

Use of mental health services by veterans disabled by auditory disorders

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Abstract—This study examined whether veterans disabled by auditory disorders face barriers to receipt of Department of Veterans Affairs (VA) mental health services. We compared use of VA mental health services by veterans disabled by auditory disorders with use of such services by veterans disabled by four other chronic illnesses. We hypothesized that disabled veterans with auditory disorders, including tinnitus and/or hearing loss, would be less likely to use VA mental health services than other disabled veterans because of communication difficulties. The study sample was based on national VA administrative data for veterans with a diagnosed mental health disorder who were not receiving VA compensation for that disorder but who were receiving VA compensation for another disorder, either physical or auditory, at the end of fiscal year 2005. After controlling for potentially confounding factors, we unexpectedly found that veterans disabled by auditory disorders were more likely than other disabled veterans to use VA mental health services at least once. Among users, however, those with auditory disorders accessed slightly fewer visits than those disabled by other conditions, although the reasons for the difference remain unclear.

Key words: auditory disorder, disability, health services use, hearing loss, mental health, psychiatric disorder, rehabilitation, tinnitus, VA, veterans.

INTRODUCTION

The 2003 President's New Freedom Commission on Mental Health report articulated a concern about understanding and treating special populations, especially those

with medical comorbidities and accompanying psychiatric disorders [1]. Although hearing loss is the third most prevalent chronic health condition in the United States [2], limited attention has been paid to the association between hearing loss and psychopathology or its potential role in impeding access to mental health services [3–5]. In 2001, 17.4 percent of the U.S. adult population had some type of trouble hearing according to estimates of a sample population [6]. Even after adjusting for age, researchers found that the prevalence of auditory disorders increased by 14.0 percent between 1971 and 1990 to 1991 [7]. Such disorders typically include tinnitus (ringing of the ears) and/or conductive or sensorineural hearing loss. Factors such as an aging baby boomer population and differing survey methods may account for this rapid increase of auditory disorders over the past two decades [8]. Additionally, some people have difficulty distinguishing whether they have trouble hearing because of their tinni-

Abbreviations: ANOVA = analysis of variance, FY = fiscal year, OEF = Operation Enduring Freedom, OIF = Operation Iraqi Freedom, OR = odds ratio, PTF = Patient Treatment File, PTSD = posttraumatic stress disorder, VA = Department of Veterans Affairs, VAMC = VA medical center, VBA = Veterans Benefits Administration.

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tus or hearing loss, thus it is unknown whether population studies include both persons with tinnitus and hearing loss. Therefore, the term “auditory disorder” describes some type of auditory problem when it is unknown whether tinnitus, hearing loss, or both are present.

The U.S. population includes 25 million veterans, many of whom have auditory disorders and/or mental health disorders. Although there is the expectation of communication difficulties, it is unknown whether those with adult-onset hearing loss and tinnitus encounter barriers to receipt of mental health services at Department of Veterans Affairs (VA) medical centers (VAMCs) [9]. Identifying whether veterans with auditory disorders access VA mental health services at a similar rate as veterans with other disabilities offers the potential to improve clinical services to meet the needs of veterans and inform future studies regarding the comorbidity of mental health and auditory disorders. Furthermore, the number of veterans disabled by auditory disorders has been steadily increasing since 2001, and auditory disorders are the most common new disability among veterans [10]. As Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) veterans return from service, this disability rate is likely to increase further. This study seeks to determine whether there are barriers to the receipt of VA mental health services by veterans with auditory disorders.

Several studies have found an association between adult-onset hearing loss and mental health disorders [9,11]. Hearing loss reduces one’s ability to communicate with others, which can exacerbate a mental health disorder, such as depression or anxiety, or create a period of adjustment during which mental health services may be needed [9]. Many people with adult-onset hearing loss grieve this loss before finally accepting and adapting to it. Mental health providers can assist with the adjustment process by teaching effective coping strategies and by offering treatment and support [12].

Further, tinnitus severity ratings strongly correlate with measures of psychological distress, indicating that tinnitus may exacerbate mental health disorders [13–15]. Measures of anxiety and depression are often elevated among tinnitus sufferers, suggesting that tinnitus and some mental health disorders may affect similar neural mechanisms in the central nervous system that can affect attention, emotions, and perception [13–14]. Posttraumatic stress disorder (PTSD) was present in 34 percent of 300 veterans seeking help for tinnitus over a 4-year period [13]. Tinnitus may serve as a constant reminder of a trau-

matic event, such as a blast exposure [15]. When a blast occurs, even in the absence of shrapnel or debris, a wave of energy from the blast may damage cells of the human body, including the ears, brain, and internal organs. It is unknown how tinnitus interacts with more serious mental health disorders, such as schizophrenia and bipolar disorder. Tinnitus may also affect communication since it may distract a listener and cause frustration.

It might be expected that persons disabled by auditory disorders and diagnosed with mental health disorders would use health care services to a greater extent than other nondisabled persons since they are coping with problems that may affect communication, social relationships, and frustration tolerance. However, one could expect that communication barriers would prevent persons with auditory disorders, hearing loss in particular, from accessing healthcare services as readily as people with other common chronic conditions, such as arthritis. Additionally, people with tinnitus may be told by clinicians that nothing can be done to help them with their tinnitus and mental health providers may be unaware of assistance they can provide to patients with tinnitus, leading to a barrier in service access. Few previous studies have examined either general healthcare or mental health service use among people with hearing loss, and no known studies have examined use of health services by people with tinnitus.

Barnett and Franks, in a study using data from the 1990 and 1991 National Health Interview Survey Hearing Supplement, found that persons who were first diagnosed with a profound hearing loss after the age of 3, the postlingually deafened, received more physician visits and were more likely to have visited a physician within 2 years of the interviews than those in a group of survey responders without hearing loss [5]. However, postlingually deafened females in that study were less likely to have mammograms within the preceding 2 years than the comparison group, suggesting possible barriers to preventive care. The sample included adult respondents aged 19 and older, 82.9 percent of whom had adult-onset hearing loss.

Green and Pope analyzed health service use among a sample of elderly patients and found those with hearing loss initiated contact with physicians more often than others, yet “Having made that initial contact, however, did not subsequently make any more contacts than they would had they not been hearing impaired” [4, p. 324–25]. However, Verbrugge and Patrick found that hearing

dysfunctions, including tinnitus, “. . . do not prompt frequent care” [16, p. 177].

One regional study examined the use of mental health care by deaf and hard of hearing patients [3]. This study examined a public mental health service database in Rochester, New York, an area with a large representation (5.5%) of deaf and hard of hearing people. Both prelingually and postlingually deaf and hard of hearing people were included. Most deaf and hard of hearing people in the United States are aged 65 and older; therefore, people with adult-onset hearing loss were likely well represented [8]. Only 0.64 percent of patients who used the public mental health system in Rochester were deaf or hard of hearing, a much smaller representation than would be expected from the population figures. Further, mental health diagnoses among deaf and hard of hearing patients were more often missing or deferred than in the group without hearing loss, suggesting the population was poorly understood by clinicians who were unfamiliar with the psychological effects of hearing loss or were unable to communicate effectively with patients. Thus, without the ability to develop a clear diagnostic picture, these patients were potentially underserved.

The U.S. veteran population is distinctive in that physical standards set for acceptance into the armed services exclude persons who have disabling auditory disorders. Thus, it is likely that few if any veterans experienced major childhood hearing loss, although some developed auditory disorders related to military service or experienced onset during or after military service, typically while still in their 20s. Focusing on veterans with service-related auditory disorders eliminates potentially confounding features of childhood hearing loss, such as impaired English acquisition [17]. However, studies of veterans have limited generalizability, since they are overwhelmingly male (approximately 96%) and may have unique characteristics [18]. In the general population, men are 39 to 49 percent more likely to have chronic tinnitus than women when adjusting for age [19]. Men are also more likely to have hearing loss. Approximately 57 percent of adults with hearing loss are men, perhaps because of occupational precursors to auditory disorders, such as military service or exposure to loud noises at work [7]. In a study of mental health service use among veterans who served during the Vietnam era, female veterans were as likely to use VA mental health services as male veterans [18]. Similar to other studies of mental health services use in the general population, female vet-

erans were more likely than male veterans to use non-VA mental health care [18].

Nearly one-tenth of all veterans have a service-connected disability [10]. Before a veteran is compensated for a disability, he or she is assigned a “percent service-connected” rating from 0 to 100, which is an estimate of the severity of his or her disabilities and determines the monetary compensation paid to each veteran. When a veteran is disabled for more than one condition, these disability ratings are converted to a single combined disability rating that is based on a standard formula and determines percent service-connection for all physical disabilities together. The percent of service-connection is rounded to the nearest 10 and accounts for all disabilities for which a veteran is receiving compensation. Monetary compensation for service-connected disabled veterans may include direct financial support paid to the veteran and/or eligibility to access health and vocational services at VAMCs.

Veterans are assigned disability ratings for hearing loss based on results of an audiogram, service history, noise exposure, and subjective complaints, such as how hearing loss has limited a veteran’s vocational and daily activities. Specifically, VA audiologists use specific measures to provide a “pure tone threshold average,” which is the average hearing acuity of provided sounds at 1,000, 2,000, 3,000, and 4,000 Hertz, and percent “speech discrimination” ratings, which is how well the listener hears specific spoken words. In special circumstances, such as language difficulties due to brain injury or poor academic achievement, the pure tone threshold average may be used alone to calculate level of hearing loss. Results from these hearing tests for each ear are entered into a series of tables to calculate level of disability due to impaired auditory acuity.

Disability ratings for tinnitus are based on service history, noise exposure, and subjective complaints as well as co-occurrence with hearing loss; the perceived effects of tinnitus on sleep, emotions, and concentration; and the persistence, recurrence, frequency, and duration of tinnitus. The level of disability due to auditory disorders is then combined using a formula for an overall disability rating, which assists in determining level of disability compensation awarded during a formal Compensation and Pension evaluation. This evaluation takes into account vocational limitations and other daily effects that hearing impairment and other physical problems have had on each individual’s life in order to assign disability ratings and compensation.

Estimates from Veterans Benefits Administration (VBA) data indicate that approximately 822,413 veterans were compensated for an auditory disorder or “impairment of auditory acuity” in fiscal year (FY) 2005 (October 1, 2004, to September 30, 2005), an increase of 176.2 percent from FY 2001 [10]. Although the reason for such a marked increase in service-connected disabilities for auditory disorders is unknown, factors such as the aging veteran population and returning OIF and OEF veterans may contribute. Overall, auditory disorder was the second most common disability among all veterans in FY 2005 and included tinnitus, hearing loss, otitis media, and any other conditions that result in the decreased ability to hear [10]. Of these disabled veterans, 38,657 were newly compensated for “defective hearing” and 46,739 were newly compensated for tinnitus in FY 2005. Defective hearing and tinnitus were the first and second most common new service-connected disabilities in FY 2005 [10].

This study used national VA administrative data to examine access to VA mental health services among disabled veterans with diagnosed mental illnesses (but not receiving VA disability compensation for mental illness) who had either service-connected auditory disabilities or other nonpsychiatric disabilities. Mental health services at the VAMCs are provided separately from primary care and other healthcare services and are considered to be “specialty” health services. Although VA mental health care may be provided by a primary care provider or other healthcare staff member, this study only considered services provided by “specialty” VA mental health services, which will be simply referred to as “mental health services” or specified as “VA mental health services” as needed. Additionally, the terms “disabled” and “disability” in this study indicate that a veteran is being compensated for a physical problem by the VA and do not indicate that these veterans are unable to work or function well in their daily lives. We hypothesized that among disabled veterans with diagnosed mental illnesses, those with auditory disorders would be less likely to have accessed VA mental health services than disabled veterans without auditory disorders.

METHODS

We compared veterans who had service-connected disabilities for an auditory disorder or one of four other chronic illnesses and who received clinical diagnoses of mental illness (International Classification of Diseases-

9th Revision codes 290.00–312.99, 310.xx, or 331.xx, not including 305.1) on use of VA mental health services while controlling for demographic factors. The study was conducted entirely with national VA administrative data and received Human Subjects Subcommittee approval, which approved an exemption from written consent.

Sample

The first data file, the Compensation and Pension Mini File, a VA disability payment file, includes data on all veterans eligible for compensation because of a service-related disability. Since veterans are only paid compensation if they are at least 10 percent service-connected, veterans who were 0 percent service-connected were not included. Veterans receiving disability compensation at the end of FY 2005 for any one of five chronic illnesses were identified within this file through the use of the following VBA codes: (1) auditory disorders—hearing loss: 6100–6110, 6277–6297, 6250–6258 and auditory disorders—tinnitus: 6260; (2) diabetes mellitus: 7909–7913; (3) arthritis: 5002–5010; (4) back problems: 5235–5243; or (5) visual impairments: 6000–6035, 6061–6079. These particular disabilities were chosen for this study because four of them (auditory disorders, diabetes mellitus, arthritis, and visual impairments) are among the top seven chronic conditions in the United States [16]. Back problem as a disability was included because it is one of the most common disabilities among veterans [10]. Veterans disabled by auditory disorders were classified into three groups: (1) hearing loss only, (2) tinnitus only, and (3) hearing loss and tinnitus.

These data were then merged with data from mental health treatment systems databases to evaluate use of mental health services. Data pertaining to disabled veterans from the Compensation and Pension Mini Files were merged with VA health system workload data, the Patient Treatment File (PTF) and the Encounter File, through the use of scrambled Social Security number identifiers. The PTF includes sociodemographic data on all veterans upon discharge from inpatient treatment at VAMCs. The Encounter File records diagnostic and workload data on all VA outpatient services. Selected service use variables from the combined data file included patient-specific information on (1) sociodemographic characteristics, such as age, race, and sex; (2) military service, such as branch of service; (3) service-connected disability status; (4) specific mental health diagnoses; and (5) the number of outpatient mental health contacts in FY 2005. Clinical mental health diagnoses examined included PTSD; substance abuse,

including alcohol or drug; psychotic disorders, including schizophrenia, schizoaffective disorder, psychotic disorder not otherwise specified, and bipolar disorder; and depression of any type except bipolar disorder. **Table 1** presents the variables used in this study.

From these data files, 899,126 veterans disabled by one of the five conditions were identified and 119,393 (13.3%) were found to have been diagnosed with a mental illness. Of these, 2,748 (2.3%) veterans for whom data on age were missing were excluded from the analyses: the remaining 116,645 comprised the study sample. Of these, 57,253 (49.1%) received VA disability compensation for auditory disorders and 59,392 (50.9%) received VA disability for one of the four other conditions but not an auditory disorder. Of the 116,645 veterans in the study sample, 28,596 (24.5%) were disabled by both hearing loss and tinnitus, 20,278 (17.4%) were disabled by hearing loss but not tinnitus, and 8,379 (7.2%) were disabled by tinnitus but not hearing loss.

The primary dependent variable was use of mental health services as measured by documentation of any encounter for VA mental health services. Encounters within the VA are defined and coded administratively as “clinic stops.” Included encounters or “clinic stops 500–599” are all outpatient mental health visit types except consultation liaison services and smoking cessation. A secondary dependent variable was the frequency of mental health services use as measured by the number of encounters for VA mental health services among those with any encounter.

Statistical Analysis

First, we compared veterans in all four groups (disabled by hearing loss and tinnitus, disabled by hearing loss but not tinnitus, disabled by tinnitus but not hearing loss, and not disabled by hearing loss or tinnitus) on each descriptive characteristic. Next, we used multivariate logistic regression to examine the likelihood of veterans having received any mental health services while controlling for other factors. Three dichotomous independent variables were included, representing those disabled by hearing loss alone, tinnitus alone, and both hearing loss and tinnitus. Veterans with no hearing disability were the reference condition. Since this was not a sample of disabled veterans but rather a population, inferential statistics were not necessary.

These analyses were then repeated among four diagnostically stratified subgroups of veterans categorized by the following primary mental health diagnoses: (1) psychotic disorder, including schizophrenia and bipolar dis-

order; (2) depression; (3) PTSD; and (4) substance abuse. Analyses of variance (ANOVAs) compared average number of mental health visits for each of the four mental health diagnostic groups. Finally, we used general linear models, again adjusting for sociodemographic variables, military service, and percent service-connection, to evaluate the relationship between the number of encounters for VA mental health services and the presence of a service-connected disabling auditory disorder. These analyses were repeated among the diagnostically stratified subgroups categorized according to the four primary mental health disorders listed previously.

RESULTS

Sample Demographics and Characteristics

Table 1 describes the distribution of sociodemographic and diagnostic characteristics among veterans in this study. The logistic regression models used in subsequent analyses included all of these demographic variables or independent variables. Of the 116,645 disabled veterans with diagnosed mental health problems, 62,750 (53.8%) had received VA mental health services at least once during FY 2005. Among all disabled veterans in the sample who used VA mental health services at least once ($n = 62,750$), an average of 8.2 visits was used during FY 2005.

Approximately 5.1 percent of the sample consisted of female veterans, yet 7.2 percent of the veterans disabled by a condition other than an auditory disorder were female. There were 2.0 percent more females represented in the “disabled by tinnitus” category (without disabling hearing loss) than were represented by the overall sample.

Diagnoses and Mental Health Services Use

After controlling for sociodemographic characteristics (age, race, diagnosis, disability, sex, percent service-connected, and branch of service), we found that veterans disabled by either hearing loss or tinnitus were more likely to use VA mental health services at least once than veterans disabled by a condition other than an auditory disorder. These adjusted odds ratios (ORs) indicate veterans disabled by hearing loss and tinnitus were 22 percent more likely to use VA mental health services at least once than veterans disabled by a condition other than an auditory disorder. Veterans disabled by hearing loss but not tinnitus were 8 percent more likely to use VA mental health services at least once than veterans not disabled by an auditory disorder. Veterans disabled by tinnitus but not

Table 1.
Description of sample by auditory disorder.

Characteristic	All Subjects		Disabled by Hearing Loss		Disabled by Tinnitus		Disabled by Hearing Loss and Tinnitus		Not Disabled by Auditory Disorder	
	N = 116,645	%	n = 20,278	%	n = 8,379	%	n = 28,596	%	n = 59,392	%
Age Group										
18–34	5,748	4.9	645	3.2	1,010	12.1	1,055	3.7	3,038	5.1
35–44	10,838	9.3	1,578	7.8	1,456	17.4	1,765	6.2	6,039	10.2
45–54	22,975	19.7	3,800	18.7	2,404	28.7	4,642	16.2	12,129	20.4
55–64	45,579	39.1	6,482	32.0	2,438	29.1	10,329	36.1	26,330	44.3
65–74	16,627	14.3	3,809	18.8	669	8.0	5,496	19.2	6,653	11.2
75+	14,878	12.8	3,964	19.5	402	4.8	5,309	18.6	5,203	8.8
Percent Service-Connected*										
10 to <20	20,214	17.3	4,735	23.4	863	10.3	8,755	30.6	5,861	9.9
20 to <50	45,165	38.7	7,974	39.3	2,584	30.8	11,525	40.3	23,082	38.9
50 to <80	30,826	26.4	4,541	22.4	3,322	39.6	5,904	20.6	17,059	28.7
80 to 100	20,440	17.5	3,028	14.9	1,610	19.2	2,412	8.4	13,390	22.5
Sex: Male	110,654	94.9	19,578	96.5	7,787	92.9	28,145	98.4	55,144	92.8
Branch of Service										
Army	66,303	56.8	11,128	54.9	4,284	51.1	15,519	54.3	35,372	59.6
Navy	19,037	16.3	3,414	16.8	1,429	17.1	5,426	19.0	8,768	14.8
Marines	11,842	10.2	1,772	8.7	1,032	12.3	3,160	11.1	5,878	9.9
Other	1,070	0.9	198	1.0	91	1.1	305	1.1	476	0.8
Air Force/Army Air	18,393	15.8	3,766	18.6	1,543	18.4	4,186	14.6	8,898	15.0
Disability										
Arthritis	25,695	22.0	2,796	13.8	1,422	17.0	2,549	8.9	18,928	31.9
Back	22,584	19.4	1,896	9.4	1,729	20.6	2,915	10.2	16,044	27.0
Diabetes Mellitus	32,042	27.5	2,618	12.9	1,164	13.9	3,008	10.5	25,252	42.5
Visual Impairment	13,618	11.7	1,561	7.7	476	5.7	1,411	4.9	10,170	17.1
Auditory Disorder	57,253	49.1	20,278	100.0	8,379	100.0	28,596	100.0	NA	NA
MH Diagnosis										
PTSD	23,177	19.9	3,205	15.8	2,104	25.1	5,443	19.0	12,425	20.9
Substance Abuse	17,937	15.4	3,138	15.5	1,135	13.5	4,425	15.5	9,239	15.6
Psychotic Disorder [†]	8,966	7.7	1,862	9.2	557	6.6	2,103	7.4	4,444	7.5
Depression	58,094	49.8	9,366	46.2	4,263	50.9	14,188	49.6	30,277	51.0
MH Service Used ≥1	62,750	53.8	9,928	49.0	5,001	59.7	14,671	51.3	33,150	55.8

*Combined degree of disability expressed as percentage 10–100 in increments of 10 based on overall disabling effect of all service-connected disabilities.

[†]Includes bipolar disorder.

MH = mental health, NA = not applicable, PTSD = posttraumatic stress disorder.

hearing loss were 17 percent more likely to use VA mental health services at least once than veterans disabled by a condition other than an auditory disorder.

Stratified analyses limited to veterans diagnosed with PTSD, substance abuse, psychotic disorder, or depression were also examined. Among veterans with psychotic dis-

orders, those with disabling tinnitus with or without disabling hearing loss were more likely to use VA mental health services at least once than other disabled veterans diagnosed with a psychotic disorder. More specifically, veterans diagnosed with a psychotic disorder who were disabled by tinnitus without disabling hearing loss were

43 percent more likely to use VA mental health services at least once than veterans not disabled by an auditory disorder, and veterans diagnosed with a psychotic disorder who were disabled by tinnitus and disabled by hearing loss were 54 percent more likely to use VA mental health services at least once than veterans not disabled by an auditory disorder.

Among veterans diagnosed with depression, those with disabling tinnitus without hearing loss were 19 percent more likely to use VA mental health services at least once than veterans not disabled by an auditory disorder. Veterans with both disabling tinnitus and disabling hearing loss who were diagnosed with depression were 12 percent more likely to use VA mental health services at least once than veterans not disabled by an auditory disorder. Veterans diagnosed with depression who were disabled by hearing loss without disabling tinnitus were 6 percent more likely to use VA mental health services at least once than veterans not disabled by an auditory disorder.

Furthermore, veterans with both disabling tinnitus and a disabling hearing loss were more likely to use VA

mental health services at least once if they were diagnosed with PTSD (13% more likely) or substance abuse (15% more likely) than veterans not disabled by an auditory disorder who were diagnosed with these clinical mental health disorders. Veterans with disabling tinnitus without disabling hearing loss were 18 percent more likely to use VA mental health services at least once if they were diagnosed with substance abuse than veterans not disabled by an auditory disorder. Overall, veterans disabled by tinnitus with or without hearing loss were more likely to use VA mental health services at least once than other disabled veterans.

Before adjusting for potentially confounding covariates, we found that veterans disabled by hearing loss or tinnitus were significantly less likely to use VA mental health services at least once unless they had been diagnosed with PTSD (Table 2). No single potentially confounding covariate was responsible for changing the likelihood of veterans accessing VA mental health services at least once. Rather, all covariates contributed to the model, which allowed more reliable comparisons among similar groups.

Table 2.

Associations between disabling auditory disorders and use of Department of Veterans Affairs mental health services ($N = 116,645$).

Mental Health Diagnosis	Type of Hearing Disability	<i>n</i>	% ≥1 Mental Health Visit	Unadjusted Odds Ratio	Adjusted Odds Ratio*
Any Mental Health Diagnosis	None	59,392	55.8	1.00	1.00
	HL	20,278	49.0	0.76 [†]	1.08 [†]
	Tinnitus	8,379	59.7	1.17 [†]	1.17 [†]
	HL & Tinnitus	28,596	51.3	0.83 [†]	1.22 [†]
Psychotic Disorder [‡]	None	4,444	78.8	1.00	1.00
	HL	1,862	68.4	0.58 [†]	1.14
	Tinnitus	557	86.5	1.73 [†]	1.43 [¶]
	HL & Tinnitus	2,103	75.2	0.82 [†]	1.54 [†]
Depression	None	30,277	69.2	1.00	1.00
	HL	9,366	63.5	0.78 [†]	1.06 [¶]
	Tinnitus	4,263	71.9	1.14 [†]	1.19 [†]
	HL & Tinnitus	14,188	64.0	0.79 [†]	1.12 [†]
Posttraumatic Stress Disorder	None	12,425	88.8	1.00	1.00
	HL	3,205	87.6	0.89	1.05
	Tinnitus	2,104	87.9	0.92	1.03
	HL & Tinnitus	5,443	88.5	0.97	1.13 [¶]
Substance Abuse	None	9,239	69.3	1.00	1.00
	HL	3,138	62.4	0.75 [†]	1.06
	Tinnitus	1,135	71.6	1.12	1.18 [¶]
	HL & Tinnitus	4,425	64.3	0.80 [†]	1.15 [†]

*Adjusted for age, percent service-connected, sex, branch of service, and disability.

[†]Significant at $p < 0.01$.

[‡]Includes bipolar disorder.

[¶]Significant at $p < 0.05$.

HL = hearing loss.

While veterans with disabling hearing loss or tinnitus were more likely to use VA mental health services at least once than veterans without a disabling auditory disorder, they had slightly but significantly fewer VA mental health visits (**Table 3**). Veterans disabled by hearing loss accessed 0.53 fewer visits in 1 year, and veterans disabled by tinnitus accessed about 0.67 fewer visits in 1 year than veterans without a disabling auditory disorder. Overall, veterans disabled by auditory disorders accessed 4 to 7 percent fewer VA mental health visits than veterans disabled by another chronic condition other than an auditory disorder. These differences did not emerge among any of the clinical mental health disorder subgroups, most likely because of smaller sample sizes, except for those diagnosed with PTSD; the subgroup in which veterans disabled by tinnitus had approximately 1.44 fewer visits than veterans who were not disabled by an auditory disorder.

ANOVAs for average number of visits among the four auditory disorder groups by mental health diagnostic

subgroup provide similar results as the general linear models also shown in **Table 3**. This result indicates that adjusting for potentially confounding covariates in the general linear models of mental health visits did not greatly change the significance of differences when average number of visits among the auditory disorder groups and mental health diagnostic groups were compared.

DISCUSSION

This study of veterans with disabling auditory disorders found little evidence that they were less likely to access VA mental health services than other disabled veterans during FY 2005. After adjusting for potentially confounding covariates, we found that veterans disabled by auditory disorders were in fact more likely to have at least one encounter with VA mental health services than other disabled veterans. However, as predicted, veterans disabled by an auditory disorder used these VA mental

Table 3.

Associations between disabling auditory disorders and visits to Department of Veterans Affairs mental health services ($N = 116,645$).

Mental Health Diagnosis	Type of Hearing Disability	<i>n</i>	<i>n</i> (≥ 1 Mental Health Visit)	Mental Health Service Visits			
				Mean \pm SD	<i>B</i> *	SE*	<i>p</i> -Value*
Any Mental Health Diagnosis	None	59,392	33,147	8.5 \pm 21.1 [†]	0	0	NA
	HL	20,278	9,924	7.8 \pm 20.5 [‡]	-0.53	0.26	0.04 [‡]
	Tinnitus	8,379	5,000	7.9 \pm 19.3	-0.67	0.33	0.04 [‡]
	HL & Tinnitus	28,596	14,670	8.1 \pm 20.4	-0.41	0.25	0.10
Psychotic Disorder [¶]	None	4,444	3,499	14.4 \pm 33.0	0	0	NA
	HL	1,862	1,273	12.0 \pm 29.5	-1.21	1.25	0.33
	Tinnitus	557	482	16.1 \pm 39.5	1.43	1.72	0.40
	HL & Tinnitus	2,103	1,582	14.3 \pm 35.7	0.74	1.22	0.54
Depression	None	30,277	20,945	8.8 \pm 21.0	0	0	NA
	HL	9,366	5,948	8.3 \pm 20.4	-0.23	0.34	0.50
	Tinnitus	4,263	3,064	8.4 \pm 19.0	-0.44	0.42	0.30
	HL & Tinnitus	14,188	9,076	8.6 \pm 20.4	-0.12	0.31	0.70
Posttraumatic Stress Disorder	None	12,425	11,032	11.0 \pm 23.1	0	0	NA
	HL	3,205	2,807	10.4 \pm 23.2	-0.59	0.53	0.26
	Tinnitus	2,104	1,849	9.7 \pm 19.8	-1.44	0.61	0.02 [‡]
	HL & Tinnitus	5,443	4,816	11.1 \pm 24.2	0.10	0.47	0.83
Substance Abuse	None	9,239	6,399	20.1 \pm 40.7	0	0	NA
	HL	3,138	1,957	18.3 \pm 39.5	-1.82	1.15	0.12
	Tinnitus	1,135	813	18.5 \pm 36.9	-0.76	1.55	0.63
	HL & Tinnitus	4,425	2,845	19.5 \pm 38.1	-1.05	1.08	0.33

*Adjusted for age, percent service-connected, sex, branch of service, and disability.

[†]Significant at $p < 0.01$.

[‡]Significant at $p < 0.05$.

[¶]Includes bipolar disorder.

HL = hearing loss, NA = not applicable, SD = standard deviation, SE = standard error.

health services slightly less often as measured by the number of encounters. Furthermore, looking at individual mental health diagnoses, we found that veterans with auditory disorders who were diagnosed with psychotic disorders or depression were significantly more likely to access VA mental health services at least once than veterans diagnosed with a psychotic disorder or depression who were not disabled by an auditory disorder.

These auditory disorders thus do not seem to pose a barrier to veterans accessing mental health services at VAMCs, at least for an initial visit. It is unknown why these veterans are using slightly fewer mental health visits than other disabled veterans, although the effects are small and their statistical significance may reflect the very large size of this sample. Similar to other recent studies of healthcare use by persons with auditory disorders [4–5], veterans with auditory disorders receive fewer visits to VA mental health services.

As mentioned in the “Introduction” (page 1349), increased use of services is consistent with previous studies that have suggested that tinnitus may exacerbate some mental health disorders, such as PTSD. In the current study, high rates of mental health services use were observed among veterans diagnosed with psychotic disorders or depression and who were disabled by tinnitus, with or without a hearing loss. This finding may suggest that as tinnitus or psychiatric symptom severity increases so does mental health services use. Although veterans disabled by auditory disorders seem to readily connect with VA mental health services, the reduced frequency or repetition of services use may require intervention.

Recommendations

What may be needed to address lower frequency of services use is specialized training for providers and administrative staff on establishing rapport with patients with auditory disorders, especially communication strategies associated with hearing loss and coping strategies associated with tinnitus management. Sensitivity training for all mental health staff who may encounter veterans with auditory disorders may help veterans feel more comfortable negotiating and receiving mental health services and may reduce frustration for staff and clients. This training could be provided online or by an educator from the hospital’s audiology service.

Specifically, people with hearing loss suffer a great deal from a variety of personal and environmental deficits, including stigma, lack of understanding, and lack of awareness of their surroundings. Furthermore, alternative

approaches to scheduling appointments via the telephone, such as scheduling by e-mail, may encourage continued mental health services use among veterans with hearing loss.

Likely, many mental health providers do not understand the impact of tinnitus on emotions and psychological distress. Mental health providers should become familiar with effective modalities of psychotherapy for tinnitus, such as cognitive-behavioral therapy, which facilitate self-management and coping. Henry and Wilson published an excellent resource for mental health providers who wish to offer cognitive-behavioral therapy for patients with tinnitus [12]. Furthermore, patients with tinnitus may not be aware that mental health providers can help them manage their tinnitus and may need education to reduce their fears due to the stigma of receiving mental health care. Mental health providers should emphasize to patients with tinnitus that their auditory disorder is not a psychological disorder or “in their heads.” The **Appendix** (available online only at <http://www.rehab.research.va.gov/jour/08/45/9/pdf/contents.pdf>) provides some communication strategies for working with clients who have auditory disorders [13,20].

Providing mental health services in groups versus individually may offer both advantages and disadvantages. Group treatment allows peers to share their experiences and offer coping strategies and reduces isolation. Group treatment is more efficient in terms of clinicians’ time. However, accommodating everyone with hearing loss in a group treatment setting can be challenging and may require additional resources for bridging communication among group members. A combination of individual treatment and targeted support groups may best address this treatment concern. The **Appendix** lists communication strategies for providing individual or group treatment to people with auditory disorders.

Mental health providers may also benefit from working as a team with other providers such as audiologists, otologists, and primary care providers. A team approach encourages sharing relevant and important clinical factors such as an individual’s eligibility for audiological treatments, type of hearing loss, and severity of tinnitus. Audiologists are trained to offer counseling and auditory rehabilitation for clients, and it may be useful for mental health professionals to know what treatments have been offered and the recommendations of specialists who have previously worked with the individual on his or her auditory disorder.

Future Directions

Of importance to future research on auditory disorders is the use of multivariate logistic regression models that account for sociodemographic characteristics associated with hearing loss, such as age. Comparison of the adjusted and unadjusted ORs in **Table 2** illustrates how critical it is that studies of auditory disorders account for potential confounds. If we had examined only mental health services, it would have appeared that veterans disabled by a hearing loss were less likely to receive VA mental health services. To further explore which of these characteristics influenced the likelihood of accessing mental health services, we examined ORs using multivariate logistic regression models with only one factor at a time. No one factor in the model was responsible for the change in direction between the unadjusted and adjusted ORs, rather it appeared to be a joint effect of all the covariates or unmeasured aspects of the auditory disabilities, although we did adjust for overall severity of disabilities via the percent service-connected variable.

Future research on mental health treatment and adult-onset auditory disorders may more closely examine the factors associated with establishing rapport, perhaps using focus groups or client surveys. This may provide insight into the barriers to receiving more frequent mental health services over time and ways providers may improve mental health service delivery for people with auditory disorders. We lack data on why these veterans are not further engaged in VA mental health treatment. Qualitative information gathered through interviews or surveys completed by veterans with auditory disorders and clinicians providing mental health services for these veterans might clarify our understanding of these data.

Efficacy of treatments for veterans with auditory disorders should be explored among all healthcare specialties. Multidisciplinary research teams including audiology, otology, psychiatry, and psychology should collaborate to design tinnitus and hearing loss management studies. Establishing evidence-based psychological treatments for veterans with tinnitus and those with hearing loss is also essential given the prevalence of service-related tinnitus. Tinnitus is a condition for which there are few effective treatments and no cure [12]. Several studies of cognitive-behavioral therapy have suggested that it is effective in helping clients adjust to severe, chronic tinnitus, though no adequately powered, randomized, clinical trials have been conducted [21]. Studies focused on the development of effective treatment delivery protocols are greatly needed.

Further research examining the comorbidities of tinnitus and mental health disorders would be useful in understanding how these conditions interact. Examining whether tinnitus severity correlates with psychiatric symptom severity would provide important clinical information for mental health providers. It would also be useful to understand the patterns of mental health services use among veterans disabled by auditory disorders relative to other disabled veterans. This may help us gain understanding of veterans with auditory disorders who are motivated to seek mental health treatment but perhaps become discouraged after several sessions.

Auditory conditions that were not investigated in this study, hyperacusis and phonophobia, occasionally co-occur with tinnitus. Hyperacusis is a hypersensitivity to sound or decreased tolerance to sound, and phonophobia is an extreme fear of sound. These conditions occasionally accompany tinnitus and can be more disturbing than tinnitus [22]. Understanding veterans with tinnitus who have hyperacusis or phonophobia may provide a greater understanding of the interaction of these disorders with mental health disorders, such as PTSD and anxiety disorders. Fagelson found that veterans diagnosed with both tinnitus and PTSD were significantly more likely to present with persistent sound-tolerance problems and discomfort from unexpected sounds than veterans with tinnitus who did not suffer from PTSD [13]. Again, this is further evidence that the comorbidities of tinnitus and mental health disorders need to be explored.

Limitations

This study used administrative data that does not include information about comorbid conditions, such as traumatic brain injury. Furthermore, it is limited to veterans who were compensated for their non-mental-health disabilities. There are likely many veterans with auditory disorders who are not being compensated for their problems. Relative to the comparison disability group, veterans with auditory disorders, especially tinnitus, may be less likely to seek compensation for their disability since auditory disorders have less obvious effects on daily functioning than arthritis, diabetes mellitus, back problems, and visual impairments.

This study has limited generalizability to nonveteran populations. Veterans may have unique characteristics that are unlike other adults. This sample was nearly 95 percent male, thus this study has limited generalizability to females. Previous research indicates that women are more likely to access mental health services than men [18]. However, as

was discussed in the "Introduction," among veterans who served in the Vietnam era, male and female veterans are similarly likely to use VA mental health services.

CONCLUSIONS

Veterans disabled by hearing loss, tinnitus, or both and diagnosed with mental illness in FY 2005 were more likely to access VA mental health services at least once than a comparison group of veterans disabled by visual impairments, back problems, arthritis, or diabetes mellitus. However, veterans disabled by auditory disorders accessed fewer visits, possibly indicating mental health providers are not fully meeting the treatment needs of these veterans. Tinnitus may exacerbate mental health disorders such as PTSD and psychotic disorders. Establishment of patient-provider rapport may improve engagement in mental health services. This study has limited generalizability since all subjects in the sample were veterans, with a preponderance of males represented.

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