ORIGINAL ARTICLE

Long-term Outcomes of Disability Benefits in US Veterans With Posttraumatic Stress Disorder

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Context: Most studies examining the clinical impact of disability benefits have compared aid recipients with people who never applied for benefits. Such practices may bias findings against recipients because disability applicants tend to be much sicker than never-applicants. Furthermore, these studies ignore the outcomes of denied claimants.

Objective: To examine long-term outcomes associated with receiving or not receiving Department of Veterans Affairs (VA) disability benefits for posttraumatic stress disorder (PTSD), the most common mental disorder for which veterans seek such benefits.

Design: Comparison of outcomes between successful and unsuccessful applicants for VA disability payments. Because we could not randomize the receipt of benefits, we used exact matching by propensity scores to control for potential baseline differences. We examined clinical outcomes approximately 10 years later.

Setting and Participants: Stratified, nationally representative cohort of 3337 veterans who applied for VA PTSD disability benefits between January 1, 1994, and December 31, 1998.

Main Outcome Measures: Assessment on validated survey measures of PTSD; work, role, social, and physical functioning; employment; and poverty. We compared outcomes with earlier scores. Homelessness and mortality were assessed using administrative data.

Results: Of still-living cohort members, 85.1% returned usable surveys. Symptoms of PTSD were elevated in both groups. After adjustment, awardees had more severe PTSD symptoms than denied claimants but were nonetheless more likely to have had a meaningful symptom reduction since their last assessment (−6.1 vs −4.4; SE, 0.1; $P=.01$). Both groups had meaningful improvements of similar magnitude in work, role, and social functioning (−0.15 vs −0.19; SE, 0.01; $P=.94$), but functioning remained poor nonetheless. Comparing awardees with denied claimants after adjustment, 13.2% vs 19.0% were employed ($P=.11$); 15.2% vs 44.8% reported poverty ($P<.001$); 12.0% vs 20.0% had been homeless ($P=.02$); and 10.4% vs 9.7% had died ($P=.66$).

Conclusions: Regardless of claim outcome, veterans who apply for PTSD disability benefits are highly impaired. However, receiving PTSD benefits was associated with clinically meaningful reductions in PTSD symptoms and less poverty and homelessness.

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Posttraumatic stress disorder (PTSD) is a uniquely disabling condition affecting approximately 8% of all US adults[1] and up to 60% of selected US military veterans, such as former prisoners of war.[2] In addition to primary symptoms, PTSD has been associated with higher rates of depression, suicide attempts, and substance use disorder[3-5] and with impaired occupational and social functioning.[6] Associated medical conditions include pain, obesity, and chronic lung and cardiovascular disease.[4,5,7,8] These strikingly high comorbidity levels no doubt explain why US veterans with PTSD account for just 9% of all veterans receiving disability benefits through the Department of Veterans Affairs (VA) but receive approximately 21% of all benefit dollars disbursed.[9]

The VA manages the second largest federal disability program in the United States and currently indemnifies almost 3 million veterans for disabling disorders and conditions that resulted from military service.[10] Benefits may include health insurance and care through VA medical facilities, pharmacy benefits, rehabilitation services, and monthly cash compensation. Posttraumatic stress disorder is the most common mental disorder for which veterans seek VA disability benefits and the fourth most common diagnosis among re-

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cipients. Unlike Social Security Disability Insurance, which is the largest federal disability program, veterans do not have to be completely unable to work to receive VA disability benefits. However, the generosity of VA benefits corresponds to veterans' degree of disability or injury. We estimate that nearly 600 000 veterans have applied for VA disability benefits for PTSD since 1980.[11] As of 2009, 386 882 veterans were receiving PTSD compensation.[10]

Compensating military veterans for injuries and conditions incurred in the line of duty predates this country's founding. Yet, whether disbursed by the VA or by some other program, critics worry that disability payments may induce some recipients to remain ill or to exaggerate or feign symptoms.[12,13] For a variety of conditions, including PTSD, clinical and vocational outcomes have repeatedly been shown to be poorer when contrasting disability aid recipients with others.[13-17]

Unfortunately, prior work has been fundamentally limited because disability aid recipients have almost always been compared with people who never applied for aid.[13,16,17] However, individuals who apply for disability benefits tend to be considerably sicker than those who do not.[14,18,19] Comparing outcomes across 2 such inherently different groups will therefore tend to find poorer outcomes among the aid recipients, thus biasing results. This limitation is rarely acknowledged by investigators; however, poorly conceptualized research could carry potentially devastating policy consequences for aid recipients. For example, pervasive beliefs that disability benefits are harmful could prompt policy makers to reduce funding or even defund such benefits.

Besides influencing funding policies, beliefs that disability aid recipients have poorer outcomes than nonrecipients could prompt clinicians to discourage patients from applying for aid. Such beliefs also undergird the assumption that disability benefits "pay" recipients to remain ill[20] and may feed into clinicians' negative attitudes toward patients seeking disability aid.[21,22] Patients themselves may incorporate these negative stereotypes into their self-image,[23,24] thus also impeding positive outcomes and—ironically—perpetuating the perception that disability aid might be harmful. Because PTSD is treatable and even potentially reversible, patients, clinicians, and policy makers need accurate information about the impact of disability aid on PTSD recovery.

Prior investigators may have chosen to compare disability aid recipients with those who never applied for aid because finding more suitable control subjects—namely, applicants who applied for but were denied disability aid—is difficult. Once claims are adjudicated, denied claimants may become invisible to researchers. Yet, knowing what happens to denied applicants may be more important than knowing what happens to those receiving aid because the former leave the disability claims process with far fewer resources and a much thinner safety net.[25,26]

In the few studies comparing characteristics and outcomes across disability aid recipients and denied applicants, findings suggest that the 2 groups differ modestly in terms of clinical symptoms and dysfunction.[18,23,25,27] However, denied applicants often have poorer outcomes than beneficiaries once the claims decision is made. For example, in one study,[28] veterans halved their mental health care use after their disability claims were denied, whereas successful claimants' use doubled. In an inception cohort[29] of male Social Security Disability Insurance applicants from 1970, denied applicants' 3-year mortality was approximately one-third that of beneficiaries' but still exceeded the general population's mortality by almost 2-fold. More recently, Rosenheck et al[25] showed that homeless, mentally ill veterans who were denied Supplemental Security Income or Social Security Disability Insurance benefits subsequently had poorer life quality, more homelessness, and more reliance on welfare and food stamps to meet basic needs compared with successful claimants.

With the exception of the 1970s cohort, these studies have been limited to small, local samples and short, 3-month follow-up. In the present study, we rectify these and many earlier studies' deficiencies and examine long-term outcomes of disability aid for PTSD using an appropriate control group. In contrast to much prior research, we speculated that receipt of VA disability benefits for PTSD, which includes facilitated access to PTSD-specific treatments and to medical and rehabilitative care, would result in improved outcomes among aid recipients relative to denied claimants, including greater reductions in PTSD symptom severity; better improvement in their work, role, and social functioning; smaller declines in physical functioning; and lower mortality. We anticipated that the VA's cash benefits would result in fewer aid recipients reporting incomes below poverty[30] or becoming homeless compared with denied applicants,[25] but we also anticipated that the cash benefit would result in fewer aid recipients being employed.[25,31] To our knowledge, this is the first long-term study to examine clinical effects of disability aid in any pool of former disability aid applicants.

METHODS

PROTOCOL

The Minneapolis VA Medical Center's Subcommittee on Human Studies reviewed and approved the study protocol. A letter describing the study's risks and benefits, $10 incentive, and 23-page questionnaire were mailed to subjects' homes. Returning a completed survey signified the veterans' consent to participate. Nonrespondents were sent a postcard reminder and 2 more surveys at 2-week intervals. Later, nonrespondents were interviewed by telephone about their reasons for nonresponse.

Veterans were surveyed several years after their claims were adjudicated, and our questions were asked in a research context (as opposed to a disability evaluation for benefits). Although there was no reason to assume that secondary gain motivations would influence participants' responses, we nonetheless avoided hypothesis guessing and consequent biased responding by not telling veterans what prompted their invitation into the study and by blinding them to study hypotheses. We further minimized hypothesis guessing by not asking questions related to veterans' disability award status, instead gathering that information from administrative data.

SETTING AND SUBJECTS

The study builds on a cohort of 3337 nationally representative veterans, stratified by sex (1655 men and 1682 women), who

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first applied for VA PTSD disability benefits between January 1, 1994, and December 31, 1998. The cohort was originated to explore disparities in PTSD disability awards.[32] At inception, 100 750 male veterans and 3866 female veterans were potentially eligible for participation. Male subjects, who represent approximately 96% of all applicants for VA PTSD disability benefits, were randomly selected from all male applicants, and female subjects were independently and randomly selected from all female applicants to achieve a 1:1 sex ratio in the final sample. All original PTSD disability claims had been adjudicated before veterans were enrolled.

Regardless of claims outcome, most cohort members had a PTSD diagnosis at some point during the study. For example, a retrospective claims file audit of 10.9% of the cohort, randomly selected, indicated that approximately 80% had received a diagnosis of PTSD from a qualified clinician at the time of their claim.[32,33] Approximately 2 years after they filed their claims, 75.8% of beneficiaries met screening criteria for PTSD on a self-report survey compared with 64.4% of denied claimants.

All cohort members completed a mailed questionnaire using validated measures between January 1, 1998, and December 31, 2000 (time 1),[27] and surviving veterans (n=2998) were invited to complete a similar questionnaire between January 1, 2004, and December 31, 2006 (time 2). Among survivors, addresses could not be found for 137 veterans (4.6%), but some outcomes were still obtained for them. Response rate for the remainder was 89.6% (n=2564). However, 13 respondents removed the identification number from their surveys, yielding 2551 usable surveys (85.1% of all surviving cohort members).

Based on time 1 data, which were available for all cohort members, nonrespondents and respondents at time 2 had similar time 1 PTSD symptoms; work, role, social, and physical functioning; income; and employment status (all, $P \geq .16$). Response rates at time 2 were higher for beneficiaries than for denied claimants (87.2% vs 81.7%; $P=.001$). Survivors without addresses at time 2 (who were all nonrespondents) were more likely than other survivors to have been homeless (24.2% vs 13.9%, $P<.001$). Based on their time 1 data, time 2 nonrespondents were approximately 2 years younger, 5% more likely to be nonwhite, and 4% less likely to have attended college than time 2 respondents (all $P \leq .04$). Among veterans with valid addresses, the most common reasons for nonresponse were that the veteran thought he or she had returned it (25.3%) or the veteran was too busy or forgot to return it (20.8%). Remaining explanations each accounted for less than 10% of reasons (data not shown).

MEASURES

We used the same validated survey measures at times 1 and 2 to assess clinical outcomes. For covariates, we assessed combat exposure and military sexual assault history at time 1 only and depression, anxiety, and substance abuse at time 2 only. All other covariates were assessed at both times using the same measures.

PRIMARY OUTCOMES

The primary outcomes were PTSD symptom severity and work, role, and social functioning at time 2. We also examined score changes in these variables since time 1. Severity of PTSD symptoms in the last 2 weeks was measured using the Penn Inventory for Posttraumatic Stress Disorder,[34] which has excellent internal consistency and 0.87 to 0.93 test-retest reliability. Among veterans, scores of at least 35 have 0.90 to 0.98 sensitivity and 0.94 to 1.00 specificity for PTSD diagnosis.[34] Higher scores indicate more severe symptoms; score changes of at least 6 are considered clinically meaningful.[35]

We used the overall summary score of the self-reported Social Adjustment Scale[36] to assess work, role, and social functioning. The Social Adjustment Scale measures functioning in the following 7 domains: major work role (ie, paid employment, homemaker, or student); social and community activities; marriage, extended family, family unit, and parental relationships; and economic self-sufficiency. It has internal consistency of 0.74 and test-retest reliability of 0.80 in community samples.[36] Higher scores indicate poorer adjustment across all domains. Healthy community-dwelling adults have mean Social Adjustment Scale scores of 1.6, whereas scores for individuals with psychiatric illness usually exceed 2.0.[37] Score changes of 0.4 represent a very large clinical effect; smaller changes of 0.1 also appear clinically relevant.[38]

SECONDARY OUTCOMES

Secondary outcomes included time 2 physical functioning, income below poverty, employment status, homelessness history, and mortality. We used the RAND Revised Physical Functioning Battery[39] to assess physical functioning. Scores range from 12 (worst impairment) to 36 (no impairment), with most community-dwelling adults averaging scores of 35.[40] We also examined the score change in this variable since time 1. Even 1-unit score changes are considered clinically important.

We used the Social Adjustment Scale to assess employment. Income was assessed using a 6-category question. We defined poverty as total annual income of $20 000 or less.[30]

Homelessness and mortality were determined for all cohort members regardless of time 2 response status. Homeless history was ascertained using the VA's Mental Health Database, which contains standardized administrative information on all veterans contacted through the VA's national homeless programs since 1987, and the Patient Treatment Files and Outpatient Clinic files, which house administrative flags and VA visits coded for homelessness. Mortality as of August 31, 2006, was extracted from the National Death Index and the VA's Beneficiary Identification and Records Locator Subsystem (BIRLS).

MAIN INDEPENDENT VARIABLE

The main independent variable, award status for PTSD disability benefits at time 1, was assessed using the Special Interest Resources System (SIRS) database and Veterans Issues Tracking Adjudication Log (VITAL). We used BIRLS to track changes in veterans' award status from time 1 to time 2.

OTHER COVARIATES

Well-established predictors of study outcomes include sociodemographic characteristics, comorbid physical and psychiatric conditions, health care access, nature of the trauma that led to PTSD, and subsequent exposure to other high-magnitude stressors. Age, race, sex, marital status, and education were obtained using single-item survey questions. Service era was obtained from SIRS or VITAL. We used Patient Treatment Files and Outpatient Clinic diagnostic codes to identify comorbid psychosis and to calculate the Charlson Comorbidity Index[41] to assess major medical comorbidities. The self-reported RAND Mental Health Battery–Short Form[42] assessed current depression and anxiety symptoms; the Drug Use Screening Inventory–Revised[43] assessed current substance use. The TWEAK (an acronym for tolerance, worry about drinking, eye-opener, amnesia, and cut down on drinking)[44] assessed problem alcohol consumption. Two health care access variables, distance lived from a VA medical facility and health insurance status, were assessed with previously validated survey questions.

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In this cohort, PTSD was most commonly attributed to combat or sexual assault. Measured at time 1 only, combat exposure was assessed using a modified version of the Combat Exposure Inventory,[45] and military sexual assault history, using the Sexual Harassment Inventory's Criminal Sexual Misconduct subscale.[46] Documented combat injuries were extracted from SIRS or VITAL. High-magnitude stressor experiences in the past year were assessed using an adaptation of the Life Stressor Checklist.[47]

To isolate the effect on the study outcome of compensation for PTSD specifically, we controlled for veterans' receipt or nonreceipt of other VA disability benefits, extracting this information from SIRS, VITAL, and BIRLS.

STATISTICAL ANALYSIS

Denied disability applicants represent a far superior comparison group for aid recipients than people who have never applied for benefits, but inherent differences nonetheless remain between those who ultimately do and do not receive aid. Because we could not ethically or legally randomize receipt of PTSD disability benefits, we used propensity and other statistical methods to control for these potential baseline differences. Propensity methods correct for the differences between cases and controls in observed covariates, and in some circumstances can reduce related bias by 95% to 100%.[48] The propensity for receiving a PTSD disability award at time 1 was estimated using logistic regression, whereby award status was regressed on the following 7 variables highly predictive of PTSD disability award: age, sex, race, college education, combat exposure, documented combat injury, and disability award for other disorders.[11,27] Each participant, based on his or her unique combination of these 7 variables, then received a probability of disability award (a propensity score) ranging from 0.00 to 1.00. We then used exact matching by propensity score[49] within each sex to balance differences between veterans who did and did not receive PTSD compensation. Of the original 3337 cohort members, 3077 could be matched by propensity scores. Of these, 2257 were time 2 respondents and hence could be used to assess the outcomes of time 2 PTSD symptom severity; work, role, and social functioning; physical functioning; employment; and income below poverty. All 3077 matched members were assessed for the homelessness and mortality outcomes.

To control for group differences that were not captured by the propensity score (eg, potential differences in current depression symptoms that might influence current functioning regardless of disability award status), we used multiple linear or logistic regression, regressing study outcomes on matched veterans' PTSD award status and previously described covariates. We used respondents' time 2 covariates when assessing time 2 PTSD symptom severity; work, role, and social functioning; physical functioning; employment; and income below poverty. We used time 1 covariates when assessing homelessness and mortality.

Our preplanned primary analysis called for an intention-to-treat approach in which veterans' PTSD disability award status was considered fixed at time 1. Because crossover in award status is ignored, such an analysis will trend toward the null, thus heightening confidence when significant differences are found. We also prespecified a secondary analysis to account for veterans' crossover status at time 2. In this secondary analysis, we regressed study outcomes on matched veterans' PTSD award status at time 1, PTSD award status at time 2, and a times 1×2 award status interaction term, as well as the previously described covariates.

All score changes subtracted time 1 scores from time 2 scores. For the primary and secondary analysis, results were weighted back to the overall population of veterans who applied for PTSD disability benefits. Oversampling women allowed for more reliable women-related inferences that were the focus of our time 1 analyses.[32] However, the present goal was to make inferences for the overall population of PTSD disability applicants. This mandated that we correct for women's nonproportional representation, which was accomplished using weighted stratified generalized linear modeling.[50] In the overall population of VA PTSD disability applicants, women accounted for just 3.7% of all applicants. Weighted standard errors and standard deviations were also based on the sex stratification. We used Matchit[49] and R2.9.1 Survey[51] software.

RESULTS

DESCRIPTIVE STATISTICS

The population's estimated time 2 characteristics are given in **Table 1**. Compared with denied claimants, beneficiaries were more likely to be older, white, and married. Beneficiaries were also more likely than denied claimants to have served before or during the Vietnam Conflict, to have been exposed to combat, and to have a documented combat injury. However, medical and psychiatric comorbidities were similar in the 2 groups. Almost 10 years had passed since the cohort filed their original PTSD claims.

PRIMARY OUTCOMES ANALYSIS

Mean propensity scores for receiving a PTSD disability award were unsurprisingly higher in beneficiaries (mean, 0.69; range, 0.34-0.97) than in denied veterans (mean, 0.57; range, 0.34-0.96). However, the substantial overlap in propensity indicated that most participants could be matched on this summary statistic. After matching but before adjustment, beneficiaries and denied claimants had the same time 1 work, role, and social functioning scores (mean [SD], 2.7 [0.8]) and physical functioning scores (28.9 [5.5]). Matched beneficiaries had higher time 1 PTSD symptom scores (mean [SD], 46.1 [15.4]) than their denied claimant counterparts (41.0 [16.3]; $P < .001$), but the difference was not large clinically, and the overlap in scores was substantial.

As the data in **Table 2** indicate, after using multiple linear regression to control for other differences between matched beneficiaries and denied claimants, beneficiaries' time 2 PTSD symptoms were again slightly higher than those of their matched counterparts, although not meaningfully so. Both groups had improved PTSD symptoms at time 2 compared with time 1, but the change was significantly greater for beneficiaries and appeared to be clinically meaningful within their group only. The 2 groups reported similar, clinically relevant improvements in their work, role, and social functioning compared with time 1, but again remained in the impaired range. In contrast to time 1, beneficiaries' physical functioning was better at time 2 than their matched counterparts', but the difference was not clinically meaningful.

As our results in **Table 3** indicate, after matching and adjustment for other differences between beneficiaries and denied claimants, less than one-fifth of either group was employed at time 2. However, beneficiaries were signifi-

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Table 1. Characteristics of 2551 Veterans Applying for VA PTSD Disability Benefits at Time 2 Overall and by PTSD Disability Award Status at Time 1: Population Estimates

Time 2 Characteristic	Overall	PTSD Disability Award Status at Time 1: Awarded	PTSD Disability Award Status at Time 1: Denied	*P* Value
Sociodemographic				
Male sex,[a] %	96.3	96.3	96.3	>.99
Age, mean (SD), y	61.2 (9.7)	61.9 (9.5)	59.3 (9.8)	<.001
Race/ethnicity, %				
White[a]	73.6	77.2	64.8	<.001
African American	15.5	11.6	25.0	<.001
Native American	7.2	6.4	9.3	.07
Asian	0.7	0.9	0.1	<.001
Hispanic	5.8	6.3	4.8	.31
Hawaiian/other Pacific Islander	0.7	0.9	<0.1	<.001
Married, %	58.2	61.7	49.1	<.001
At least some college experience,[a] %	54.2	54.5	54.2	.78
Service era, %				
World War II or Korean War	15.2	16.4	12.3	.05
Vietnam conflict	75.4	76.5	72.3	.02
After Vietnam	9.4	7.2	15.4	<.001
Comorbidities				
Charlson Comorbidity Index, mean (SD)	1.1 (1.4)	1.1 (1.5)	1.2 (1.4)	.75
Depression and anxiety score, mean (SD)[b]	15.4 (5.0)	15.6 (4.9)	15.0 (5.2)	.34
Psychotic disorder diagnosis, %	4.2	3.8	5.1	.29
Any substance abuse, %	21.3	21.3	21.6	.98
Health care access variables				
Distance lived from a VA medical facility, median response, km[c]	50-96	50-96	≤49	.07
Have private insurance, %	23.2	22.8	24.7	.45
Receiving VA disability benefits for other conditions, %[a]	51.1	49.5	55.6	.04
Stressor history				
No. of high-magnitude stressors in past year, mean (SD)	2.4 (2.1)	2.3 (2.0)	2.7 (2.3)	<.001
Any combat exposure, %[a,d]	91.4	93.8	85.7	<.001
Combat injury documented, %[a,d]	22.9	30.5	3.2	<.001
Military sexual assault history, %[d]	7.1	6.2	9.5	<.001
Time since PTSD claim was filed, mean (SD), y	9.8 (1.4)	9.8 (1.4)	9.9 (1.4)	.66

Abbreviations: PTSD, posttraumatic stress disorder; VA, US Department of Veterans Affairs.
[a] These variables were used to create the propensity scores. Numbers do not add to 100% because respondents could select more than 1 race/ethnicity category.
[b] Assessed using the RAND Mental Health Battery–Short Form.[42]
[c] Distance to the VA was assessed using categories of 49 km or less, 50 to 96 km, 97 to 106 km, and more than 106 km away.
[d] Assessed at time 1 only.

Table 2. Adjusted Outcomes for Continuously Measured Variables at Time 2 After Adjustment: Population Estimates[a]

Time 2 Outcome	Adjusted Scores at Time 2, Mean (SE): PTSD Disability Award Status at Time 1: Awarded	Adjusted Scores at Time 2, Mean (SE): PTSD Disability Award Status at Time 1: Denied	*P* Value	Adjusted Change in Scores From Time 1 to Time 2, Mean (SE): PTSD Disability Award Status at Time 1: Awarded	Adjusted Change in Scores From Time 1 to Time 2, Mean (SE): PTSD Disability Award Status at Time 1: Denied	*P* Value
PTSD symptom severity	43.5 (0.3)	40.6 (0.4)	.04	−6.1[b] (0.1)	−4.4[b] (0.1)	.02
Work, role, and social functioning	2.77 (0.01)	2.79 (0.02)	.34	−0.15[b] (0.01)	−0.19[b] (0.01)	.94
Physical functioning	27.80 (0.06)	27.30 (0.08)	.03	−0.57[c] (0.03)	−0.45[c] (0.03)	.88

Abbreviation: PTSD, posttraumatic stress disorder.
[a] Results are adjusted for age, marital status, service era, military sexual assault status, distance lived from a Department of Veterans Affairs medical center, private insurance status, Charlson Comorbidity Index, diagnosis of psychosis, anxiety and depression scores, substance abuse scores, and exposure to other high magnitude stressors. Population estimates are based on 2257 propensity-matched respondents.
[b] Negative score indicates improvement since time 1.
[c] Negative score indicates worsening since time 1.

cantly and substantially less likely than denied claimants to report income below poverty. Beneficiaries were also almost half as likely as denied claimants to have ever been homeless. Mortality was similar across groups.

SECONDARY OUTCOMES ANALYSIS

Ninety-eight veterans lost and 424 veterans gained PTSD disability benefits at time 2. Time 2 PTSD award status

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Table 3. Outcomes for Dichotomous Variables at Time 2 After Adjustment: Population Estimates[a]

Time 2 Outcome	No. of Respondents	Adjusted Prevalence by PTSD Disability Award Status at Time 1, % (95% CI)		*P* Value
		Awarded	Denied	
Employment	2257	13.2 (12.1-14.3)	19.0 (17.3-20.6)	.11
Income below poverty	2257	15.2 (14.5-15.9)	44.8 (43.2-46.3)	<.001
Ever homeless	3077[b]	12.0 (11.6-12.4)	20.0 (19.2-20.5)	.02
Deceased	3077[b]	10.4 (10.0-10.8)	9.7 (9.2-10.2)	.66

Abbreviations: CI, confidence interval; PTSD, posttraumatic stress disorder.

[a] Employment and income below the poverty line were adjusted for the following time 2 covariates: age, marital status, service era, military sexual assault status, distance lived from a Department of Veterans Affairs (VA) medical center, private insurance status, Charlson Comorbidity Index, diagnosis of psychosis, anxiety and depression scores, substance abuse scores, and exposure to other high magnitude stressors. Ever homeless and deceased status were adjusted for the following time 1 covariates: marital status, service era, military sexual assault status, distance lived from a VA medical center, Charlson Comorbidity scores, diagnosis of psychosis, and exposure to other high-magnitude stressors.

[b] Population-based estimates are based on a larger sample size because they are drawn from all time 1 propensity-matched respondents instead of time 2 respondents.

had no statistically significant association with any study outcome (all $P>.24$) except poverty (adjusted odds ratio$_{poverty}$, 0.6; 95% confidence interval, 0.4-1.1; $P=.08$). There were no statistically significant interactions between time 1 and time 2 PTSD award status and study outcomes (all, $P>.16$) (data not shown).

COMMENT

Approximately 10 years after applying for VA disability benefits for PTSD, veterans who received these benefits still reported slightly more severe PTSD symptoms than those who did not. However, as anticipated, beneficiaries were on average more likely than denied claimants to report clinically meaningful reductions in PTSD symptoms. They also reported better physical functioning than denied claimants, although the difference was not clinically meaningful. Contrary to expectations, albeit in a felicitous way, both groups reported similar, clinically relevant improvements in work, role, and social functioning.

Despite these improvements and regardless of PTSD disability award status, veterans in this cohort continued to report clinically relevant PTSD symptoms and poor functioning 10 years after applying for VA disability benefits. Both groups reported work, role, and social functioning scores worse than those reported for community-dwelling adults with alcoholism or major depression[52] and similar to scores reported for women hospitalized for psychiatric illnesses.[53] Likewise for both groups, physical functioning was strikingly worse than that reported by more general populations,[40] and, although it did not differ significantly by disability award status, labor force participation was approximately one-half to one-third that of comparably aged adults.[54] After considering the cohort's age, race, and sex, mortality approximated that of the US general population[55] and also did not differ by disability award status.

Perhaps not surprisingly, PTSD disability benefits had striking effects on income and the closely related phenomenon of homelessness. Among beneficiaries, the percentage reporting annual income of less than $20 000 or being identified as homeless was no greater than that of the US general population.[56-58] In contrast, poverty prevalence was almost 3 times higher in denied claimants compared with beneficiaries, and homelessness was almost twice as high.

Based on prevalence data, we estimate that about 1.5 million US veterans currently have clinically relevant PTSD-like symptoms, of whom nearly 600 000 have applied for VA disability benefits for PTSD.[11] Of these, we estimate that almost 250 000 veterans' PTSD claims have been denied.[10] Claims are most commonly denied because the forensic examiner does not diagnose PTSD or cannot link the veteran's PTSD to a military stressor or because the claimed stressor cannot be adequately documented. Although many such veterans will obtain VA disability benefits on some other basis, our data suggest that they nonetheless carry very high risks for poverty, homelessness, and dysfunction. This is consistent with findings from time 1, which showed that receiving VA disability benefits for PTSD protected participants against poverty more than receiving VA benefits for other disorders did.[30] Furthermore, although any VA disability award facilitates enrollment into the VA health care system, compensation specifically for PTSD guarantees rapid access to mental health services and covers medication costs related to PTSD treatment. Facilitated access to PTSD-specific treatments, of which compensated veterans take advantage,[59] could explain why PTSD beneficiaries were more likely than their counterparts to report clinically meaningful reductions in PTSD symptoms. Furthermore, although many veterans wrestle with self-stigma and shame when applying for VA PTSD disability benefits,[24] VA culture is geared to honor successful recipients as extraordinary citizens who suffered greatly on their country's behalf. These uniquely validating aspects of VA disability aid could counter negative self-images and facilitate clinical improvement.

Although receiving VA disability benefits for PTSD at time 1 was subsequently associated with some clinical improvements, crossing over from being a denied applicant at time 1 to receiving PTSD disability benefits at time 2 was not. Possibly, effects are time dependent. In exploratory analyses, we previously showed that veterans with at least 6 years of PTSD disability benefits had lower PTSD scores and better functioning than all other vet-

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erans who applied for these benefits.[60] With longer follow-up, some positive outcomes in these newer beneficiaries might also emerge.

Few studies have used appropriate controls when examining the impact of disability aid. To our knowledge, none have examined long-term outcomes. This study rectifies these deficiencies. Additional strengths include the study's large sample size, nationally representative sampling frame, excellent response rate, and focus on an array of important clinical outcomes. Findings also highlight the importance of examining outcomes in denied disability aid applicants.

Absent randomization, any control group we selected would have necessarily differed systematically from the beneficiaries in some way (eg, PTSD diagnosis). However, for studies examining the impact of receiving disability benefits, denied disability applicants probably represent the least biased, fairest comparator. For other research questions, other control groups might be preferable.

Propensity methods reduce selection biases but do not always eliminate them. Matching by propensity scores generated a sample of beneficiaries and denied claimants with very comparable time 1 work, role, social, and physical functioning, but the beneficiaries still had slightly more severe PTSD symptoms. However, if anything, this imbalance should have biased the study against finding positive outcomes for disability aid. Propensity methods also cannot address bias related to unobserved differences between groups. These unobserved differences between beneficiaries and denied claimants could explain their divergent outcomes—or obscure them. Unmeasured variables, and not the receipt of PTSD disability benefits, could likewise have accounted for beneficiaries' improved PTSD symptoms.

Prior research[61] has shown that small fractions of applicants may exaggerate symptoms when they undergo evaluation for disability benefits. Even if secondary gains prompted this exaggeration, it seems unlikely that such motivations would persist into a research context years later. Consistent with this, we found no evidence of extreme reporting on any measure overall or by disability award status at either time point. We have also shown elsewhere that veterans with invalid symptom reporting styles appear to be roughly evenly distributed among those who do and do not ultimately obtain VA PTSD disability benefits.[61] Under such circumstances, measurement error (eg, owing to exaggeration) should not bias the effect-size estimate, but confidence intervals may be widened.

Our findings indicated that veterans who apply for PTSD disability benefits are on average highly impaired, but we cannot solely attribute this impairment to PTSD. Veterans who apply for PTSD disability benefits often have other disabling disorders that are not indemnified by the VA. For example, the VA does not indemnify personality disorders or psychiatric conditions unrelated to military service. These other impairments, if asymmetrically distributed, could contribute to discrepant disease courses among beneficiaries and denied claimants. Despite the excellent response rate, differences between veterans who did and did not participate in the time 2 survey could have affected results. The generalizability of findings to veterans of more recent conflicts, to other disabling conditions, and to other types of disability aid is unknown. Finally, beneficiaries' improvement in PTSD symptoms, although clinically meaningful, was not substantially larger than the improvement reported by denied claimants. Nonetheless, nothing in the results suggests that disability aid caused poorer outcomes among recipients compared with denied applicants, as has often been suggested.

CONCLUSIONS

Annual expenditures for disability aid approach $200 billion in the United States,[10,62] yet there is a paucity of high-quality research examining clinical outcomes in aid recipients—and by extension, those denied aid. We encourage other disability aid programs to develop longitudinal assessments of their applicants. Studies comparing outcomes across disability systems or that elucidate the mechanisms through which disability aid might influence outcomes would be particularly useful.

Our findings counter common concerns that PTSD disability benefits impede recovery by incentivizing veterans to remain ill and suggest that benefits may be helpful. Unfortunately, findings also indicate that PTSD has a long and chronic course among disability applicants, regardless of award status. Denied applicants appeared to have a particularly high risk of poverty and homelessness and might represent an appropriate group for targeted outreach.

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