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ORIGINAL ARTICLE

Trait-Based Correlates of Post-traumatic Stress Symptoms in Occupational Injury Sample: Sensory-Processing Sensitivity, ADHD Symptoms, and Dispositional Mindfulness

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Abstract

Background: Occupational injuries are associated with substantial post-traumatic stress symptoms, yet brief trait-based markers of vulnerability remain underexplored. This study examined whether sensory-processing sensitivity, adult attention-deficit/hyperactivity disorder (ADHD) symptoms, dispositional mindfulness, and workload factors are associated with post-traumatic stress disorder (PTSD) symptom severity following workplace injury.

Methods: Forty-seven adults with documented occupational injuries, assessed 1–12 months post-accident at a university hospital psychiatry outpatient clinic, completed the Impact of Event Scale-Revised (IES-R), the Highly Sensitive Person Scale (HSPS), the Adult ADHD Self-Report Scale version 1.1 (ASRS v1.1), and the Mindful Attention Awareness Scale (MAAS). Group differences were examined with Mann–Whitney U tests, associations with Pearson correlations, and hierarchical multiple regression with IES-R total as the dependent variable.

Results: High PTSD-risk participants (IES-R ≥ 33) showed higher ASRS and HSPS scores and lower MAAS scores. Bivariate analyses indicated that IES-R total correlated positively with HSPS, ASRS, and weekly working hours, and negatively with MAAS and time since injury. In the final regression model, HSPS ($\beta = 0.60$, $p < .001$) and weekly working hours ($\beta = 0.35$, $p = .002$) remained significant independent predictors, whereas ASRS and MAAS were not.

Conclusions: Sensory-processing sensitivity and workload intensity emerged as key correlates of PTSD symptom severity after occupational injury, beyond ADHD symptoms and dispositional mindfulness. Routine assessment of sensory sensitivity and work demands may support early risk stratification and more tailored interventions for trauma-exposed workers.

Keywords: Sensory-processing sensitivity; post-traumatic stress; occupational injury; attention-deficit/hyperactivity disorder; mindfulness.

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INTRODUCTION

Occupational injuries are not only a source of physical harm but also a potent trigger of post-traumatic stress symptoms in civilian settings. Recent evidence shows that workers exposed to traumatic occupational events frequently meet clinically significant PTSD thresholds in the months following injury, while a longitudinal cohort study of injured workers demonstrated clinically relevant PTSD or depression at 12 months (1,2). Extending this to return-to-work outcomes in trauma-exposed public-safety personnel, a population-based cohort study found that only 43.5% returned to their pre-accident work after rehabilitation, and that earlier treatment alongside stronger workplace connection predicted better outcomes (3). Together, these findings underscore the clinical and occupational stakes of early risk stratification in injured workers, motivating the present study's focus on easily administered psychological markers that may flag vulnerability to persistent PTSD symptoms.

A trait-based vulnerability perspective may clarify why some injured workers develop persistent post-traumatic stress whereas others recover. Within this framework, the present study focuses on three brief, clinically usable constructs considered together with occupational exposure factors: sensory-processing sensitivity (SPS), adult ADHD symptom burden, and dispositional mindfulness

SPS denotes a stable individual difference characterized by deeper cognitive processing of stimuli, heightened awareness of subtle environmental cues, greater emotional reactivity, and susceptibility to overstimulation. The construct is psychometrically separable from introversion and neuroticism and has been elaborated in subsequent theoretical reviews that emphasize depth of processing and overarousal as core features (4) .

There is converging evidence that sensory over-responsivity is relevant to trauma phenotypes. Contemporary neurobiological accounts of PTSD highlight alterations in sensory processing systems and exaggerated reactivity to sensory cues, which map onto intrusion and hyperarousal symptom clusters (5) . This work argues for incorporating sensory processing into mechanistic models of PTSD rather than focusing solely on canonical threat circuitry. Complementing this, an integrative framework proposes a somatic-sensory basis for trauma-related disorders that can inform assessment and intervention (6). In the context of workplace injury, individuals high in SPS may appraise routine post-injury cues in the environment as more intense and inescapable, thereby potentiating re-experiencing and sustained arousal.

ADHD-related traits can compound vulnerability through attentional dysregulation, difficulties sustaining attention, and impulsivity, which may influence how individuals respond to traumatic cues. A systematic review and meta-analysis reports a bidirectional association between ADHD and PTSD, and prospective military cohort data indicate that pre-deployment ADHD confers elevated odds of subsequent PTSD (7,8) . These findings suggest shared cognitive-emotional pathways that may sustain intrusive symptoms and avoidance after trauma. In additon to this, the interplay SPS, attentional control, and stress reactivity can be framed within broader neuropsychological vulnerability models for trauma responses. Individuals with elevated SPS are thought to have heightened reactivity to external stimuli and deeper processing of such inputs.

Neurophysiological work shows that SPS is associated with altered functional connectivity in attentional and sensory networks (e.g., hippocampus-precuneus coupling) and may moderate how environmental information is filtered and processed (9,10). Conceptually, it is also plausible that ADHD-related inattention and impulsivity partially overlap with broader sensitivity or arousal-related traits captured by measures such as sensory-processing sensitivity, so that when SPS and ADHD indices are modeled simultaneously, the unique predictive contribution of ADHD may be attenuated.

Dispositional mindfulness is consistently inversely related to PTSD symptoms. A meta-analysis shows a robust negative association between total mindfulness and PTSD severity, with the strongest effects for acting with awareness and non-judging facets (11). Neurobiological and clinical reviews further argue that mindfulness supports top-down regulation and reduces avoidance, which is consistent with its protective role in trauma adaptation (12). However, mindfulness correlates negatively with ADHD traits and shows links to SPS in some samples, which can dilute its unique predictive value in multivariable models (13,14) .

Beyond individual traits, objective features of the work environment and injury timeline may also shape vulnerability to persistent post-traumatic stress. Workload intensity and time since injury are context-setting de-

terminants. An updated systematic review of occupational PTSD identifies work-related exposures and sustained job stressors among prognostic factors for poorer post-trauma adjustment (2).

Despite increasing recognition of post-traumatic stress difficulties among injured workers, there is still limited empirical work examining how stable psychological dispositions and occupational exposure factors jointly shape variability in PTSD symptoms. Notably, the combined roles of sensory-processing sensitivity, adult ADHD symptom burden, and dispositional mindfulness have not been systematically evaluated in occupational injury populations.

Accordingly, the present study aimed to examine whether easily administered trait and contextual indicators account for variability in post-traumatic stress symptoms among workers following occupational injury. Specifically, we hypothesised that:

1) Higher SPS, greater ADHD symptom burden, longer weekly working hours, and shorter time since injury would each be associated with higher PTSD symptom severity, whereas higher dispositional mindfulness would be associated with lower PTSD symptom severity.

2) ADHD symptoms would show a positive association with SPS, while both SPS and ADHD symptoms would show negative associations with dispositional mindfulness.

3) SPS would provide the largest unique contribution to explaining PTSD symptom severity, after accounting for workload intensity, time since injury, and shared variance among the psychological predictors.

MATERIALS AND METHODS

Ethical Consideration

Ethical approval for the study was obtained from the Marmara University Faculty of Medicine Clinical Research Ethics Committee on March 3, 2023 (Protocol Code: 09.2023.346). All participants provided written informed consent, and the study was conducted in accordance with the principles of the Declaration of Helsinki.

A Priori Sample Size

Based on the final regression model and literature-trend estimates from comparable studies (5–8,11,15) , the overall effect size was set at $f^2 \approx 1.10$, indicating a very large association between the predictors (Weekly Hours, Accident Date, ASRS Total, HSPS Total, and MAAS) and PTSD symptom severity (IES-R Total). However, to adopt a more conservative assumption for sample size planning, an a priori $f^2 \approx 0.30$ (large effect, but substantially smaller than the literature-trend estimate) was considered. Using this prior value ($\alpha = .05$, $1–\beta = .80$, 5 predictors), a minimum of approximately N = 49 participants would be required according to G*Power calculations. This conservative approach helps mitigate overfitting risk and improves generalizability while remaining consistent with the strong associations typically reported in the literature. Given the final sample size of 47, statistical power was slightly below the 80% target for detecting medium effects.

Procedure

Between May 1, 2023, and December 15, 2023, recruitment was conducted at the Psychiatry Outpatient Clinics of Marmara University Faculty of Medicine Hospital. After eligibility screening, participants provided written informed consent and completed a paper-and-pencil battery of self-report questionnaires in Turkish in a quiet room under researcher supervision; administration took approximately 15 minutes on average.

Inclusion criteria were: (i) a documented workplace accident; (ii) age 18–65 years; (iii) Turkish literacy; and (iv) accident-to-assessment interval ≥1 month and ≤12 months.

Exclusion criteria were: (i) any additional physical or psychological trauma occurring after the index accident; (ii) head injury related to the accident (e.g., concussion/TBI suspicion); (iii) marked reasoning or judgment difficulties or a severe psychiatric condition causing substantial functional impairment that would compromise valid self-report; (iv) inability to follow self-report instructions adequately; (v) non-Turkish language proficiency; (vi) on the day of the accident, use of unusual medications likely to affect attention; (vii) alcohol use on the accident day or within the preceding 48 hours and/or illicit substance use within the preceding 7 days; and (viii) a major life event immediately before the accident that could independently induce acute psychological distress.

Measurements

Adult ADHD Self-Report Scale (ASRS v1.1; 18 items). ADHD symptoms were assessed using the ASRS v1.1, which evaluates Inattention and Hyperactivity/Impulsivity on a 5-point Likert scale ranging from 0 (*Never*) to 4 (*Very often*). A Total score is calculated, with higher scores reflecting greater ADHD symptom severity. The original scale was developed within the World Health Organization framework for adult ADHD screening (16). The Turkish adaptation demonstrated satisfactory validity and reliability (17).

Highly Sensitive Person Scale (HSPS; 27 items). Sensory-processing sensitivity was measured with the HSPS, rated on a Likert-type scale and producing a Total score (4) . In line with the Turkish adaptation, we report four subscales: Sensitivity to External Stimuli (SES), Aesthetic Sensitivity (AES), Harm Avoidance (HA), and Sensitivity to Overstimulation (SOS). Higher scores reflect greater environmental sensitivity. The original instrument has been validated across cultures, and the Turkish version shows strong psychometric properties (18) .

Impact of Event Scale—Revised (IES-R; 22 items). PTSD symptoms experienced during the past week were assessed with the IES-R, rated on a 5-point scale (0–4). It provides a Total score as well as Intrusion, Avoidance, and Hyperarousal subscale scores, with higher values indicating more severe post-traumatic stress (19) . The Turkish adaptation was validated for reliability and construct equivalence (20).

Mindful Attention Awareness Scale (MAAS; 15 items). Dispositional mindfulness was measured with the MAAS, rated on a 6-point scale from 1 (*Almost always*) to 6 (*Almost never*) (21). Higher total scores indicate greater mindful awareness of present-moment experiences. The Turkish version has been shown to have satisfactory internal consistency and validity (22).

Accident Date (Months Ago). This variable reflects the number of months that have elapsed since the workplace accident. Higher values indicate a longer interval since the injury.

Weekly Hours. Participants reported the average number of hours worked per week in their current job, with higher values indicating greater workload intensity.

Statistical Analysis

All statistical analyses were conducted using IBM SPSS Statistics (Version 25). Descriptive statistics (means, standard deviations, and ranges) were calculated for continuous variables, while frequencies and percentages were reported for categorical variables. Internal consistency was assessed using Cronbach's α coefficients.

Before hypothesis testing, the data were examined for normality, linearity, and multicollinearity. Normality was evaluated using Shapiro–Wilk tests and visual inspection of histograms and Q–Q plots, and residual diagnostics were examined to confirm linearity and homoscedasticity. Given the non-normal distribution of several psychological scale scores, Mann–Whitney U tests were applied for group comparisons. To control for multiple comparisons across subscales, the False Discovery Rate (FDR) correction (Benjamini–Hochberg procedure) was applied to adjusted p-values. Bivariate correlations were computed using Pearson's r to explore associations among ASRS, HSPS and subscales, MAAS, and IES-R total and subscales. Correlation coefficients were visualized via a heat map (Figure 1) for interpretability. A hierarchical multiple regression analysis was conducted to identify the factors explaining IES-R Total. Model fit was evaluated by R^2 change (ΔR^2), F-change, and standardized regression coefficients (β). The alpha level for statistical significance was set at 0.05.

Participants

Between May 1, 2023, and December 15, 2023, of the 58 occupational injury cases presenting to Psychiatry Outpatient Clinics of Marmara University Faculty of Medicine Hospital, 47 who met the eligibility criteria were included in the study. Participants (N = 47) were mostly male (n = 35; 74.5%) and married (n = 32; 68.1%); the mean age was 34.51 ± 8.51 years (19–53). Education clustered at high school (n = 15; 31.9%) and bachelor's degree (n = 9; 19.1%), and most were workers/civil servants (n = 46; 97.9%).

Clinically, comorbidities were uncommon (medical yes: n = 1; 2.1%; psychiatric yes: n = 1; 2.1%). Prior conditions were infrequent (previous psychiatric disorder: n = 2; 4.3%; previous ADHD: n = 3; 6.4%); alcohol use was n = 2 (4.3%), and psychostimulant and substance use were n = 0 (0%).

Accident context: time since accident averaged 4.78 ± 2.47 months (1.5–11) and weekly working hours 45.77 ± 8.82 (10–70). The most frequent accident types were slip/fall/trip/pinch (n = 15; 31.9%) and moving machinery (n = 11; 23.4%); injuries most often involved the fingers–wrist (n = 23; 48.9%). Accident source was typically self (n = 19; 40.4%) or non-human factors (n = 18; 38.3%), with another person accounting for n = 10 (21.3%).

Additional sociodemographic, clinical, and accident-related details are provided in Table 1 and descriptives of study scales were shown in Table 2.

RESULTS

Descriptive Statistics of the Study Scales and Internal Consistency

Participants' scores on the psychological measures were as follows: ASRS Total (ADHD symptoms) M = 15.06, SD = 9.18, range 0–35; HSPS Total (sensory-processing sensitivity) M = 101.87, SD = 26.45, range 41–151; IES-R Total (PTSD symptoms) M = 40.70, SD = 13.59, range 15–75; and MAAS (dispositional mindfulness) M = 70.83, SD = 16.44, range 17–90.

Internal consistency for the total scales was excellent to outstanding: ASRS Total α = .89, HSPS-Total α = .90, IES-R Total α = .92, and MAAS α = .93. Across all subscales, reliability was generally acceptable to excellent (approx. α = .67–.91); see Table 2 for the complete reliability and descriptive statistics by subscale.

Group Comparisons by PTSD Risk

For interpretive clarity, participants were divided into low- and high-risk groups. The IES-R cut-off score of 33 used to define high PTSD risk in this study was chosen in line with the recommendations of the Turkish adaptation study of the scale (20) . Mann–Whitney U tests showed that the high-risk PTSD group had higher ASRS Total (Median[IQR] = 16.0[10–24]) than the low-risk group (8.0[5–14]; U = 98.50, Z = −2.505, p = .011, FDR-adjusted p = .020), and higher HSPS Total (111.0[95–123.75] vs. 71.0[56–104]; U = 79.50, Z = −2.979, p = .002, FDR-adjusted p = .009). Conversely, MAAS scores were lower in the high-risk group (72.0[58.5–80]) relative to the low-risk group (86.0[69–90]; U = 107.50, Z = −2.277, p = .021, FDR-adjusted p = .028). Among subscales, HSPS-HA did not differ significantly between groups after FDR correction (U = 132.50, Z = −1.649, p = .100, FDR-adjusted p = .100). Full results for all subscales are reported in Table 3.

Bivariate Associations: PTSD Symptoms and Scale Interrelations

Significant bivariate associations indicated that IES-R Total correlated positively with Weekly Hours (r = .34, p = .019), ASRS Total (r = .31, p = .036) and Inattention (r = .32, p = .027), as well as with HSPS Total (r = .60, p < .001), HSPS-SES (r = .46, p = .001), HSPS-AES (r = .42, p = .003), and HSPS-SOS (r = .58, p < .001); it was negatively related to MAAS (r = −.30, p = .040) and showed a small inverse association with Accident Date (months ago) (r = −.29, p = .049). For subscales, Intrusion correlated with Weekly Hours (r = .37, p = .011), ASRS Total (r = .41, p = 0.004), Inattention (r = .49, p= .001), HSPS-SOS (r = .32, p = .031), and MAAS (r = −.49, p = .001); Avoidance correlated with Weekly Hours (r = .43, p =.003).

Among ASRS, HSPS (and subscales), and MAAS, significant associations were as follows: ASRS Total correlated with HSPS Total (r = .30, p = .037), HSPS-SES (r = .31, p = .039), and HSPS-SOS (r = .38, p = .007). Inattention and Hyperactivity/Impulsivity also related to HSPS-SOS (r = .38, p = .009; r = .33, p = .025, respectively). Finally, MAAS showed robust inverse associations with ASRS Total (r = −.61, p < .001), Inattention (r = −.65, p < .001), and Hyperactivity/Impulsivity (r = −.45, p = .001), while its correlations with HSPS Total/subscales were not significant. All remaining correlation coefficients (full matrix) are provided in Figure 1 (heat map).

Predictors of PTSD Symptoms (IES-R): Hierarchical Regression Results

To identify predictors of overall PTSD symptom severity, a hierarchical multiple regression analysis was performed with IES-R total as the dependent variable. In Step 1, occupational variables (Weekly Hours and Accident Date) were entered; in Step 2, ASRS Total was added; in Step 3, HSPS Total was included; and in Step 4, MAAS was entered to assess incremental variance explained. Age and gender were not included, as they

Table 1. Sociodemographic, Clinical, and Injury-Related Characteristics of the Sample (N = 47)				
Variables	**Category**	**n/Mean**	**%/SD**	**Minimum-Maximum**
Age	**(Mean±SD)**	34.51	8.51	19-53
Gender	Female	12	25.5	
	Male	35	74.5	
Marital Status	Single	13	27.7	
	Married	32	68.1	
	Divorced/Widow	2	4.3	
Education	Primary	6	12.8	
	Secondary	9	19.1	
	High School	15	31.9	
	Associate's Degree	8	17	
	Bachelor's Degree	9	19.1	
Income	Low	12	25.5	
	Low-to-Middle	17	36.2	
	Middle	14	29.8	
	High	4	8.5	
Occupation	Worker/Civil Servant	46	97.9	
	Self-employed	1	2.1	
Medical Comorbidity	No	46	97.9	
	Yes	1	2.1	
Psychiatric Comorbidity	No	46	97.9	
	Yes	1	2.1	
Previous Psychiatric Disorder	No	45	95.7	
	Yes	2	4.3	
Previous ADHD	No	44	93.6	
	Yes	3	6.4	
Previous Psychostimulant	No	47	100	
	Yes	0	0	
Alcohol	No	45	95.7	
	Yes	2	4.3	
Substance	No	47	100	
	Yes	0	0	

Accident Type	Slip/Fall/Trip/Pinch	15	31.9	
	Moving Machinery Accident	11	23.4	
	Falling Object Strike	4	8.5	
	Electric Shock	1	2.1	
	Cut/Laceration by Sharp Tool	6	12.8	
	Fire/Explosion	1	2.1	
	Transportation/ Vehicle-Machinery Accident	3	6.4	
	Other	6	12.8	
Source of the Accident	Self	19	40.4	
	Another Person	10	21.3	
	Non-human Factor	18	38.3	
Regular Medication	No	41	87.2	
	Sleep Medicine	1	2.1	
	Cardiovascular/Anti-hypertensive	3	6.4	
	Pain Killer	1	2.1	
	Other	1	2.1	
Injured Body Part	Head & Neck	9	19.1	
	Back & Lumbar Region	2	4.3	
	Fingers to Wrist	23	48.9	
	Toes to Ankle	7	14.9	
	Arm	2	4.3	
	Leg & Thigh	4	8.5	
Limb Loss	No	46	97.9	
	Yes	1	2.1	
Sensory Organ Damage	No	46	97.9	
	Yes	1	2.1	
Accident Date (Months ago)	**(Mean±SD)**	4.78	2.47	1.5-11
Last Employement Duration (Months)	**(Mean±SD)**	58.53	60.78	1-216
Weekly Hours	**(Mean±SD)**	45.77	8.82	10-70
Previous Accident	**(Mean±SD)**	0.36	0.79	0-3

Table 2. Descriptive Statistics and Internal Consistency of Psychological Measures (N = 47)

Variable	Cronbach's α	Minimum	Maximum	Mean	SD
ASRS Total	0.890	0.00	35.00	15.06	9.18
Inattention	0.873	0.00	20.00	6.94	4.99
Hyperactivity&Impulsivity	0.791	0.00	18.00	8.13	5.13
HSPS-Total	0.896	41.00	151.00	101.87	26.45
HSPS-SES	0.868	7.00	41.00	24.55	10.38
HSPS-AES	0.670	6.00	36.00	24.70	6.08
HSPS-HA	0.735	9.00	41.00	28.66	7.59
HSPS-SOS	0.680	8.00	40.00	23.96	8.12
IES-R-Total	0.917	15.00	75.00	40.70	13.59
IES-R-Intrusion	0.905	0.00	28.00	7.04	7.13
IES-R-Avoidance	0.722	0.00	25.00	11.21	6.17
IES-R-Hyperarousal	0.856	8.00	33.00	22.45	6.04
MAAS	0.931	17.00	90.00	70.83	16.44

ASRS = Adult ADHD Self-Report Scale v1.1; HSPS = Highly Sensitive Person Scale; SES = Sensitivity to External Stimuli; AES = Aesthetic Sensitivity; HA = Harm Avoidance; SOS = Sensitivity to Overstimulation; IES-R = Impact of Event Scale–Revised; MAAS = Mindful Attention Awareness Scale

Table 3. Comparison of Psychological Scale Scores Between Low- and High-Risk PTSD Groups (N = 47)

Scale / Subscale	Low risk PTSD (n=11) (Median [IQR])	High risk PTSD (n=36) (Median [IQR])	U	Z	p	FDR-adjusted p
ASRS-Total	8.0 [5–14]	16.0 [10–24]	98.50	−2.505	.011	.020
Inattention	3.0 [1–6]	7.0 [4–12]	108.00	−2.271	.023	.028
Hyperactivity / Impulsivity	4.0 [1–9]	9.0 [4.75–14.0]	109.50	−2.230	.025	.028
HSPS-Total	71.0 [56–104]	111.0 [95–123.75]	79.50	−2.979	.002	.009
HSPS-SES	14.0 [12–21]	28.0 [22–33]	90.50	−2.704	.006	.014
HSPS-AES	21.0 [15–24]	26.0 [23–30]	68.50	−3.264	.001	.009
HSPS-HA	22.0 [14–34]	29.5 [26.25–34]	132.50	−1.649	.100	.100
HSPS-SOS	18.0 [13–21]	24.5 [21–31]	83.50	−2.882	.003	.009
MAAS	86.0 [69–90]	72.0 [58.5–80]	107.50	−2.277	.021	.028

Mann–Whitney U tests compared low-risk and high-risk PTSD groups defined by IES-R ≥ 33. FDR = False Discovery Rate (Benjamini–Hochberg correction). ASRS = Adult ADHD Self-Report Scale; HSPS = Highly Sensitive Person Scale; MAAS = Mindful Attention Awareness Scale.

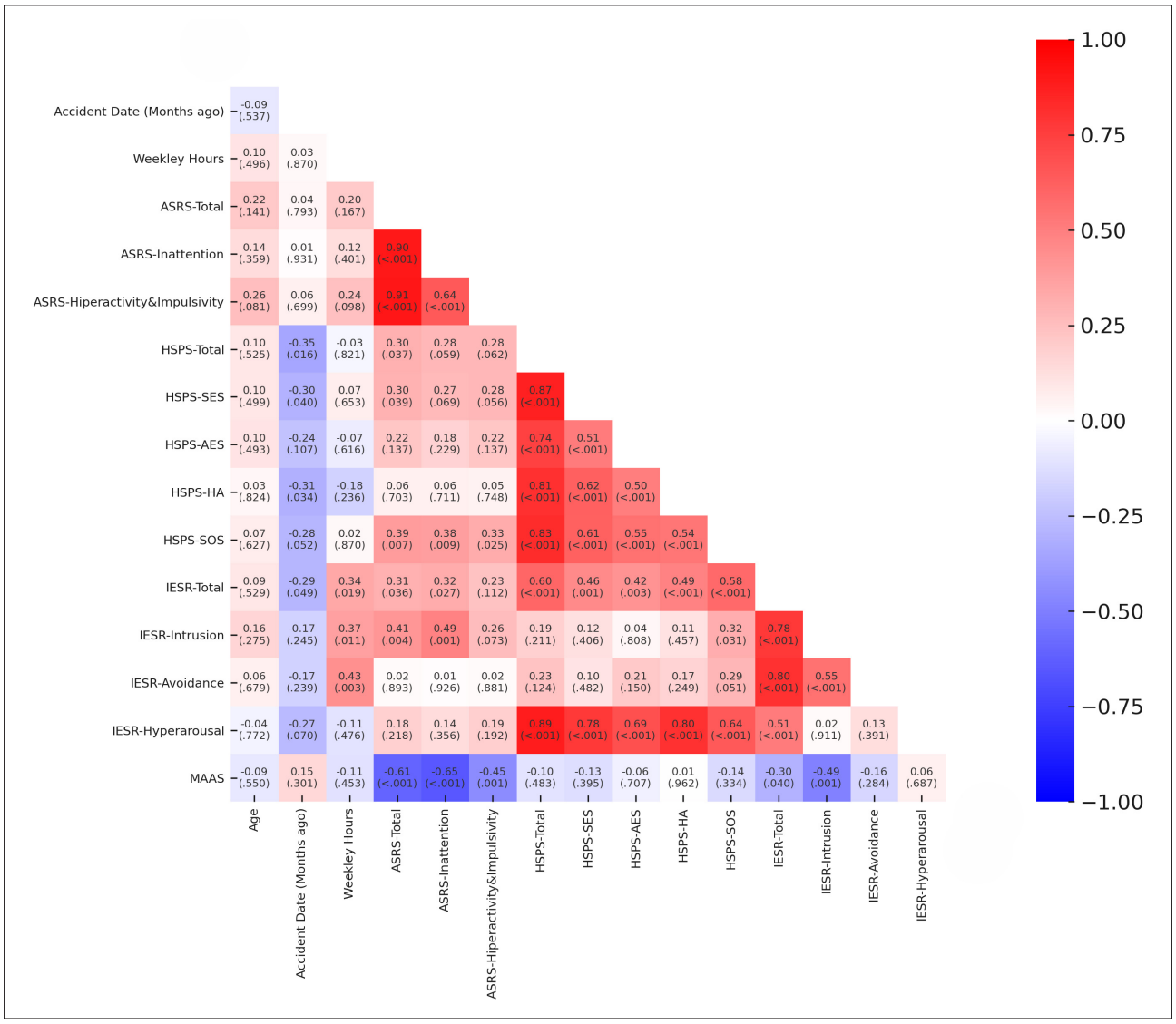

Figure 3: Heat map of Pearson correlation coefficients among study variables (N = 47), including sociodemographic and occupational indicators (age, accident date, weekly working hours), Adult ADHD Self-Report Scale version 1.1 (ASRS v1.1) total and subscales, Highly Sensitive Person Scale (HSPS) total and subscales, Impact of Event Scale–Revised (IES-R) total and subscales, and Mindful Attention Awareness Scale (MAAS). Cell entries display correlation coefficients with corresponding p values in parentheses; warmer colors indicate stronger positive correlations and cooler colors indicate stronger negative correlations.

showed no significant correlations with IES-R total or its subscales in preliminary analyses.

In Step 1 (Weekly Hours, Accident Date), the model explained 20.5% of the variance ($\Delta R^2 = .205$, $p = .007$). Both Weekly Hours ($\beta = .35$, $p = .013$) and Accident Date (months ago) ($\beta = –.30$, $p = .032$) were significant predictors. Adding ASRS Total in Step 2 did not yield a significant increment ($\Delta R^2 = .064$, $p = .059$); Weekly Hours ($\beta = .30$, $p = .032$) and Accident Date ($\beta = –.31$, $p = .024$) remained significant, whereas ASRS Total was not. Introducing HSPS Total in Step 3 produced a substantial improvement ($\Delta R^2 = .230$, $p < .001$). In this step, HSPS Total ($\beta = .55$, $p < .001$) and Weekly Hours ($\beta = .35$, $p = .004$) were significant; the earlier effects of Accident Date and ASRS Total were no longer significant. Finally, adding MAAS in Step 4 did not improve fit ($\Delta R^2 =$

.036, p = .083). In the final model, HSPS Total (β = .60, p < .001) and Weekly Hours (β = .35, p = .002) remained significant predictors; MAAS showed only a nonsignificant trend, and the earlier predictors that had lost significance remained nonsignificant. All detailed statistics are reported in Table 4.

Table 4. Hierarchical Multiple Regression Analysis Predicting PTSD Symptom Severity (IES-R Total) (N = 47)

Step	Predictor	β	p	R	R^2	Adj. R^2	SEE	ΔR^2	ΔF (df1, df2)	p (change)
1	Accident Date(Months ago)	−.297	**.032**	.452	.205	.168	12.392	.205	5.657 (2, 44)	.007
	Weekly Hours	.348	**.013**							
2	Accident Date(Months ago)	−.306	**.024**	.518	.269	.218	12.020	.064	3.765 (1, 43)	.059
	Weekly Hours	.295	**.032**							
	ASRS-Total	.259	.059							
3	Accident Date(Months ago)	−.109	.362	.706	.499	.451	10.068	.230	19.286 (1, 42)	<.001
	Weekly Hours	.347	**.004**							
	ASRS-Total	.074	.541							
	HSPS-Total	.547	**<.001**							
4	Accident Date(Months ago)	−.047	.695	.731	.535	.478	9.819	.036	3.159 (1, 41)	.083
	Weekly Hours	.354	**.002**							
	ASRS-Total	−.096	.527							
	HSPS-Total	.595	**<.001**							
	MAAS	−.250	.083							

DISCUSSION

This study examined the interplay between ADHD symptoms, SPS, mindfulness, and post-traumatic stress in individuals who had experienced occupational injuries. The findings revealed several key patterns. First, higher SPS and longer weekly working hours were strongly associated with greater PTSD symptom severity. Second, ADHD-related traits showed positive correlations with PTSD symptoms but did not independently predict them once sensory sensitivity was considered, suggesting shared cognitive and emotional vulnerability pathways. Third, mindfulness demonstrated an inverse relationship with PTSD severity, though this

association did not reach significance in the final model. Overall, these results highlight that both individual sensitivity traits and work-related exposure factors may contribute meaningfully to the development and persistence of post-traumatic stress after workplace accidents.

SPS emerged as the most robust correlate of PTSD severity in our all level of analysis. Individuals with higher environmental and sensory reactivity tend to demonstrate increased vigilance, sensory over-responsivity, and startle reactions (4) . These patterns mirror the perceptual and hyperarousal symptoms of PTSD, suggesting a pathway from elevated sensory sensitivity to greater intrusion and arousal symptom severity (5,6). The current result aligns with this evidence and extends it to the workplace injury context.

ADHD symptom burden was positively associated with PTSD symptoms, consistent with meta-analytic findings showing that adults with ADHD have approximately a three-fold increased risk of developing PTSD compared to those without ADHD (8,15). Longitudinal data further indicate that pre-deployment ADHD is associated with an adjusted odds ratio of 2.13 (95% CI [1.51, 3.00], $p < .001$) for subsequent PTSD in trauma-exposed soldiers (7) . In the present study, ADHD symptoms correlated with IES-R total scores in bivariate analyses along with related to higher PTSD risk, but the effect attenuated in the regression model once sensory-processing sensitivity was included, suggesting that attentional dysregulation may share vulnerability pathways with heightened sensory sensitivity.

Dispositional mindfulness shows a consistent inverse association with post-traumatic stress symptoms across studies and populations. A comprehensive meta-analysis reported a robust inverse association between total mindfulness and PTSD symptom severity (11) . This effect was particularly strong for the "Act with Awareness" and "Non-judge" facets, supporting the notion that mindful attention and acceptance mitigate trauma-related cognitive and emotional reactivity.

Neurobiological and theoretical reviews further suggest that mindfulness may buffer PTSD symptoms through enhanced attentional control, reduced avoidance, and improved top-down regulation of limbic hyperactivity (12). Consistent with this literature, MAAS was found to be correlated negatively with IES-R total at the bivariate level and higher mindfullness was found to be related to lower risk of PTSD , yet it was not a unique predictor in the final multivariable model after HSPS Total entered. This loss of significance is parsimoniously explained by shared variance and partial overlap in what MAAS and other predictors capture: MAAS was strongly correlated with ADHD symptom indices and partially overlapped with the sensory sensitivity construct. Thus, while mindfulness appears protective, its influence may operate indirectly through attentional control and sensory regulation processes.

Prolonged weekly working hours have emerged in occupational health literature as a non-trauma-specific but plausible stress amplifier that may heighten vulnerability to post-traumatic symptomatology. For instance, an updated systematic review of occupational PTSD identified "long working hours" as one of several work-related risk factors linked to poorer adjustment after trauma exposure (2). Likewise, the inverse relationship we observed between the post-trauma interval and symptom severity reflects the dynamic process of recovery captured by individual growth models, which frequently identify a pattern of symptom decline over time as a common course. However, this recovery trajectory may not be universal, as Roemer et al. (1998) demonstrated that PTSD symptom severity can conversely lead to increased retrospective reports of trauma exposure over time, highlighting how symptom-driven cognitive biases may potentially complicate or counteract typical recovery patterns in certain individuals (23). In our study sample, the small negative correlation between months since injury and IES-R total aligns with this time-decay pattern; however, the modest size of the effect suggests that chronicity may be driven more by individual and contextual factors (e.g., sensory sensitivity, workload) than mere elapsed time.

Emerging literature reveals notable interrelations among trait mindfulness, SPS and attentional/impulsivity traits. First, higher SPS has been associated with lower dispositional mindfulness in a large Japanese sample, indicating that individuals high in HSPS tend to report reduced mindful attention and regulation (14). Second, dimensions of adult ADHD (inattention and hyperactivity/impulsivity) show modest but consistent negative correlations with dispositional mindfulness: a twin-study reported phenotypic correlations between MAAS and both inattention and hyperactivity/impulsivity subtypes, largely due to shared genetic factors (13). In our

study, the MAAS–HSPS and MAAS–ASRS correlations mirror these patterns, supporting the idea that mindfulness may act as a bridging construct between sensory vulnerability and attentional/impulsivity liabilities. However, because of shared variance and limited sample size, the unique predictive value of mindfulness in regression models may become attenuated when HSPS and ASRS are included simultaneously.

The findings highlight the clinical relevance of evaluating SPS in individuals exposed to occupational trauma. Early identification of high sensory sensitivity may help clinicians detect those at greater risk for post-traumatic stress and design more personalized interventions to address overstimulation, attentional dysregulation, and stress vulnerability. The negative association between mindfulness and PTSD symptoms further supports the use of mindfulness-based approaches such as Mindfulness-Based Cognitive Therapy (MBCT) and Mindfulness-Based Stress Reduction (MBSR). These programs enhance attentional control and emotion regulation, potentially reducing hyperarousal and improving adaptation after trauma (24,25). Incorporating such interventions into psychiatric rehabilitation and return-to-work programs may aid recovery and promote sustained functional improvement in trauma-exposed workers.

This study has several limitations. The small sample size (N = 47) and cross-sectional design limit the generalizability of the findings and prevent causal interpretations. Although the study collected information on the types of occupational injuries, the sample size did not allow for modeling potential differences across trauma types. The use of self-report instruments may have introduced response bias, and the exclusion of participants with head trauma might have reduced the ecological validity, as such cases are common in workplace accidents. Finally, all constructs and post-traumatic stress outcomes were assessed at the trait and symptom level rather than clinician-administered diagnostic interviews. Accordingly, the findings reflect associations at the level of characteristics and symptoms, and cannot be interpreted as demonstrating disorder-level or causal relationships.

Future studies should use longitudinal designs to examine the temporal relationships between sensory-processing sensitivity, attentional traits, and PTSD symptoms. The inclusion of neurophysiological measures, such as attention-based behavioral tasks or EEG recordings, could help clarify the biological mechanisms underlying these associations. Moreover, intervention studies testing whether HSPS moderates the effects of trauma-focused or mindfulness-based therapies could provide valuable insights for developing personalized preventive and rehabilitative approaches.

CONCLUSION

The present study provides preliminary evidence that SPS and attentional traits are meaningfully associated with PTSD symptom severity among individuals recovering from occupational injuries. While higher environmental sensitivity and ADHD-related traits were linked to greater PTSD symptoms, mindfulness appeared to have a protective role. These findings emphasize the potential value of assessing sensory and attentional profiles in trauma-exposed workers to inform early intervention and tailored rehabilitation strategies. While the results are preliminary and drawn from a modest sample, they highlight directions that may guide future assessment and rehabilitation practices in occupational settings. Although limited by sample size and cross-sectional design, the study contributes to a growing understanding of how individual differences in sensory sensitivity and attentional regulation shape vulnerability and resilience following trauma.

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Abbreviations List

ADHD: Attention-deficit/hyperactivity disorder
ASRS v1.1: Adult ADHD Self-Report Scale version 1.1
HSPS: Highly Sensitive Person Scale
SPS: Sensory-processing sensitivity
IES-R: Impact of Event Scale–Revised
MAAS: Mindful Attention Awareness Scale
PTSD: Post-traumatic stress disorder

Ethics Approval and Consent to Participate

The study was approved by the Marmara University Faculty of Medicine Clinical Research Ethics Committee (protocol no. 09.2023.346; 03 March 2023). All procedures were conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants prior to enrollment.

Consent for Publication

Written informed consent included permission for the use of anonymized data in scientific publications. No identifiable personal data are presented in this manuscript.

Availability of Data and Materials

The datasets generated and analysed during the current study are not publicly available due to institutional and privacy restrictions but are

available from the corresponding author on reasonable request and with appropriate ethical approval.

Competing Interests

The authors declare that they have no competing interests.

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Author Contributions

All authors contributed equally to this work. Study conception and design were jointly developed by all authors. All authors were involved in patient recruitment, data acquisition, and data management. Data analysis and interpretation were conducted collaboratively, with all authors participating in the evaluation of statistical outputs and clinical implications. The manuscript was drafted jointly, and all authors contributed to the critical revision of each section for important intellectual content. All authors approved the final version of the manuscript and agree to be accountable for all aspects of the work.