

Longitudinal relationship of combat exposure and deployment with PTSD and sleep diagnoses in the MHS

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Background

- Deployment to a warzone is associated with numerous mental and physical health disorders and comorbid conditions¹
- Combat exposure has been linked to worse outcomes compared to deployment with no combat exposure¹
- This study investigated the relationship of deployment with and without reported combat exposure on the incidence of PTSD and Sleep diagnoses in the MHS over time

Methods

- This longitudinal study utilized multiple administrative Military Health System datasets spanning FY2005 to FY2015.
- A random sample of 10,000 U.S. Army active duty Service members (single deployers only) was stratified into four mutually exclusive groups after two years entry to the military:
 - Deployment with Combat Exposure (N = 1266)
 - Deployment with No Combat Exposure (N = 2288)
 - Korea/Japan Peacekeeping Assignment - one year (N = 677)
 - Not Deployed (N = 5769)
- Deployment included Iraq, Afghanistan, and Kuwait (>30 days), and combat exposure was defined by endorsement of specific questions on the Post Deployment Health Assessment
- Outcomes of interest were new PTSD and Sleep diagnoses
 - A Sleep diagnostic category were created to include all relevant ICD-9 codes
 - SMs with diagnoses of interest one year prior to baseline were excluded
 - New diagnoses were defined by one outpatient or one inpatient encounter reflecting relevant ICD-9 code
- Unadjusted descriptive analyses and survival analyses (adjusted for age, gender, education, and tobacco use disorder) were performed
- Incidence rates, rate ratios and adjusted hazard ratios were calculated

Results

- There were statistically significant differences in demographic and military characteristics
 - The deployment groups were similar for age, education, rank, and time in service
 - Compared to other groups, the Combat Exposure group showed larger percentages of males, single marital status, White race, no tobacco use disorder diagnosis, and combat specific and health care occupations
- Table 2 presents unadjusted incidence rates and survival analysis model-based cumulative failure rates over time
- Overall, the deployed groups demonstrated much higher incidence rates of PTSD and Sleep diagnoses than did the control groups (Korea/Japan assignment and Not Deployed)
- Compared to the Deployed, No Combat Exposure group, the Combat Exposure group had significantly higher rates of PTSD and Sleep diagnoses
- Deployment, including combat and non-combat exposure, predicted greater risk for all diagnoses over the 24 month time span, relative to the Korea/Japan assignment and Not Deployed control groups
- Combat exposure predicted 2.3 times the risk for PTSD and 1.5 times the risk for Sleep disorders compared to the Deployed, No Combat Exposure group

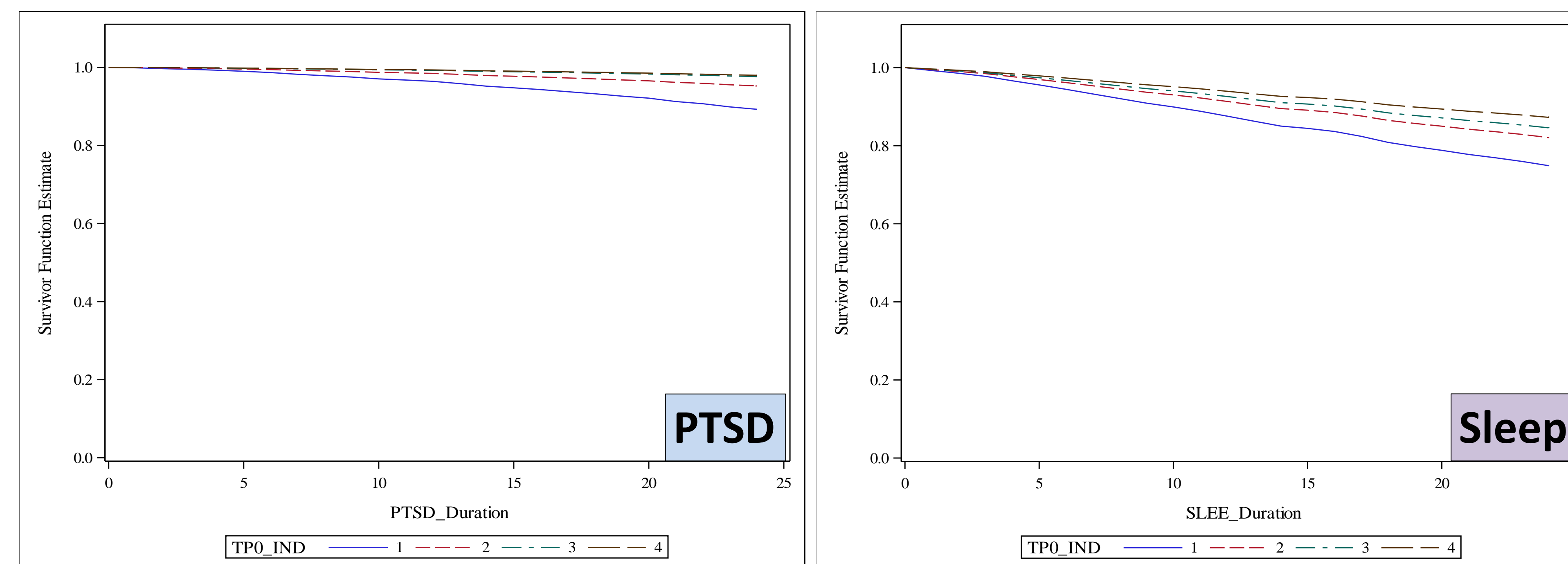
Conclusions

- As expected, deployment (with and without combat exposure) was associated with significantly higher relative risks and incidence rates for PTSD and Sleep diagnoses compared to both the Korea/Japan assignment and the Not Deployed control groups
- Comparing the deployed groups, combat exposure was associated with significantly higher relative risks and incidence rates for PTSD and Sleep diagnoses, compared to deployment with no combat exposure
- Unadjusted analyses yielded incidence rates that were substantially less (lower bound) than population failure estimates based on survival analyses, which modeled likely rates of diagnoses over 24 months, taking high attrition into account (upper bound)
- Study strengths include longitudinal design, direct comparison of combat exposure in deployed groups, use of the Korea/Japan peacekeeping assignment group for an overseas psychosocial control, and direct comparison of raw data with population modeling results
- Study limitations include reliance on MHS diagnoses which may not fully capture symptoms or experiences, and inclusion of single deployers who may differ from repeated deployers

		Deployment Status Group																								
		Age			Gender		Marital Status			Education			Tobacco Use D/O		Race				Rank			Occupation			Time in Service	
		<25 years	25-35 years	>35 years	Male	Female	Never Married	Married	Divorced	High School	Some College	College Degree	No	Yes	White	Black	Hispanic	Other	Junior Enlisted	Senior Enlisted	Officer or Warrant	Combat Specific	Health	Other	1-4 Years	5-10 Years
CE N=1266	N	956	289	21	1202	64	830	416	20	1084	64	115	1083	183	907	156	146	56	1183	14	69	690	148	428	761	505
	%	75.51	22.83	1.66	94.94	5.06	65.56	32.86	1.58	85.62	5.06	9.08	85.55	14.45	71.64	12.32	11.53	4.42	93.44	1.11	5.45	54.50	11.69	33.81	60.11	39.89
NCE N=2288	N	1708	521	59	1976	312	1404	840	42	1971	120	192	1930	358	1432	438	273	138	2161	21	106	682	86	1520	1407	881
	%	74.65	22.77	2.58	86.36	13.64	61.36	36.71	1.84	86.15	5.24	8.39	84.35	15.65	62.59	19.14	11.93	6.03	94.45	0.92	4.63	29.81	3.76	66.43	61.49	38.51
KJ N=677	N	509	156	12	540	137	470	197	10	565	39	71	541	136	388	150	92	46	639	8	30	117	67	493	427	250
	%	75.18	23.04	1.77	79.76	20.24	69.42	29.10	1.48	83.46	5.76	10.49	79.91	20.09	57.31	22.16	13.59	6.79	94.39	1.18	4.43	17.28	9.90	72.82	63.07	36.93
ND N=5769	N	4011	1022	137	4747	1022	3483	2168	113	4448	430	839	4742	1027	3655	1077	668	343	5091	44	634	1428	737	3604	3445	2324
	%	69.53	17.72	2.37	82.28	17.72	60.37	37.58	1.96	77.10	7.45	14.54	82.20	17.80	63.36	18.67	11.58	5.95	88.25	0.76	10.99	24.75	12.78	62.47	59.72	40.28

▲ Table 1. Demographic and Military Characteristics by Deployment Status Groups

Figures 1-2. Survival Rates for Diagnoses by Deployment Status



▼ Table 2. Associations between Deployment Status and Diagnoses

► Table 3: Adjusted Hazard Ratios (With Confidence Limits) over 24 months for Diagnoses by Deployment Status Groups (*p<.0001)

KEY to Groups (Status determined at 2 year baseline)

- 1 = CE Deployed with Combat Exposure
- 2 = NCE Deployed with No Combat Exposure
- 3 = KJ Korea Japan assignment
- 4 = ND Not Deployed

Groups	PTSD	Sleep
CE v NCE	2.34 (1.85-2.96)*	1.46 (1.27-1.69)*
CE v KJ	4.78 (2.99-7.65)*	1.73 (1.39-2.15)*
CE v ND	5.54 (4.38-7.02)*	2.12 (1.86-2.43)*
NCE v KJ	2.04 (1.28-3.27)*	1.18 (0.95-1.46)
NCE v ND	2.37 (1.87-3.00)*	1.45 (1.29-1.63)*
KJ v ND	1.16 (0.73-1.85)	1.23 (1.00-1.50)*

Sample Description (Unadjusted)					Model-based Cumulative Failure Rate Over 24 months Percent % (SE) (Adjusted for age, gender, education, tobacco use disorder)	
Diagnosis by Group	Sample Size	Number with Disorder	Person-years	(Unadjusted) Incidence Rate /100 PYs		
PTSD	Deployed, Combat Exposure	1247	151	2516.33	6.01	10.74 (0.94)
	Deployed, No Combat Exposure	2265	139	4749.42	2.91	4.74 (0.46)
	Korea/Japan Assignment	668	20	1377.67	1.45	2.35 (0.53)
	Not Deployed	5604	146	11,849.42	1.23	2.03 (0.20)
Sleep	Deployed, Combat Exposure	1214	323	2222.50	14.53	25.14 (1.28)
	Deployed, No Combat Exposure	2198	443	4236.92	10.46	17.93 (0.84)
	Korea/Japan Assignment	641	108	1225.25	8.82	15.43 (1.40)
	Not Deployed	5291	751	10,513.25	7.14	12.75 (0.51)

References: ¹Ramchand, R., Rudavsky, R., Grant, S., Tanielian, T., & Jaycox, L. (2015). Prevalence of, risk factors for, and consequences of posttraumatic stress disorder and other mental health problems in military populations deployed to Iraq and Afghanistan. *Curr Psychiatry Rep*, 17(5), 37. doi: 10.1007/s11920-015-0575-z