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Secondary traumatic stress among physiatrists treating trauma patients

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ABSTRACT

Secondary traumatic stress is a form of posttraumatic stress disorder resulting from exposure to others' acute serious physical harm or death, regardless of mechanism. However, the incidence of secondary traumatic stress among physiatrists remains unexplored. This study examined relationships with secondary traumatic stress among physiatrists. Surveys were distributed to members of the Association of Academic Physiatry and local physiatrists. Surveys included measures of secondary traumatic stress, resilience, personality factors, demographics, and work-related factors. Of 102 surveys returned, 88 were complete and included for analysis. The sample was 42 ± 11 years and included 45 women (51%). Moderate to severe levels of secondary traumatic stress were found in 26 (30%) respondents, and 45% reported clinical levels of at least one symptom cluster. Higher resilience, higher extraversion, and higher emotional stability were associated with significantly lower odds of positive secondary traumatic stress screens and lower symptom severity (all $P < 0.023$). In conclusion, a third of responding physiatrists reported moderate to severe symptoms of secondary traumatic stress—a rate consistent with previous research among clinicians in a trauma setting and higher than the rate of posttraumatic stress disorder in the general population. Resilience-building interventions for secondary traumatic stress are likely to improve the well-being of physiatrists.

KEYWORDS Injury; physiatrists; secondary traumatic stress

Secondary traumatic stress (STS) is a specific form of posttraumatic stress disorder (PTSD) that results from "repeated or extreme exposure to the aversive details" of others' acute serious physical harm, actual or threatened death, or sexual violence, regardless of mechanism.[1] Recent data has shown that up to 80% of professionals providing trauma-focused treatment and care reported symptoms of posttraumatic stress.[2,3] However, STS among physiatrists, or physicians in the specialty of physical medicine and rehabilitation, remains largely unexplored, even though they experience regular exposure to patients who have suffered traumatic injuries. The combination of exposure to patients in the acute setting as well as the often extended exposures that occur in the postacute setting likely places physiatrists at a particularly high risk for STS. Therefore, the objectives of this study were to (a) survey the rate of STS among physiatrists, which was hypothesized to be similar to that of other impacted trauma care professionals, and (b) determine whether associations identified in existing literature between personality factors, resilience, and STS are present in physiatrists. Associations with demographic and work-related variables were also examined on an exploratory basis.

METHODS

Study approval was obtained from the hospital's institutional review board. Data were collected using an online survey distributed via email to the 1422 members of the

Association of Academic Physiatry as well as an institutional group of physiatrists, accounting for approximately 1500 individuals surveyed between January and June 2015. Reminders to complete the survey were emailed each week for 3 weeks after the initial survey was sent. Physiatrists were required to be 18 years or older and to have experience providing direct care to patients who experienced "actual or threatened death, serious injury, or sexual violence," which is the *Diagnostic and Statistical Manual of Mental Disorders* (DSM), fifth edition, definition of trauma.[1] Individuals completed the informed consent process electronically at the beginning of the survey. All responses were anonymous.

STS was measured with the Secondary Traumatic Stress Scale (STSS). The STSS was chosen because it was designed specifically to measure the impact of health care providers' exposure to secondary trauma from patient experiences. Unlike other measures of STS/PTSD, the STSS assesses symptoms related to patient care and interactions (e.g., "My heart started pounding when I thought about my work with patients," "I noticed gaps in my memory about patient sessions") to reduce the possible impact of personal, direct traumatization.[4] The 17 STSS items are based on the diagnostic criteria of PTSD in the DSM-IV and measure the frequency of intrusion (criterion B), avoidance (criterion C), and arousal (criterion D) symptom clusters experienced in the past 7 days. The STSS uses a Likert scale ranging from 1 to 5, anchored with the labels of *never* and *very often*, respectively. A total score of 38 or higher is considered a positive screen for STS at a sensitivity of 0.93 and a specificity of 0.91.[5] Additionally, the STSS can be scored using an algorithm to determine what symptom clusters (intrusion, avoidance, and arousal) are present at clinical levels. Respondents who endorse one item on the Intrusion subscale, at least three items on the Avoidance subscale, or at least two items on the Arousal subscale as occurring *occasionally*, *often*, or *very often* are considered to have those symptom clusters at clinical levels. The STSS has been studied in numerous populations, including social workers,[5] surgeons,[3] and emergency medicine clinicians.[6]

Resilience refers to the ability to respond to and recover from stressful events in healthy ways, and it was measured using the 10-item Connor-Davidson Resilience Scale (CD-RISC 10), which uses a 5-point Likert-type scale ranging from 0 (*not true at all*) to 4 (*true nearly all of the time*). Higher scores indicate greater resilience. The CD-RISC 10 has been shown to demonstrate sound psychometric properties, with good internal consistency and test–retest reliability.[7] The CD-RISC 10 has been used previously to analyze resilience among surgeons,[3] critical care nurses,[8] and the general population.[9]

The Big Five personality factors form a series of traits that can be used to describe the primary aspects of human personality.[10] *Openness* is characterized by intellect, curiosity, and willingness to try new things. *Conscientiousness* is associated with self-discipline, taking obligations seriously,

carefully planning before acting, and being goal-oriented. *Extraversion* is the inverse of *introversion* and is associated with being highly social, energetic, potentially assertive, and working well on teams. People with high levels of *agreeableness* are commonly described as trustworthy, modest, compassionate, and cooperative. Lastly, *emotional stability*, which is the inverse of *neuroticism*, is typified by emotional levelheadedness and the ability to control one's urges. The Ten-Item Personality Inventory (TIPI) was used to measure the Big Five personality factors with two items for each factor. Each item is rated on a Likert scale ranging from 1 (*disagree strongly*) to 7 (*agree strongly*).[11] Despite its brevity, the TIPI has sound psychometrics and is commonly used when time is restricted.[12–14]

Demographic and career-related information were also collected, including age, gender, race, ethnicity, marital status, patient population, and number of years in one's job position.

An exact binomial test was used to assess whether the sample's rate of STS was higher than the general US population rate of PTSD. Associations with STS were examined in two ways: associations with STSS scores and associations with positive versus negative STS screens. Univariable tests included t tests, analyses of variance, chi-square tests, and Spearman rho correlations as appropriate. For multivariable analyses, all variables were initially entered into generalized linear models. These models were then reduced using a stepwise algorithm that used Schwarz's Bayesian information criterion (BIC) to perform both backward and forward variable selection at each step. Because the continuous variables have different scales (e.g., TIPI scores range from 1 to 7, whereas CD-RISC 10 scores range from 0 to 40), results from the reduced models are presented with conventional, unstandardized coefficients (i.e., with covariates on their original scales) as well as standardized coefficients (i.e., with all continuous covariates transformed to have mean $= 0$ and SD $= 1$). Thus, the standardized coefficients serve as effect sizes. Distributions of continuous variables were assessed using quantile–quantile plots. To investigate the potential impact of nonresponse bias, we performed a sensitivity analysis that quantified the amount of bias that would be necessary to invalidate the obtained results.[15] All analyses were performed in R version 3.3.3 at a 5% alpha level using two-tailed P values.

RESULTS

A total of 102 participants accessed the survey, and 88 provided complete data and were included in the analysis. Respondents who completed the questionnaire did not significantly differ from noncompleters on any demographic or work-related variables (all $P > 0.29$). All further analyses were performed on the completers.

The average age of respondents was 41.7 ± 11.2 years; the majority of the sample were women (51%) and Caucasian (66%). Respondents most frequently treated patients with

Table 1. Frequency of secondary traumatic stress symptom clusters (*n* = 88)

Symptom clusters present	Frequency	Percentage
None	48	55%
Arousal only	6	7%
Avoidance only	4	5%
Intrusion only	8	9%
Avoidance and arousal	5	6%
Intrusion and arousal	1	1%
Intrusion and avoidance	2	2%
All three	14	16%

spinal cord injury (76%), traumatic brain injury (65%), stroke (55%), or "other" injury (42%).

The average STSS score for participants was 31.0 ± 5.3. As shown in *Table 1*, 45% of respondents reported at least one cluster of stress symptoms. Using the ≥38 cutoff, 30% of the sample screened positive for STS; with a 95% confidence interval of 20.3% to 40.2%, this rate was significantly higher (*P* < 0.001) than the 4% rate of PTSD in the general US population.[16]

Bivariate correlations revealed negative correlations between STSS scores and resilience (rho = −0.47, *P* < 0.001) as well as the personality factors of extraversion (rho = −0.41, *P* < 0.001), agreeableness (rho = −0.21, *P* = 0.049), conscientiousness (rho = −0.21, *P* = 0.048), emotional stability (rho = −0.30, *P* = 0.005), and openness (rho = −0.25, *P* = 0.018). The *t* tests showed a similar pattern of results: physiatrists who screened positive for STS had significantly lower scores on the personality factors of openness (5.2 ± 1.2 vs 5.8 ± 0.8, *P* = 0.025), extraversion (4.1 ± 1.8 vs 5.3 ± 1.4, *P* = 0.003), and emotional stability (5.2 ± 1.3 vs 5.9 ± 1.1, *P* = 0.008). Resilience was also significantly lower in physiatrists with positive STS screens (28.4 ± 4.8 vs 32.3 ± 5.1, *P* = 0.001). Levels of agreeableness (5.7 ± 0.9 vs 6.0 ± 0.9, *P* = 0.132) and conscientiousness (6.2 ± 0.7 vs 6.3 ± 0.7, *P* = 0.415) did not significantly differ by STS screen result. No demographic or work-related variables were significantly associated with STSS scores or STS screens *(Table 2)*.

Associations with total STSS score were modeled using a gamma generalized linear model with log link. The model with the lowest BIC (630.11) to predict total STSS score included only extraversion and resilience as covariates *(Table 3)*. The exponential regression coefficients (*B*s) indicate that STSS scores decreased by an average of 7% (approximately 2.4 points) per point increase in extraversion and decreased by an average of 2% (approximately 0.7 points) per point increase in resilience. The standardized coefficients (*β*s), however, indicated that the effect sizes for extraversion and resilience were

comparable (0.88 and 0.89, respectively). Sensitivity analysis for this model indicated that, to invalidate these results, 89.75% of the observed effects for extraversion and 89.23% of the observed effects for resilience would have to be due to bias. Thus, the model appears robust to the effects of bias.

Associations with positive STS screens were modeled using a binomial generalized linear model with logit link. The model with the lowest BIC (99.75) to predict STS screens included extraversion and emotional stability as covariates *(Table 4)*. The odds ratios (ORs) indicated that the odds of a positive STS screen were 0.63 times as high per point increase in extraversion and 0.57 times as high per point increase in emotional stability. The standardized odds ratios (SORs) indicated that the effect sizes for extraversion and emotional stability were comparable (0.45 and 0.48, respectively). Sensitivity analysis indicated that, to invalidate the results of this model, 76.35% of the observed effects for extraversion and 77.99% of the observed effects for emotional stability would have to be due to bias.

Given the incongruity between the models selected for STSS scores and STS screens, additional models were run to predict STSS scores using extraversion and emotional stability as well as STS screens using extraversion and resilience. The second model to predict STSS scores had a BIC of 632.25, indicating that its fit was comparable to the original model using extraversion and resilience as covariates. The model indicated that higher extraversion (*B* = 0.92; 95% confidence interval [CI], 0.89–0.96; *P* < 0.001) and higher emotional stability (*B* = 0.92; 95% CI, 0.87–0.97; *P* = 0.001) were independently associated with lower STSS scores. The standardized coefficients indicated comparable effect sizes for extraversion (*β* = 0.87; 95% CI, 0.82–0.93) and emotional stability (*β* = 0.90; 95% CI, 0.84–0.96).

The second model for STS screens had a BIC of 101.65, indicating that it and the model with extraversion and emotional stability as covariates had similar levels of support. The model showed that higher extraversion (OR = 0.66; 95% CI, 0.47–0.89; *P* = 0.009) and higher resilience (OR = 0.88; 95% CI, 0.78–0.98; *P* = 0.023) were independently associated with lower odds of positive STS screens. The SORs from the model indicated that extraversion (SOR = 0.49; 95% CI, 0.27–0.82) and resilience (SOR = 0.51; 95% CI, 0.28–0.89) had comparable effect sizes.

DISCUSSION

Consistent with the hypothesis, the frequency of STS in the current sample was higher than that seen in the general population (30% vs 4%).[16] Additionally, 45% of the sample reported clinical levels of at least one STS symptom cluster. Unexpectedly, demographic and occupational factors were not associated with STS. However, certain psychological factors may have a significant role in determining risk for STS. Specifically, low resilience, low extraversion, and low emotional stability were associated with increases in STS symptomology.

Table 2. Demographic and occupational variables' associations with Secondary Traumatic Stress Scale scores and screening results

Variable	Spearman correlation/mean ± SD	P value	Positive screen (N = 26)	Negative screen (N = 62)	P value
Age (years)	0.04	0.718	42.5 ± 37.8	41.6 ± 42.5	0.727
Gender		0.642			0.124
Male	31.9 ± 11.1		16 (37%)	27 (63%)	
Female	30.8 ± 11.1		10 (22%)	35 (78%)	
Marital status		0.989			0.715
Not married	31.3 ± 9.8		9 (32%)	19 (68%)	
Married	31.4 ± 11.7		17 (28%)	43 (72%)	
Race		0.227			0.292
White	30.3 ± 10.4		15 (26%)	43 (74%)	
Nonwhite	33.4 ± 12.3		11 (37%)	19 (63%)	
Years in profession		0.968			0.699
1–3 years	31.6 ± 10.6		5 (360%)	9 (64%)	
3–10	31.7 ± 11.9		7 (24%)	22 (76%)	
≥10 years	31.0 ± 10.9		14 (31%)	31 (69%)	
Employment setting		0.913			0.580
Inpatient	30.5 ± 10.1		4 (27%)	11 (73%)	
Outpatient	30.9 ± 13.1		4 (21%)	15 (79%)	
Mixture of both	31.7 ± 10.7		18 (33%)	36 (67%)	
Time with SCI patients		0.736			0.506
≤25%	30.8 ± 10.4		18 (27%)	49 (73%)	
26%–50%	33.1 ± 14.1		5 (36%)	9 (64%)	
≥50%	32.7 ± 11.5		3 (43%)	4 (57%)	
Time with TBI patients		0.388			0.828
≤25%	30.8 ± 11.6		17 (30%)	40 (70%)	
26%–50%	31.0 ± 10.0		6 (26%)	17 (74%)	
≥50%	36.5 ± 9.4		3 (38%)	5 (63%)	
Time with stroke patients		0.453			0.225
≤25%	30.1 ± 12.0		11 (23%)	37 (77%)	
26%–50%	33.3 ± 9.7		13 (41%)	19 (59%)	
≥50%	30.5 ± 10.5		2 (25%)	6 (75%)	
Time with other patients		0.438			0.222
≤25%	29.5 ± 10.6		8 (22%)	28 (78%)	
26%–50%	32.2 ± 11.0		12 (41%)	17 (59%)	
≥50%	33.0 ± 11.9		6 (26%)	17 (74%)	

SCI indicates spinal cord injury; TBI, traumatic brain injury.

Though the rate of positive STS screens (30%) and percentage of respondents having clinical levels of at least one STS symptom cluster (45%) may seem high, they are consistent with previous research among clinicians exposed to trauma patients.[3,17] For example, Warren et al[3] found that 22% of trauma surgeons screened positive for STS and

Table 3. Multivariable associations with Secondary Traumatic Stress Scale scores

	B (95% CI)	β (95% CI)	P value
Extraversion	0.93 (0.89–0.96)	0.88 (0.83–0.94)	<0.001
Resilience	0.98 (0.97–0.99)	0.89 (0.83–0.95)	<0.001

B indicates exponentiated regression coefficient; β, exponentiated regression coefficient from standardized covariate; CI, confidence interval.

Table 4. Multivariable associations with positive secondary traumatic stress screens

	OR (95% CI)	SOR (95% CI)	P value
Extraversion	0.63 (0.44–0.86)	0.45 (0.25–0.77)	0.005
Emotional stability	0.57 (0.36–0.85)	0.48 (0.27–0.81)	0.009

CI indicates confidence interval; OR, odds ratio; SOR, odds ratio from standardized covariate.

that nearly two-thirds had clinical levels of at least one STS symptom cluster. The higher incidence of STS in this physiatrist sample reinforces the notion that clinicians who treat patients with life-changing and/or life-threatening acute conditions have an increased risk of STS.

Physiatrists with STS may experience intrusive thoughts or physiological distress to reminders of patients; try to avoid thinking about, engaging with, or having conversations about their patients; have trouble sleeping; or be irritable around patients. In addition to these emotional and behavioral symptoms, STS can result in reduced cognitive function, including poor problem solving/decision making, poor concentration, confusion, and forgetfulness. These symptoms may also place clinicians at risk for additional mental health conditions, such as burnout and compassion fatigue.[18,19]

Higher emotional stability was associated with lower levels of STS in this sample of physiatrists. Low emotional stability is typified by feelings of anxiety, depression, guilt, tension, and irritability, as well as general moodiness[10]—all of which would likely be found in patients with diagnosed PTSD. The association between emotional reactivity and STS is also supported by previous research.[18]

Unfortunately, the Big Five personality factors (extraversion, agreeableness, conscientiousness, emotional stability, and openness) are generally invariant over time and become increasingly difficult to change after young adulthood.[19,20] Therefore, though introversion and low emotional stability may be useful for stratifying STS risk, interventions targeting them are unlikely to be successful. As such, these data suggest that resilience may be the only feasible modifiable factor and potential intervention target for medical professionals. Specifically, physiatrists at risk for STS may benefit from stress management or resilience training, which helps participants learn how to cope with stress in healthy ways.[21,22]

The primary limitations of this study are that it relied on self-report measures to assess STS in a relatively small sample—potentially resulting in nonresponse bias, with individuals with STS being more likely to answer the survey. As such, this sample is unlikely to be fully representative of the field of physiatry. However, given that the results of the study do not conflict with extant literature and that sensitivity analyses revealed the results to be quite robust to the effects of bias, it appears unlikely that the true population effects fall outside the confidence intervals reported in this study. Nonetheless, the potential for reduced generalizability of this study means that future research on the topic should strive to obtain larger, more diverse samples and should consider longitudinal or interventional designs. Another limitation is that personal trauma history was not solicited from the participants. Personal trauma could partially explain the symptoms reported rather than the indirect exposure to others' trauma or variations of personality factors. However, the STSS measure specifically elicits responses related to patients (e.g., "My heart started pounding when I thought about my work with patients") to reduce this possibility. That notwithstanding, other potentially confounding factors, such as current and historical psychological diagnoses, non-work-related sources of traumatic stress, as well as other occupational factors (e.g., type of practice setting, patient load, percentage of time spent with patients vs performing administrative duties), were not evaluated in this investigation.

Therefore, given the consequences of STS, it is important to identify risk and protective factors for potential intervention among physiatrists. Because it is impossible to perfectly predict whether an individual will or will not develop STS, universal resilience training for all clinicians would certainly be ideal. However, though this may not be feasible across all institutions, targeted interventions for those who are identified as being at risk of STS or who display signs of distress may be warranted. These findings provide a foundation for developing measures for the prevention and treatment of STS to improve the well-being of physiatrists and the care that they provide to their patients.

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