptom severity.

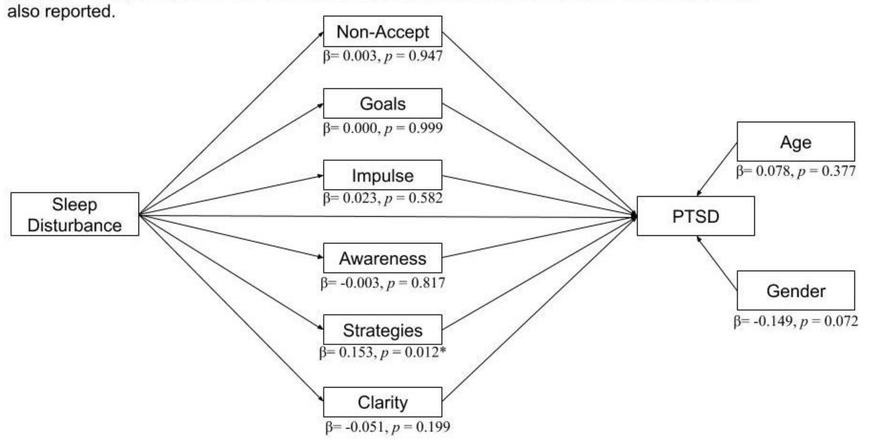
Table 3. Mediating role of individual DERS subscales in sleep disturbance and PTSD.

Subscale (M)	a-path (X -> M)	b-path (M -> Y)	C-path (X -> Y)	Indirect effect	R^2 in DERS subscale	R^2 in PTSD
Non-accept	0.318***	0.210**	0.434***	0.067*	0.101	0.349***
Goals	0.435***	0.226*	0.402***	0.098*	0.189**	0.355***
Impulse	0.285***	0.234**	0.428***	0.067	0.081	0.363***
Awareness	-0.026	0.111	0.497***	-0.003	0.001	0.330***
Strategies	0.426***	0.341***	0.358***	0.145***	0.181**	0.402***
Clarity	0.256**	0.114	0.467***	0.029	0.066	0.326***

Note. Standardized coefficients are reported. X = sleep disturbance (PSIQ); M = DERS subscale in the model; Y = PTSD symptom severity
*****p≤ 0.001; **p≤ 0.01; *p≤ 0.05**

However, in a full model adjusting for multivariate effects of other DERS subscales (Figure 2), only the Strategies subscale (=0.153, *p*=0.012) remained significant.

Figure 2. Multivariate effects on the mediating role of DERS subscales in the relationship between sleep disturbance and PTSD symptoms at 3-month follow-up. Standardized indirect effects and p-values are reported below the associated subscale. Standardized covariate directs effects are also reported.



CONCLUSION

- These results highlight the impact of sleep disturbance on PTSD symptoms as well as the role emotion regulation in this relationship.
- Specifically, our results demonstrate that those with clinically significant reported sleep disturbance within 2 weeks of experiencing an acute trauma report significantly more severe PTSD symptoms and emotion dysregulation initially, and more severe PTSD symptoms at 3-month post-trauma follow-up. These findings suggest initial sleep disturbance following an acute trauma is critically related to more severe immediate psychopathology as well as sustained elevated symptoms of PTSD.
- Moreover, overall emotion dysregulation was found to mediate the relationship between sleep and PTSD symptoms. This finding supports the literature that emotion regulation has a unique association with PTSD as well as with sleep; however it adds a directional and explanatory component to the extant literature.
- These findings implicate emotion regulation, specifically increasing one's access to emotion regulation strategies, as well as increasing one's awareness of emotions and ability to engage in goal-directed behavior despite experiencing a negative emotional state, as critical in the sleep disturbance-PTSD symptom relationship. This suggests that acute PTSD development and symptom severity at 3-months post-trauma may be impacted by early intervention focused on addressing these components of emotion regulation while simultaneously improving sleep.