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SHORT PAPER

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Testing the theory of Differential Susceptibility to nightmares: The interaction of Sensory Processing Sensitivity with the relationship of low mental wellbeing to nightmare frequency and nightmare distress

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Summary

Propensity to have nightmares has been theorised in terms of diathesis–stress models, with this propensity being seen as negative or even pathological. In contrast, a recent model proposes that nightmare propensity is due to Differential Susceptibility to stimuli, where high susceptibility can be beneficial in positive environments but detrimental in negative environments. This susceptibility to stimuli is assessed as the biobehavioural trait Sensory Processing Sensitivity, which refers to a greater responsivity to internal and external stimuli, and an increased depth of cognitive and emotional processing. To test the Differential Susceptibility Framework for nightmares, 137 participants (females = 104, males = 33; mean age = 33.66 years), recruited from a student population and social media sites, were divided into high (n = 39), medium (n = 59) and low (n = 39) Sensory Processing Sensitivity categories based on their score on the Highly Sensitive Person Scale. Low mental wellbeing and the presence of minor psychiatric problems, measured by the General Health Questionnaire, was found to be significantly correlated with nightmare frequency for the high and medium SPS groups (rs = .29 and .28, respectively), but not for the low Sensory Processing Sensitivity group (r = .19). General Health Questionnaire score was also significantly correlated with trait nightmare distress, for the high Sensory Processing Sensitivity group only (r = .32). These findings in favour of the Differential Susceptibility Framework have aetiology and treatment implications for nightmares that differ from diathesis–stress models.

KEYWORDS

differential sensitivity, nightmares, personality, vantage sensitivity

1 | INTRODUCTION

Nightmares are a form of dream disturbance that involve extreme emotional manifestations, typically resulting in awakening. Traditional models of nightmares usually focus on the diathesis–stress framework, in which emotional dysregulation is implicated in the production of nightmares. For example, heightened emotional reactivity measured as neuroticism is associated with nightmare frequency (NMF), and also with nightmare distress (ND), a trait assessing negative reactions to having nightmares (Schredl & Goeritz, 2019). Such findings support the Affect Network Dysfunction Model (Levin & Nielsen, 2007). That model states that nightmares result from the inability to regulate emotions that follow from the cumulative toll of waking life negative emotional events (affect load) and the tendency to experience distress in response to negative emotional stimuli (affect distress), leading to a dysfunction in the neural networks responsible for the regulation of emotions during normal dreaming.

However, a more comprehensive theory that may account for nightmares was proposed by Carr and Nielsen (2017). Their Differential Susceptibility Framework (DSF) proposes that trait Sensory Processing Sensitivity (SPS) is a main contributing factor to nightmare production. SPS refers to a greater responsivity to internal and external stimuli, and an increased depth of cognitive and emotional processing (Aron & Aron, 1997). In general, high SPS individuals are exceptionally sensitive to and affected by their environment; this results in negative outcomes in response to adverse conditions, but beneficial outcomes in response to benign or positive conditions. There are thus many advantages of high SPS, such as the ability to thrive in positive environments (Aron, 2010), and exhibiting greater awareness of the social and physical environment (Greven et al., 2019). In humans and some other species, this behavioural and physiological trait results in different adaptive strategies for individuals regarding response to risk and danger, these intra-species strategies being caution and hesitation versus approach and engagement for high and low SPS individuals, respectively (Aron & Aron, 1997).

High SPS is associated with greater neural response to positive and negative emotional stimuli (Acevedo et al., 2017), which, together with greater perceived stress under negative environmental conditions, are factors highlighted by previous models of nightmare production. Therefore, according to the DSF, highly sensitive persons may demonstrate a particular vulnerability to nightmares, specifically when experiencing prolonged stress. A similar personality trait, intrapsychic boundariness, has been previously associated with propensity to nightmares (Hartmann et al., 1991); however, the DSF and specifically SPS have not yet been tested empirically.

In order to test the DSF, healthy participants were recruited and tested for NMF, ND (a trait measure of negative reactivity to nightmares; Belicki, 1992) and SPS using the Highly Sensitive Person Scale (HSPS; Aron & Aron, 1997). The sample was split according to Lionetti et al.'s (2018) criteria that divide the population into three categories: high sensitives (approximately 31% highest scorers on the HSPS); medium sensitives (middle 40% scorers); and low sensitives (approximately 29% lowest scorers). The hypothesis was that the correlations between low mental wellbeing and NMF and ND would be largest for the high SPS group, smaller for the medium SPS group, and smallest for the low SPS group.

2 | METHODS

2.1 | Participants

One-hundred and thirty-seven participants (females = 104, males = 33; mean age = 33.66 years, standard deviation [*SD*] = 16.90) were recruited from social media sites and from the student population at Swansea University. Potential recruits were informed that the study concerned "Sleep, dreaming and lifestyle", so as not to refer to nightmares.

2.2 | Measures

Sensory Processing Sensitivity was measured using the HSPS (Aron & Aron, 1997). This has 27 items, responded to on a scale from 1 = Not at all to 7 = Extremely.

Nightmare frequency was measured by the question "How often have you experienced nightmares recently (in the past several months)?", from the Mannheim Dream Questionnaire (MADRE; Schredl et al., 2014). The definition given was: "Nightmares are dreams with strong negative emotions that result in awakening from the dreams. The dream plot can be recalled very vividly upon awakening." Responses were on an eight-point scale: 8 = several times a week; 7 = about once a week; 6 = two–three times a month; 5 = about once a month; 4 = about two–four times a year; 3 = about once a year; 2 = less than once a year; 1 = never.

Dream recall frequency (DRF) was measured by the question "How often have you recalled your dreams recently (in the past several months)?", from the MADRE (Schredl et al., 2014). Responses were on a seven-point scale: 7 = almost every morning; 6 = several times a week; 5 = about once a week; 4 = two or three times a month; 3 = about once a month; 2 = less than once a month; 1 = never.

Low mental wellbeing and the presence of minor psychiatric problems was measured by the General Health Questionnaire (GHQ; 12 items, each scored 1–4, scores range from 12 to 48; Goldberg & Williams, 1988). The GHQ assesses mental wellbeing (Jackson, 2007) and "inability to carry out one's normal 'healthy' functions, and the appearance of new phenomena of a distressing nature" (Goldberg & Williams, 1988). Items include: "Have you recently felt constantly under strain?".

Trait ND was measured by the Belicki (1992) Nightmare Distress Questionnaire (13 items, each scored 1–5, scores range 13–65). Items include: "Are you ever afraid to fall asleep for fear of having nightmares?".

2.3 | Procedure

Ethical approval for the study was obtained from the Research Ethics Committee of the Department of Psychology, Swansea University. Participants gave written informed consent online to take part, and then completed questionnaires presented online by Qualtrics (Qualtrics).

2.4 | Statistics

2.4.1 | Power calculation

The only prior research that gives an expected *r*-value for the study is Blagrove et al. (2004), in which GHQ and trait ND correlate with $r = .28$. A sample size of 39 is needed for this to be significant on a one-tail test with two variables (sex and age) partialled out. From Lionetti et al. (2018), the high and low SPS groups are intended to be 31% and 29%, respectively, of the total sample, with the medium group 40%. We thus aimed for a total sample size of at least $39 \times 100/29 = 135$, so as to ensure that the intended smallest SPS group was sufficiently powered at $n = 39$. There is no literature on MADRE NMF correlated with GHQ, and so sample size was determined by the ND calculation.

2.4.2 | Inferential statistics

The variables SPS, NMF, ND, DRF and GHQ were all normally distributed with |kurtosis| and |skewness| < 1 and no outliers. ANOVA was used to compare the high, medium and low SPS groups on GHQ, NMF, ND and DRF. Pearson partial correlations were then used to correlate GHQ with NMF and ND, for the high, medium and low SPS groups separately. Sex and age were partialled out of the correlations as the literature in general shows associations between sex and age and both NMF and ND.

3 | RESULTS

For the entire sample ($N = 137$), mean SPS score =109.92, $SD = 22.87$, min = 46, max = 160. We aimed to divide the participants into the low, medium and high SPS groups defined by Lionetti et al. (2018) of 29%, 40% and 31% of the sample, respectively. The most appropriate cut-offs for this were 95.0 and 122.5. This resulted in three groups, comprising 28.5%, 43.1% and 28.5% of the sample, with *ns* = 39, 59 and 39, respectively.

Means of NMF, ND, DRF and GHQ, for the three SPS groups separately, are shown in Table 1. ANOVAs showed that the SPS groups differed significantly on these variables: NMF, $F_{2,134} = 5.092$, $p = .007$; ND, $F_{2,106} = 10.867$, $p < .001$; DRF, $F_{2,134} = 8.436$, $p < .001$; GHQ, $F_{2,134} = 4.984$, $p = .008$.

Table 1 also shows that, as hypothesised, GHQ was significantly correlated with NMF for the high and medium SPS groups, but not for the low SPS group. Also, GHQ was significantly correlated with ND for the high SPS group only. Partialling out DRF made negligible difference to the correlations between NMF and GHQ.

4 | DISCUSSION

The current study demonstrates that high and medium SPS individuals, compared with low SPS individuals, show larger positive correlations between GHQ score and NMF. Furthermore, only the high SPS individuals showed a significant relationship of GHQ score with trait ND. The results accord with the DSF, which has implications for the aetiology of nightmares, and also for the treatment of nightmare sufferers. Aron (2010) describes how there can be benefits to patients when their predispositions can be explained as resulting from a "for better or for worse" trait. She describes high SPS people as being more conscientious, with greater empathy towards others, as well as having a greater awareness of and response to their own emotions. Thus, specifically when considering therapeutic interventions, for Aron (2010), emphasis

TABLE 1 Mean (and SDs) of NMF, ND, DRF and GHQ for the three SPS groups, and Pearson partial correlations between GHQ and NMF, and between GHQ and ND, for the three SPS groups separately, with age and sex partialled out

	High SPS ($n = 39$)		Medium SPS ($n = 59$)		Low SPS ($n = 39$)	
	Mean	*SD*	Mean	*SD*	Mean	*SD*
NMF	4.72^{b}	2.28	4.85^{c}	1.86	3.62^{bc}	1.76
ND[a]	33.69^{de}	8.01	29.30^{be}	6.96	24.44^{db}	7.67
DRF	5.38^{b}	1.41	5.68^{d}	1.24	4.54^{bd}	1.48
GHQ	30.33^{c}	7.68	28.78	5.74	25.87^{c}	5.80
Pearson partial correlations, one-tail, age and sex partialled out						
GHQ & NMF	$r = .29$, $p = .044$, $df = 35$		$r = .28$, $p = .017$, $df = 55$		$r = .19$, $p = .135$, $df = 35$	
GHQ & ND	$r = .32$, $p = .041$, $df = 28$		$r = .13$, $p = .180$, $df = 48$		$r = .13$, $p = .283$, $df = 21$	

[a]High SPS, $n = 32$; medium SPS, $n = 52$; low SPS $n = 25$.

Tukey test significant differences between following superscripts: $^{b}p < .05$, $^{c}p < .01$, $^{d}p < .001$, $^{e}p < .05$.

Abbreviations: DRF, dream recall frequency ; GHQ, General Health Questionnaire; ND, nightmare distress; NMF, nightmare frequency; SPS, Sensory Processing Sensitivity.

should be placed upon the positive implications of SPS, along with managing the negatives, in order to produce an optimal environment for the highly sensitive person.

The DSF approach to nightmare treatment highlights beneficial sensitivity to positive contexts, and encourages more positive attitudes towards dreaming and imagination. This can involve cognitive and social interventions informed by positive psychology (Pluess & Boniwell, 2015), mindfulness or meditation (Condon et al., 2013), and training in lucid dreaming. Such approaches may complement existing nightmare therapies and broaden focus to a wider spectrum of dream experiences and dream emotions, and to the need for high SPS nightmare sufferers to choose their environments and life contexts with respect to their increased sensitivity, so as to prevent stress-inducing overstimulation.

4.1 | Limitations

The study used a between-subjects design, and so changes in nightmare occurrence or in ND, as a function of changes in mental wellbeing and minor psychiatric problems, were not assessed. Longitudinal or experimental studies are thus needed to determine causally whether individuals high in SPS are more likely to experience nightmares in response to low mental wellbeing or minor psychiatric problems, and whether such individuals show a lowering of mental wellbeing in response to having a nightmare. Such a prospective study would also remove a limitation of the current study, that GHQ and NMF were measured on different timescales, due to the standardised instruments used. In addition, the current study did not measure distress for individual nightmares, and this state ND should be addressed in future research, as well as vividness and emotional intensity of individual nightmares, as these may also interact with SPS. Although not yet considered in the DSF, whether males and females differ in the interactive effect of SPS should also be investigated, and especially as this may have treatment implications. Further research should also address whether high SPS individuals are more likely to have emotionally positive dreams in response to more joyful or flourishing daytime experiences and environments than are low SPS individuals.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTIONS

Conception and design of the work – MC, JW, MB. Acquisition of data – EM. Analysis and interpretation of data – EM, MB, JW. Drafting the manuscript – MC, JW, MB, EM. Critical revisions to manuscript draft – MC, JW, MB, EM.

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