



Research Paper

Temporal trends in disability evaluation and retirement in the Army, Navy, and Marine Corps: 2005–2011

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Abstract

Background: Surveillance of trends in disability is necessary to determine the burden of disability on the U.S. military, the most common types of disability conditions, and the prevalence of combat exposures in the disability population. Previous studies of disability in the U.S. military have focused on a particular service or condition rather than examining the epidemiology of disability in the military overall.

Objective: This study's objective is to describe rates of disability evaluation and retirement in U.S. Army, Navy, and Marine Corps.

Methods: A cross-sectional study of 126,170 service members evaluated for disability discharge from the U.S. military in fiscal years 2005–2011 was conducted. Crude and standardized rates of disability evaluation and retirement were calculated per 10,000 service members by year of disability, demographic characteristics, and type of disability evaluation or retirement. Temporal trends in the prevalence of combat-related disability in the disability evaluated and retired population were also examined.

Results: Rates of disability evaluation and retirement were highest among female, enlisted, and active duty service members. Overall rates of disability evaluation significantly decreased, while rates of disability retirement increased. Rates of psychiatric disability evaluation and retirement significantly increased in all services during the same time period from 2005 to 2011. Combat-related disability evaluations and retirements have substantially increased in all services particularly among psychiatric disability cases.

Conclusions: Psychiatric disability, combat-related disability, and disability retirement continue to increase in the military, despite observed decreases in the rates of disability the Department of Defense since 2005. © 2013 Elsevier Inc. All rights reserved.

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Evaluation for disability discharge from military service occurs within the Department of Defense (DoD) Disability Evaluation System. Within the DoD Disability Evaluation System each service is responsible for determining whether impairments, injuries, or medical conditions prevent a service member from performing their military duties and require disability discharge from the military.^{1,2} With over two million service members deployed to Afghanistan or Iraq

since 2001,³ disability discharges of service members unable to continue with service are of increasing interest. Few studies have addressed the full population of disability discharged service members during these ongoing combat operations. Surveillance of trends in disability are necessary to determine the burden of disability on the U.S. military, most common types of disabilities, and the prevalence of combat exposures in the disability population.

Prior research on temporal trends within the DoD disability system has been limited.^{4–8} Bell et al described the Army disability population from 1981 to 2005 and found an increased risk of disability evaluation in Soldiers during this period, particularly among young junior enlisted women as well as rising rates of musculoskeletal service-related disability discharges.^{4,5} More recent studies have also shown increases in musculoskeletal disability in the Army⁷ as well as posttraumatic stress disorder (PTSD) and combat-related traumatic brain injury (TBI) in both

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the Army and Marine Corps.^{6,8} However, an examination of the trends in overall disability evaluation and retirement during combat operations in Iraq and Afghanistan has yet to be published.

Musculoskeletal, psychiatric, and neurological conditions are the leading types of disability in all services.⁹ Musculoskeletal disability in particular has been the focus of disability research.^{10–16} Analysis of disability in the Navy from 1998 to 2000 found that musculoskeletal and psychiatric were the most frequent conditions evaluated.¹⁷ Although earlier studies highlighted musculoskeletal disability, more recent analyses have examined psychiatric and neurological disabilities among veterans. Psychiatric disability discharges in Soldiers were found to be associated with a history of deployment to combat zones.¹⁸ The rate and severity of PTSD combat-related TBI disability cases in the Army and Marine Corps increased substantially from 2005 to 2010.^{6,8,14} Due to the chronic nature of psychiatric and neurological disabilities, especially PTSD and TBI, psychiatric and neurologic disability among veterans is an important area of ongoing research.

Many studies have also examined combat deployments and subsequent disability in the military research.^{6,8,15,16,18–22} Deployment has been identified as a risk factor for disability in some studies^{18,22,23}; while others have demonstrated a healthy warrior effect in which those who had a history of deployment were less likely to become disabled.^{20,21} The relationship between specific disability conditions and deployment has also been examined.^{6,8,15,16} Musculoskeletal injuries have been identified as the primary reason for disability following evacuation from a combat zone.^{15,16} Rates of PTSD and TBI disability have increased significantly from 2005 to 2010 in deployed Soldiers and Marines.^{6,8} However, trends in combat exposure in the disability population have yet to be examined.

The lack of contemporary estimates of the rate of disability evaluation or retirement in the military, particularly estimates that account for ongoing combat operations, presents significant challenges to the surveillance and monitoring of disability in the military. Therefore, this study's objective is to describe the rates of disability evaluation and retirement, in service members referred for disability evaluation in the Army, Navy, and Marine Corps for fiscal years (FY) 2005–2011. These rates are described over time for any type of disability evaluation or retirement and also for the most common types of disability evaluation and retirement: musculoskeletal, psychiatric, and neurological disabilities. In addition, this study describes changes in the prevalence of combat exposure among the disability evaluation and retired population. This epidemiologic analysis aims to identify significant trends and important areas of needed future research in order to guide policy emphasizing improved surveillance, prevention and intervention programs for veterans with disabilities across military services.

Methods

Study population

Disability evaluation in the DoD begins with a medical board evaluation by two or more physicians, one who specializes in the condition that caused the referral to the medical board.¹ If the medical board determines that a service member has a condition that is disqualifying or significantly interferes with their ability to perform the duties of their occupation, the service member undergoes a physical evaluation board.¹ At the physical evaluation board, a determination is made whether an individual is fit for duty. If deemed unfit for duty by the physical evaluation board, the service member is assigned a Veterans Affairs Schedule of Rating Disability (VASRD) code and the appropriate rating. VASRD codes are assigned to all conditions that render a service member unfit for duty by the physical evaluation board.² Though not considered medical diagnoses, VASRD codes show the basis of the rating assigned and give an indication of the medical condition that resulted in disability. If deemed fit by the physical evaluation board, the service member is returned to duty.²

All individuals evaluated by the U.S. Army Physical Disability Agency (Army) or the Secretary of the Navy Council of Review Boards (Navy and Marine Corps) in the period from October 1, 2004 to September 30, 2011 (fiscal years 2005–2011) were eligible for inclusion in this study. Air Force disability evaluations were excluded due to missing and incomplete data. Service members with a disability evaluation in progress that had not been finalized were excluded from the study population.

Data sources

Army disability data were received from the U.S. Army Physical Disability Agency. These data were collected from the Physical Disability Case Processing System (PDCAPS), where data on all disability evaluations conducted by the Army physical evaluation board are stored and maintained by the U.S. Army Physical Disability Agency. PDCAPS is the sole source for data regarding the results of Army physical evaluation boards. Army disability data have been utilized in several studies of disability in the U.S. Army,^{4–7,12–16,18–20,24,25} none of which have identified any issues with respect to the completeness or validity of these data.

Data on Navy and Marine Corps physical evaluation boards are collected and maintained by the Secretary of the Navy Council of Review Boards. Navy disability evaluation data are not as frequently studied as disability data from the Army but have been examined by other researchers^{14,17,21} who did not identify any deficiencies in the data.

Aggregate total force strength counts by service and fiscal year were provided by the Defense Manpower Data Center, the organization responsible for collecting and maintaining DoD personnel records.

Measures

Disability databases contain demographic and service characteristics in addition to details about the disability evaluation. Demographic characteristics utilized in this analysis included date of birth, used to calculate age at the time of disability evaluation, race, and sex. Service characteristics included component, either active duty for service members who are serve full time in the military or reserve for service members who are only activated periodically, and rank, classified as either enlisted or officer. Details on disability evaluation determinations include VASRD codes and percent ratings, as well as a determination from each service's physical examination board that states whether the disability is combat-related.² Disability conditions are deemed combat-related if the condition is attributable to dangers associated with armed conflict.¹ Dispositions assigned to those deemed unfit for duty include retired (permanent disability retired and temporary disability retired) or discharged, including separation with severance or separated without benefits.² Permanent disability retirement results in medical retirement from the military with full benefits. Temporary retirement is assigned when a service member is currently unfit for duty as the result of a medical condition but his/her condition is expected to improve or worsen in the next 6 months. Disabled service members can remain on the temporary disability retirement list for up to 5 years and can collect disability benefits commensurate with their temporary rating until their condition stabilizes and a permanent disposition and rating are assigned. Those who are deemed fit are returned to duty.

Disability ratings, which range from 0% to 100% and are associated with VASRD codes, are assigned to service members with conditions rendering them unfit for continued service by three members of the physical evaluation board. The disability rating associated with each VASRD code varies based on level of illness or impairment and is detailed in 10 U.S. Code.² These ratings represent the average impairment in earning capacity of a discharged service member in a civilian occupation as the result of disabling disease, medical condition, and injuries incurred during military service.² When more than one condition renders a service member unfit for continued service, a combined rating is calculated. Compensation is based on disability ratings; those with ratings over 30% are eligible for medical retirement. Determinations regarding whether a disability is combat-related are also made when a service member is deemed unfit for continued military service by the physical evaluation board.

Specific VASRD codes were assigned to body system categories, including musculoskeletal, psychiatric, and neurological, based on categorization of VASRD codes outline in 10 U.S. Code.² All disability conditions were classified into body system categories that are not mutually exclusive, and each disabled service member was categorized

as present/absent for musculoskeletal, psychiatric, and neurological conditions. Therefore, individuals with both a psychiatric and a musculoskeletal condition appear as cases in both categories.

Analysis

Unique records were created for all service members who were evaluated for disability for the first time between 2005 and 2011. For service members with more than one disability record as resulting from a periodic re-evaluation while on the temporary disability retirement list, a unique record was created by extracting the disability evaluation date from the first evaluation and disability ratings, VASRD codes, and dispositions from the most recent evaluation record. Though ratings and VASRD codes may change during the time period that a service member remains on the temporary disability retirement list, such changes are rare in the temporary disability retired population.²⁴ Among those who experience a change in rating or condition while on the temporary disability retirement list, these changes are generally not large enough to result in disability outcomes other than retirement and do not result in changes in the body system evaluated.²⁴

Crude rates of disability evaluation and retirement were calculated per 10,000 service members using aggregate service population counts from the period of FY 2005 to FY 2011 by demographic and service characteristics for the Army, Navy, and Marine Corps. Individual service members were counted once, at the time of first disability evaluation, to generate these rates. Rates of disability evaluation, including all disability dispositions, were calculated separately from rates of disability retirement. To compare rates of disability evaluation by demographic and service characteristics within each service rate ratios were calculated. Calculation of 95% confidence intervals was completed; however, due to large sample size and resultant narrow confidence intervals, *p*-values are presented.

Rates of disability evaluation and retirement per 10,000 service members were also calculated by year for the most commonly evaluated and retired disability conditions: musculoskeletal, psychiatric, and neurological conditions. Service members were categorized based on whether musculoskeletal, psychiatric, and neurological conditions were present or absent and can therefore be counted as both a musculoskeletal and psychiatric case if both types of disability conditions were present. To determine whether observed trends in disability evaluation and retirement overall as well as the most common disability condition types could be attributed to increased combat exposure, the prevalence of combat-related disability in the evaluated and retired population was calculated. Percent of combat-related disability evaluations and retirement were calculated by year for each service overall and for the most common disability condition types.

Cochran–Armitage tests for trend were conducted to determine whether significant linear trends in disability

evaluation and retirement were present during the study period. All statistical tests were conducted using two sided test statistics and were considered significant if the p -value was less than 0.01. This study was approved by the Walter Reed Army Institute of Research (WRAIR) Institutional Review Board, Silver Spring, Maryland.

Results

Between FY 2005 and FY 2011, 126,170 service members were evaluated for a disability discharge from the Army, Navy, or Marine Corps. Of these individuals, 2708 (2%) had a disposition of 'retained on the temporary disability retirement list' as their first disposition during the study period and were excluded because the disability evaluation did not begin during the study period. Among the remaining study population ($N = 123,462$), 35% ($n = 42,969$) were retired. Roughly 70% of disability evaluations and retirements were from the Army. The Navy and Marine Corps each accounted for about half of the remaining disability evaluations and retirements.

Regardless of service, the rate of disability evaluation was higher in females than in males, ranging from 101.4 per 10,000 service members in the Navy to 168.6 in the Marine Corps (Table 1). Rates of disability retirement in Army females (39.9 per 10,000) were very similar to the rate in males (40.6 per 10,000). Disability retirement rates in the Navy and Marine Corps females (32.9 and 46.2 per 10,000 respectively) were higher than rates of disability retirement of males (21.4 and 35.0 per 10,000 respectively). Differences in rates of disability evaluation and retirement by sex were statistically significant for all groups with the exception of rate of disability retirement in the Army where no significant difference was observed. In the Army, those 40 or older had the highest rates of disability evaluation (130.6 per 10,000) and retirement (52.7 per 10,000). In the Navy and Marine Corps the highest rates of disability evaluation by age were in the 20–29 age group (73.6 and 116.0 per 10,000 respectively) but the highest rates of retirement were found in the 30–39 age group (27.2 and 44.2 per 10,000 respectively). All observed differences in the rates of disability evaluation and retirement were statistically significant. In all services the rates of disability evaluation and retirement were similar by race. Only the rates of disability evaluation in the Army and Navy differed significantly by race. Enlisted service members and active duty component also had higher rates of disability evaluation and retirement in all services, all of which were statistically significant.

As shown in Table 2, rates of disability evaluation per 10,000 service members decreased significantly during the study period in the Army ($Z = -33.7$, $p < 0.0001$), Navy ($Z = -33.6$, $p < 0.0001$), and Marine Corps ($Z = -11.5$, $p < 0.0001$). During the same time period, rates of disability retirement increased significantly in the Army ($Z = 59.7$, $p < 0.0001$) and Marine Corps

($Z = 4.7$, $p < 0.0001$). In the Navy, rates of disability retirement decreased significantly during the study period similar to the rate of disability evaluation ($Z = -9.7$, $p < 0.0001$). Rates of disability evaluation were highest in the Army regardless of fiscal year of disability evaluation. Prior to 2008, rates of disability retirement were highest in the Marine Corps; however, the rate of disability retirement was highest in the Army after 2008. Standardized rates were also examined but no differences in the trends of disability evaluation or retirement were observed.

To determine if changes in the types of conditions evaluated influenced the decreased rate of evaluation and accompanying increased rate of retirement per 10,000 service members, rates of disability evaluation and retirement per 10,000 service members were calculated for the most common disability types and assessed for temporal trends (Table 3). In the Army, the rate of disability retirement significantly increased during this time period among musculoskeletal ($Z = 56.7$, $p < 0.0001$), psychiatric ($Z = 66.6$, $p < 0.0001$), and neurologic disability ($Z = 30.2$, $p < 0.0001$) cases. The rate of musculoskeletal disability evaluation in the Army significantly decreased ($Z = -21.7$, $p < 0.0001$), but both psychiatric ($Z = 39.4$, $p < 0.0001$) and neurologic ($Z = 9.8$, $p < 0.0001$) disability evaluation increased significantly. Navy disability evaluation and retirement decreased significantly for all types of disability with the exception of psychiatric disability retirement which did not show any significant trend during the study period ($Z = 1.7$, $p = 0.1$). Psychiatric disability showed significant increases in the rate of both disability evaluation ($Z = 3.7$, $p < 0.001$) and retirement ($Z = 9.8$, $p < 0.0001$). Neurological disability evaluation rates significantly decreased during the study period in the Marine Corps ($Z = -4.4$, $p < 0.0001$), but rates of neurological disability retirement showed no significant trend ($Z = -0.01$, $p = 0.99$). No significant trends in musculoskeletal disability evaluation ($Z = -1.1$, $p = 0.27$) or retirement ($Z = -0.4$, $p = 0.72$) were observed in the Marine Corps.

After assessing trends in disability evaluation and retirement by type of disability, the proportion of disability evaluations and retirements deemed combat-related was determined by year and service overall and for the most common disability types (Table 4). In all services, significant increases in the overall proportion of disability evaluation and retirement cases deemed combat-related were observed. Furthermore, psychiatric disability evaluations and retirements experienced the largest increase in combat-related determinations during the study period in all services. In the Army, the proportion of combat-related psychiatric disability retirement in 2011 (24.6%) was more than 10 times the proportion observed in 2005 (2.4%) and the proportion of combat-related disability evaluations more than quadrupled. Psychiatric disability retirements deemed combat-related more than doubled in the Navy, increasing from 8.5% of psychiatric disability

Table 1

Aggregate crude rates of disability evaluation and retirement per 10,000 service members by service for FY 2005–2011

	Army			Navy			Marine Corps											
	Evaluated			Retired			Evaluated			Retired			Evaluated			Retired		
	<i>(n = 87,491)</i>			<i>(n = 30,663)</i>			<i>(n = 19,394)</i>			<i>(n = 6507)</i>			<i>(n = 16,577)</i>			<i>(n = 5795)</i>		
	<i>n</i>	Rate	RR	<i>n</i>	Rate	RR	<i>n</i>	Rate	RR	<i>n</i>	Rate	RR	<i>n</i>	Rate	RR	<i>n</i>	Rate	RR
Sex																		
Male	70,551	110	0.8***	25,942	41	1.0	14,819	63	0.6***	5022	21	0.6***	14,885	98	0.5***	5336	35	0.7***
Female (ref)	16,871	143	1.0	4699	40	1.0	4558	101	1.0	1478	33	1.0	1675	169	1.0	459	46	1.0
Missing	69	—	—	22	—	—	17	—	—	7	—	—	17	—	—	4	—	—
Age																		
<20	2529	46	0.4***	244	4	0.1***	371	25	0.8***	64	4	0.4***	979	46	0.4***	178	8	0.2***
20–29 (ref)	44,606	119	1.0	14,211	38	1.0	10,447	74	1.0	3111	22	1.0	12,520	116	1.0	4242	39	1.0
30–39	22,967	118	1.0***	9194	47	1.2***	5741	70	0.9***	2242	27	1.2***	2470	97	0.8***	1121	44	1.1**
≥40	17,389	131	1.1***	7014	53	1.4***	2804	67	0.9***	1081	26	1.1*	571	72	0.6***	242	30	0.8***
Missing	0	—	—	0	—	—	31	—	—	9	—	—	37	—	—	16	—	—
Race																		
White	62,628	114	0.9***	21,951	40	1.0	12,826	70	1.0***	4263	23	1.0	11,858	95	1.1	4135	33	1.1
Black (ref)	17,193	122	1.0	5706	40	1.0	3508	69	1.0	1184	23	1.0	1417	86	1.0	473	28	1.0
Other ^a	7641	—	—	2998	—	—	2983	—	—	1042	—	—	3255	—	—	1179	—	—
Missing	29	—	—	8	—	—	77	—	—	18	—	—	47	—	—	12	—	—
Rank																		
Enlisted	81,740	—	127	28,548	44	2.4***	18,014	77	2.8***	5975	26	2.5***	16,082	110	3.8***	5566	38	2.8***
Officer (ref)	5677	—	50	2077	18	1.0	1335	28	1.0	505	11	1.0	433	26	1.0	205	12	1.0
Missing	74	—	—	38	—	—	45	—	—	27	—	—	62	—	—	28	—	—
Component																		
Active duty	72,504	195	4.5***	24,339	66	3.6***	17,953	77	2.6***	6001	26	2.4***	15,154	112	2.2***	5299	39	2.2***
Reserve (ref)	14,982	39	1.0	6324	16	1.0	1441	30	1.0	506	11	1.0	1423	52	1.0	500	18	1
Missing	5	—	—	0	—	—	0	—	—	0	—	—	0	—	—	0	—	—

RR: rate ratio.

p* < 0.01; *p* < 0.001; ****p* < 0.0001.^a Rates per 10,000 service members of 'other' race were not calculated due to difference in the other categorization in the disability and personnel databases.

retirement in 2005 to 19.2% in 2011. In the Marine Corps, the proportion of psychiatric disability retirements deemed combat-related nearly quadrupled, increasing from 4.9% in 2005 to 19.7% in 2011. Significant increases in the

Table 2

Crude rates of disability evaluation and retirement per 10,000 service members by service and year of disability evaluation

	Army	Navy	Marine Corps
Evaluated			
2005	154.0	93.0	115.8
2006	118.9	90.5	124.2
2007	108.8	74.8	103.4
2008	108.6	64.8	94.9
2009	121.0	54.3	87.7
2010	103.3	52.8	91.7
2011	97.9	48.2	99.8
Z ^a	−33.7*	−33.6*	−11.5*
Retired			
2005	25.8	26.0	30.5
2006	22.1	30.4	38.9
2007	23.5	22.2	34.3
2008	36.2	20.7	32.0
2009	60.1	21.9	35.2
2010	57.7	19.9	37.3
2011	54.1	20.2	41.3
Z ^a	59.7*	−9.7*	4.7*

**p* < 0.0001.^a Z score for Cochran–Armitage test for trend.

proportion of combat-related disability evaluations and retirements were observed in both the Army and Navy for musculoskeletal and neurological disabilities. In the Marine Corps, trends in disability evaluation and retirement were not significant for musculoskeletal or neurological disabilities.

Discussion

Rates of overall disability evaluation in the Army, Navy, and Marine Corps have decreased significantly from 2005 to 2011, during the most active period of military conflict in Iraq and Afghanistan. In contrast, severity of disabilities has increased during this period in each service studied, as reflected in rates of disability resulting in retirement. Although musculoskeletal disability remains the leading cause of disability evaluation, psychiatric disability rates have risen substantially, with psychiatric conditions now as common as musculoskeletal conditions among disability retired service members. Rates of combat-related disability evaluation and retirement grew over time in each service, but the increase in prevalence of combat-related psychiatric disability retirement was greatest. This study indicates that the marked increase in the rate of disability retirement despite notable decreases in disability evaluation overall may be attributed to significant and substantial increases

Table 3

Crude rates of disability evaluation and retirement per 10,000 service members for most commonly evaluated body systems by service and year of evaluation

	Army			Navy			Marine Corps		
	MS	Psych	Neuro	MS	Psych	Neuro	MS	Psych	Neuro
Evaluated									
2005	89.6	17.3	17.8	29.0	11.9	15.7	48.2	13.1	17.1
2006	70.3	14.6	14.4	26.5	13.2	14.8	53.7	19.9	24.2
2007	67.0	17.5	12.9	21.3	10.3	10.2	46.2	18.9	20.0
2008	66.8	23.8	15.4	20.3	10.2	10.1	43.8	21.5	20.8
2009	74.1	35.0	22.4	18.4	9.8	7.7	45.0	21.8	19.1
2010	62.0	34.3	19.4	17.8	9.8	7.5	44.2	19.3	16.0
2011	61.5	31.9	18.1	15.7	8.8	5.8	51.8	18.8	15.9
Z ^a	-21.7**	39.4**	9.8**	-15.8**	-6.1**	-17.5**	-1.1	3.7*	-4.4**
Retired									
2005	11.5	6.3	7.9	8.8	6.2	8.0	11.7	8.5	9.9
2006	10.9	6.3	7.2	9.8	7.3	9.6	17.1	12.7	15.5
2007	13.3	9.3	7.7	8.0	5.6	6.6	16.9	11.8	13.8
2008	21.9	16.7	10.9	7.6	6.0	6.5	14.9	14.2	13.5
2009	36.3	32.4	18.8	7.9	7.8	5.9	14.6	18.4	14.6
2010	35.2	32.9	17.1	7.0	6.3	5.6	13.7	16.0	11.9
2011	34.5	31.1	15.6	6.1	7.4	4.3	14.4	17.7	12.2
Z ^a	56.7**	66.6**	30.2**	-5.9**	1.7	-9.3**	-0.4	9.8**	-0.01

MS: musculoskeletal; Psych: psychiatric; Neuro: neurological.

* $p < 0.001$; ** $p < 0.0001$.^a Z score for Cochran–Armitage test for trend.

in combat-related disability cases, particularly psychiatric disability cases.

This study extends earlier military disability research by providing a census of disability evaluation and retirement in the Army, Navy, and Marine Corps in the context of the wars in Iraq and Afghanistan. Likewise, the primary strength of this study is the size of the study population, which includes all disability evaluations conducted on Army, Navy, or Marine Corps service members. This study

is also strengthened by robust data capture of demographic, service-related, and disability characteristics in all services studied. Previous studies of temporal trends in disability were limited to the Army,^{4,5,7} utilized a limited disability case population,⁷ or reflected only the early period of the recent overseas conflicts.²⁶ Since Air Force disability evaluation data were excluded due to missing data, this study is limited in its ability to extrapolate the findings to the Air Force disability population, which may experience

Table 4

Percent of evaluations and retirements deemed combat related by year and service for most common disability types

	Army				Navy				Marine Corps			
	Any	MS	Psych	Neuro	Any	MS	Psych	Neuro	Any	MS	Psych	Neuro
Evaluated												
2005	8.2	8.2	5.1	6.2	7.8	8.9	8.2	8.4	10.4	10.9	5.5	9.9
2006	9.1	9.2	5.9	7.5	17.2	20.0	13.7	22.4	16.2	17.0	13.4	16.0
2007	10.6	10.9	8.6	8.2	13.7	17.7	11.8	14.7	14.0	15.1	12.9	13.8
2008	13.9	13.6	13.2	13.2	15.2	15.4	14.0	18.9	15.7	14.9	17.4	18.2
2009	21.1	20.5	22.9	24.9	18.3	16.9	20.3	19.6	16.1	15.6	19.1	20.0
2010	19.2	19.0	22.8	21.6	14.3	14.2	15.8	7.7	13.2	12.1	15.0	10.4
2011	13.0	18.7	21.4	18.6	13.5	6.9	16.3	8.4	14.6	14.4	16.4	11.8
Z ^a	54.6**	41.5**	64.4**	34.6**	7.9**	5.1**	11.7**	3.3*	5.0**	2.5	11.0**	1.9
Retired												
2005	3.9	3.9	2.4	4.6	8.2	10.1	8.5	9.7	5.5	7.7	4.9	9.0
2006	5.2	5.5	3.2	5.7	14.6	20.1	10.4	16.6	13.4	17.2	11.6	15.1
2007	7.5	8.2	5.7	7.5	10.7	14.8	8.8	15.6	12.9	17.0	8.9	13.3
2008	13.1	13.2	12.0	12.8	13.4	15.4	11.7	17	17.4	14.7	15.1	17.2
2009	24.9	24.2	26.0	26.4	20.9	17.2	23.3	18.1	19.1	17.5	21.6	21.6
2010	23.4	22.6	26.2	23.1	15.7	14.8	18.0	11.4	15.0	11.9	17.2	10.8
2011	22.0	22.3	24.6	19.9	16.6	7.7	19.2	11.6	16.4	13.9	19.7	12.9
Z ^a	26.4**	16.0**	38.0**	9.3**	5.7**	3.0*	10.9**	11.5**	4.8**	-2.0	10.2**	-1.5

MS: musculoskeletal; Psych: psychiatric; Neuro: neurological.

* $p < 0.01$; ** $p < 0.0001$.^a Z score for Cochran–Armitage test for trend.

differences in deployment and occupational exposures or demographic characteristics.

The primary finding of the current study, that disability evaluations have decreased since 2005, contrasts with earlier disability research reporting an increased rate of disability through 2005.^{4,5} However, recent studies utilizing more contemporary disability data have also shown a decrease in the overall rate of disability evaluation in the Army^{6,7} and Marine Corps,⁶ concurrent with an increase in disability retirement in the Army.^{6,7} Rates of disability evaluation and retirement by demographic characteristics presented in this study showed that disability evaluation was more prevalent in females than in males in all services studied. However, in the Army and Marine Corps the difference between males and females was less pronounced when examining rates of disability retirement. These observed differences in disability retirement and evaluation by sex may be the result of differences in combat exposure or deployment history which have been demonstrated to interact with sex in previous studies.^{20,21} As women historically have not served in combat occupations, their deployment and training experiences may differ significantly from their male counterparts. Further research is needed to determine how interactions between deployment and combat exposures modify the relationship between sex and disability retirement.

Musculoskeletal disability has historically been reported as the most prevalent disability in the DoD,^{7,13,14,17} and has been the focus of military disability research.^{10–16} Consistent with previous research, this study shows that musculoskeletal conditions remain among the most common disabilities in the military, but rates of psychiatric disability evaluation and retirement have risen substantially in recent years. Furthermore, rates of psychiatric disability retirement in 2011 neared or exceeded rates of musculoskeletal retirement in the Army and Marine Corps. Most PTSD disability in both the Army and Marine Corps from 2005 to 2010 was combat-related,⁶ suggesting that the trends in psychiatric disability observed in the current study may be driven by increases in the burden of combat-related PTSD disability.

In 2008, DoD policy established new procedures for improved identification and compensation of service members with TBI and PTSD disability^{27,28} which may contribute to the elevated rates of disability retirement identified particularly in the later period of this study. Because this 2008 policy stated that all PTSD disability cases must be placed on temporary disability for at least 6 months prior with a rating consistent with disability retirement,²⁸ psychiatric disability retirement may be particularly impacted by these policy changes. Previous research has demonstrated that more than three-quarters of service members placed on temporary disability will become permanent disability cases when their condition stabilizes²⁴ and that in PTSD cases placed on the TDRL, nearly all (98%) are eventually disability retired.⁹ However, these changes in DoD policy

can explain neither inter-service differences in disability evaluation and retirement rates nor the increased rate of musculoskeletal disability evaluation.

The relationship between combat deployments and subsequent disability is a topic of ongoing military research.^{6,15,16,18–21} Studies of pre-enlistment and service-related factors associated with disability among Soldiers and Marines identified a healthy warrior effect in which those who had a history of deployment were less likely to become disabled.^{20,21} In contrast, increased rates of combat-related disability were observed in the current study, concurrent with the period of escalating conflicts in Iraq and Afghanistan, particularly among individuals evaluated for combat-related psychiatric disability retirement. Though the descriptive nature of this study prevents causal conclusions, the findings are consistent with previous studies indicating that the association between combat exposures and psychiatric disability is an increasingly important issue for veterans transitioning to civilian life following deployment to the wars in Iraq and Afghanistan.^{6,18}

Conclusions

This epidemiologic analysis documents significant and substantial changes in military disability trends from 2005 to 2011 during escalations in the conflicts in Iraq and Afghanistan. The overall decreasing trend in disability evaluation observed in this study appears to be driven by the notable decreases in musculoskeletal disability evaluation across services. The increasing trend found in disability retirement, is likely due to increasing severity of illness and injury as the result of increased combat exposure. Though the rate of musculoskeletal disability evaluation decreased, musculoskeletal disability conditions were shown to be more frequently combat-related than in previous years. The relationship between musculoskeletal disability, deployment, and combat exposure may be more complex than the clear associations observed between psychiatric conditions and combat experiences in this and other studies.^{6,18,19,23,29–31} Further study is needed to examine differences in disability outcomes across military services, emphasizing recent changing trends in musculoskeletal and psychiatric disability and the effects of deployment and combat exposure on disability outcomes.

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