Psychological Services
2013, Vol. 10, No. 2, 223–232

1541-1559/13/$12.00 DOI: 10.1037/a0031281

Veterans Administration Health Care Utilization Among Sexual Minority Veterans

Tracy L. Simpson
Veterans Affairs Puget Sound Health Care System, Seattle, Washington, and University of Washington

Kimberly F. Balsam
University of Washington

Bryan N. Cochran
University of Montana

Keren Lehavot and Sari D. Gold
Veterans Affairs Puget Sound Health Care System, Seattle, Washington, and University of Washington

According to recent census reports, nearly a million veterans have a same-sex partner, yet little is known about them or their use of Veterans Health Care Administration (VHA) services. Gay, lesbian, and bisexual (GLB) veterans recruited from the community ($N = 356$) completed an on-line survey to assess their rates of VHA utilization and whether they experience specific barriers to accessing VHA services. Andersen's model of health care utilization was adapted to provide an analytic and conceptual framework. Overall, 45.5% reported lifetime VHA utilization and 28.7% reported past-year VHA utilization. Lifetime VHA health care utilization was predicted by positive service connection, positive screen for both posttraumatic stress disorder (PTSD) and depression, and history of at least one interpersonal trauma during military service related to respondent's GLB status. Past-year VHA health care utilization was predicted by female gender, positive service connection, positive screen for both PTSD and depression, lower physical functioning, a history of military interpersonal trauma related to GLB status, and no history of stressful experiences initiated by the military to investigate or punish GLB status. Rates of VHA utilization by GLB veterans in this sample are comparable to those reported by VHA Central Office for all veterans. Of those who utilized VHA services, 33% reported open communication about their sexual orientation with VHA providers. Twenty-five percent of all participants reported avoiding at least one VHA service because of concerns about stigma. Stigma and lack of communication between GLB veterans and their providers about sexual orientation are areas of concern for VHA.

Keywords: veterans, health care utilization, lesbian, gay, bisexual

Data from the 2000 census indicate that more than 50,000 active-duty military personnel and nearly one million veterans had a same-sex partner (Gates, 2004). Because the 2000 census identified only individuals who reported a current same-sex relationship, it is likely that the actual number of same-sex-oriented active-duty service members and veterans was higher. Gay, lesbian, and bisexual (GLB) individuals comprise a significant proportion of our military forces, yet until very recently, "Don't ask, Don't tell" (DADT) and other exclusionary policies rendered them a largely invisible component of the active-duty and veteran communities (Burks, 2011; Shilts, 1993). Research on the specific needs of this group has only recently begun (Moradi, 2009).

Like all veterans, GLB veterans who met length-of-service requirements and were discharged honorably or under general honorable conditions are eligible to receive Veterans Health Care Administration (VHA) services. It is unknown whether GLB veterans utilize VHA services at rates similar to the veteran population as a whole, and it is unclear whether there are unique barriers to VHA care for GLB veterans. Data on GLB health care utilization from civilian samples are mixed, with studies finding comparable or greater rates of mental health care utilization (Grella,

Tracy L. Simpson, Veterans Affairs Puget Sound Health Care System, Seattle, Washington, and Department of Psychiatry and Behavioral Sciences, University of Washington; Kimberly F. Balsam, Department of Social Work, University of Washington; Bryan N. Cochran, Department of Psychology, University of Montana; Keren Lehavot and Sari D. Gold, Veterans Affairs Puget Sound Health Care System, Seattle, Washington, and Department of Psychiatry and Behavioral Sciences, University of Washington.

Kimberly F. Balsam is now at Palo Alto University.

A small grant from the Palm Center was used to pay for advertising for the study. The preparation of these materials was supported by resources from the Center of Excellence in Substance Abuse Treatment and Education at the Veterans Affairs Puget Sound Health Care System, Seattle, Washington. We thank Andrew David for his expert editorial assistance, Carol Malte for her statistical consultation, and Mike Wells for assistance with the National Center for Veterans Analysis and Statistics databases.

Correspondence concerning this article should be addressed to Tracy L. Simpson, Veterans Affairs Puget Sound Health Care System, 1660 S. Columbian Way, Seattle, WA 98108. E-mail: tracy.simpson@va.gov

Greenwell, Mays, & Cochran, 2009), but lower rates of general health care among GLB groups than heterosexuals (Austin & Irwin, 2010; Buchmueller & Carpenter, 2010; Kerker, Mostashari, & Thorpe, 2006). Concerns about stigmatization and past experiences of discrimination are associated with lower non-mental health care utilization rates among civilian GLB individuals (Burgess, Tran, Lee, & van Ryn, 2007; Clark, Bonacore, Wright, Armstrong, & Rakowski, 2003; Kinsler, Wong, Sayles, Davis, & Cunningham, 2007; Malebranche, Peterson, Fullilove, & Stackhouse, 2004; Mayer et al., 2008), although research has also found that reporting a major incident of discrimination is associated with increased mental health care utilization for this group (Burgess et al., 2007).

To provide a context for understanding GLB veterans' VHA utilization, it is helpful to first consider the rate at which all veterans seek health care from VHA. Information from VHA Central Office indicates that in fiscal year 2005 (FY05), which corresponds to the data collection time frame of the current study, 5.5 million of the approximately 24.5 million U.S. veterans utilized VHA care during that year (22.4%; National Center for Veterans Analysis & Statistics, 2011). Research based on the Centers for Disease Control and Prevention U.S. 2000 Behavioral Risk Factor Surveillance System (BRFSS) dataset found that 13.1% of veterans utilized VHA services in the past year (Nelson, Starkebaum, & Reiber, 2007). In the BRFSS study, correlates of VHA utilization included low income, low educational attainment, and racial/ethnic minority status.

In order to evaluate the rates and correlates of VHA utilization among GLB veterans, the present study analyzed cross-sectional self-report data collected over 9 months during 2004 and 2005 from a national sample of GLB veterans. Andersen's Emerging Behavioral Model of Health Services Use (Andersen, 1995, 2008), which has been widely used to identify factors related to health care utilization among civilian (Bowen & Gonzalez, 2008; Dhingra, Zack, Strine, Pearson, & Balluz, 2010), GLB (Datti & Conyers, 2010; Grella et al., 2009), and veteran populations (Elhai, Grubaugh, Richardson, Egede, & Creamer, 2008; Fasoli, Glickman, & Eisen, 2010; Maguen et al., 2007) was used as the framework for identifying factors associated with lifetime and past-year VHA utilization among GLB veterans (see Figure 1). Andersen's model postulates that health care utilization is influenced by a variety of environment and person-specific characteristics including (1) predisposing individual characteristics affecting one's likelihood of accessing care (e.g., age, gender) as well as beliefs or attitudes, knowledge, and values about health or health services that may influence utilization; (2) the presence or absence of enabling resources that make it easier to utilize care, and (3) clinical need for care.

The health beliefs portion of the Andersen model for the present study included whether respondents had concerns about GLB-related stigmatization (Clark et al., 2003; Kinsler et al., 2007; Malebranche et al., 2004) on the part of VHA providers or other VHA patients. In addition, after accounting for the other aspects of the Andersen model, we evaluated whether three different types of GLB-related stressors experienced during military service were associated with likelihood of VHA utilization: (1) degree of anxiety regarding the need to conceal one's sexual orientation; (2) a history of one or more interpersonal traumas experienced during military service that respondents perceived to be related to their sexual orientation (e.g., physical or sexual assault that was due to GLB status), and (3) a history of one or more stressful experiences initiated by the military to investigate or punish GLB status (e.g., isolated from unit, interrogated about one's own or other's sexual orientation, etc.; see Bowling, Firestone, & Harris, 2005; Burks, 2011; Shilts, 1993). Based on previous work evaluating the correlates of VHA utilization, we hypothesized that older age, female gender, lower income, lower educational attainment (Haskell et al., 2011; Nelson et al., 2007; Ouimette, Wolfe, Daley, & Gima, 2003), and greater psychiatric and physical health problems (Fasoli et al., 2010; Maguen et al., 2007) would all be associated with greater likelihood of lifetime and past-year VHA utilization. In order to evaluate whether GLB-related factors have a bearing on VHA utilization, we also tested whether concerns about experiencing stigmatization by VHA providers or other veterans, having a greater degree of anxiety regarding concealing GLB status during military service, and having had either one or more GLB-related military interpersonal traumas or one or more stressful experiences initiated by the military to investigate or punish GLB status were associated with lower probability of lifetime and past-year VHA utilization For this initial evaluation, we did not separate VHA mental health care from other types of care.

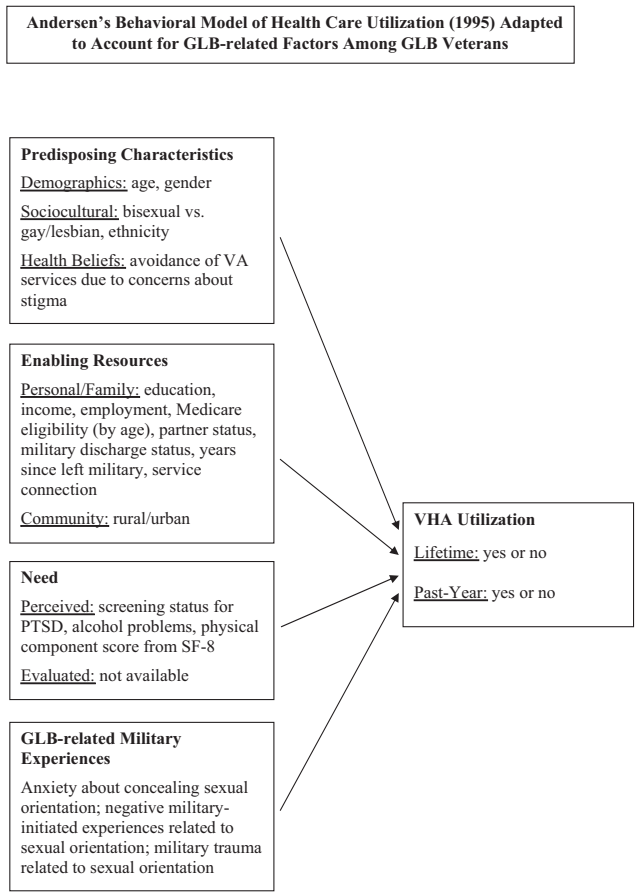

Figure 1. Andersen's Health Beliefs Model of health care utilization (1995) adapted to account for GLB-related factors among GLB veterans.

Methods

Participants

A convenience sample of gay, lesbian, bisexual, and transgender (GLBT) individuals ($n = 416$) participated in a survey regarding veterans' military experiences, mental and physical health, health care utilization, and their relationships. Because this study focused on GLB veterans, individuals who identified their sexual orientation as heterosexual ($n = 5$) or other ($n = 12$) were excluded. In addition, those who identified their gender as transgender ($n = 28$) or other ($n = 5$) were excluded from the present analysis because of insufficient representation; our aim was to focus on GLB veterans, and although some aspects of their experiences of stigmatization and prejudice are undoubtedly similar to those of GLB veterans, many aspects are likely unique and are best investigated separately (Dean et al., 2000). Current active-duty military personnel were also excluded ($n = 23$) as they have not transitioned to veteran status and therefore would be unlikely to have accessed VHA services. Some participants met multiple exclusionary criteria. The final sample was composed of 356 GLB veterans.

Procedure

From May 2004 to January 2005, participants were recruited via national on-line sources and print periodicals that specifically serve the GLBT veterans community and the GLBT community at large using electronic mail lists, websites, and newspapers. No participants were recruited from within VHA. The advertisement directed interested individuals to an Internet address with a link to the study information form. Those interested provided consent to participate and did not disclose any personal identifying information, thus allowing them to remain anonymous so as to provide a safe context for disclosure. Once participants gave consent to participate by clicking that they agreed to the study conditions, a link to the survey was provided. There was no financial remuneration for study participation.

The protocol was approved by the Institutional Review Board under the University of Washington.

Materials

VHA utilization (dependent variables), reasons for not using VHA, and communication with VHA providers about sexual orientation (descriptive variables). Lifetime and past-year VHA utilization status were queried by asking participants whether they had ever used each of 16 specific types of services and whether they had used them in the past year (see Table 1). Lifetime VHA utilization was determined to be positive if a participant indicated having used at least one of the 16 services, and the same procedure was used to determine past-year VHA utilization status. Participants who had never utilized VHA services were asked to indicate which of eight reasons were relevant in their decision to not utilize VHA care, including "I have other insurance coverage" and "I am concerned that the VA staff would not accept my sexual orientation." Participants who had utilized VHA were asked whether their VA providers knew about their sexual orientation and how often it was discussed with them.

Individual characteristics (independent variables).

Demographic and sociocultural factors. Gender (male vs. female), age (continuously scaled), sexual orientation (gay/lesbian vs. bisexual), and ethnicity (non-Hispanic white vs. minority group membership) were assessed.

GLB adapted health belief factor. All participants were asked to indicate whether they would like to access any of 16 VHA services but do not because of concerns about GLB stigmatization (at least one such service; yes/no).

Enabling resource factors. The following enabling factors were assessed: highest level of education (less than bachelor degree vs. bachelor degree or higher), Medicare eligibility (less than 65 years vs. 65 and older), annual family income (less than

Table 1
*Rates of Specific VHA Services Used Lifetime and Past Year for the Overall Sample (*N = *356)*

VHA service	Lifetime		Past year		Avoided due to stigma	
	n	%	*n*	%	*n*	%
General outpatient medical care	99	27.8	71	19.9	35	9.8
Specialty outpatient medical care	76	21.3	38	10.7	20	5.6
Emergency room	45	12.6	9	2.5	17	4.8
Inpatient medical care	35	9.8	3	0.8	18	5.1
Vision care	39	11.0	30	8.4	30	8.4
Dental care	35	9.8	14	3.9	35	9.8
Individual counseling	39	11.0	21	5.9	38	10.7
Group counseling	11	3.1	3	0.8	23	6.5
Individual substance abuse treatment	2	0.6	1	<0.1	7	2.0
Group substance abuse treatment	2	0.6	0	—	6	1.7
Inpatient psychiatric care	13	3.6	0	—	4	1.1
Vocational rehabilitation	36	10.1	4	1.1	14	3.9
Special services/evaluations	13	3.6	2	0.6	4	1.1
Social work	9	2.5	1	<0.1	7	2.0
Clergy/chaplain services	3	0.8	1	<0.1	6	1.7
Other	40	11.2	26	7.3	21	5.9

Note. VHA = Veterans Health Care Administration.

$25,000 vs. $25,000 or higher (U.S. Department of Health and Human Services, 2010), employment status (not employed vs. employed at least part-time), relationship status (partnered vs. not partnered), military discharge status (honorable or general vs. other), years since leaving military (continuously scaled), service connection status (i.e., veterans who are service connected receive a monthly monetary payment to compensate for a condition or injury related to military service; yes/no), and size of the city/town the respondents reside in (population less than 50,000 vs. population 50,000 or greater (Wikipedia contributors, 2011).

Need factors. Posttraumatic stress disorder (PTSD) symptoms were assessed using the PTSD Checklist Civilian Version (PCL-C; (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996), a 17-item self-report measure that corresponds directly to the *DSM–IV–R* criteria for PTSD (American Psychiatric Association, 2000). PCL-C values of 38 for women (Dobie et al., 2002) and 44 for men (Blanchard et al., 1996) were used as cutoff scores for identifying respondents who screened positive for a likely diagnosis of PTSD. Cronbach's alpha for the PCL-C was .95 for this sample.

Depression for the 2-week period preceding survey completion was assessed using the Patient Health Questionnaire-9 (PHQ-9; Kroenke, Spitzer, & Williams, 2001). All but one veteran who screened positive for major depressive disorder (MDD) also screened positive for PTSD, so PTSD and MDD status were combined to make the following categories for the logistic regression models: neither, PTSD only, PTSD and MDD. Cronbach's alpha for the PHQ-9 was .94 in the present sample.

Past-year alcohol consumption and alcohol-related consequences were assessed using the Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). A standard cut score of 8 was used to indicate likely problem-drinking status (problem drinker, yes/no). The Cronbach's alpha for the AUDIT was .80 in the present study.

The health status and health-related quality-of-life of respondents were assessed using the Short Form-8 (SF-8; Ware, Kosinski, Dewey, & Gandek, 2001). Physical functioning, role limitations due to physical problems, bodily pain, general health, and vitality were assessed using Physical Component Summary (PCS) scores, which range from 0 to 100. Higher PCS scores reflect a greater quality of life (continuous PCS scores were used in the model) and the Crohnbach's alpha for the PCS was .89 in the present sample.

GLB military experiences. Based on information provided by Shilts (1993) regarding the types of challenges GLB military members may have faced when they were banned from military service, we created two original scales to evaluate whether the GLB veteran' in our sample experienced such situations during their military service (Cochran, Balsam, Flentje, Malte, & Simpson, in press). The first scale was comprised of 26 items and was subjected to a principal components analysis using varimax rotation. The four components identified accounted for 41.99% of the total variance (anxiety around concealment, transition to civilian life, reflections on military career, and degree of support experienced during military). Only the first subscale had adequate internal reliability (Crohnbach's $\alpha = .73$) and was used in the present study. It is comprised of eight items, and the factor loadings ranged from .371 to .781. Sample items from this subscale include "If I had let people in the service know of my sexual orientation, I probably would have been harmed physically" and "In the service, I was constantly trying to conceal my sexual orientation." Participants responded to each item on a scale from 1 to 5, where 1 = *strongly agree* and 5 = *strongly disagree*; lower scores indicate greater anxiety about concealing one's sexual orientation. We used a continuous score for this assessment because virtually all participants reported concealment anxiety to some degree.

The second scale consists of eight items that assess whether any stressful experiences initiated by the military to investigate or punish GLB status occurred during military service, including incarceration, forced psychiatric evaluation, dismissal from the military, or isolation from their unit due to sexual orientation. Because these experiences are individually relatively rare and multiple instances are fairly unlikely to have happened to the same person, we dichotomized this subscale for use in the analyses (any such experience: yes/no).

The Life Events Questionnaire from the Clinician-Administered PTSD Scale (Blake et al., 1995) assesses 16 potentially traumatic events (e.g., natural disasters, accidents, physical assault, sexual assault, etc.). It was adapted to assess whether each trauma type occurred before, during, or after military service. In addition, individuals who endorsed interpersonal traumas, such as physical or sexual assault, during the military were asked whether they perceived that it was due to their sexual orientation (any such experience: yes/no).

Data Analysis

Univariate analyses were conducted on all the predictor variables (chi-square for categorical variables and independent sample *t* tests for ratio and interval scale variables) to identify which variables differed across veterans who did and did not report lifetime VHA utilization and across those who did and did not report past-year VHA utilization. This was done to reduce the number of variables for the logistic regressions for the following Andersen model categories: demographic and sociocultural characteristics, enabling resources, and clinical need. An alpha level of $p < .10$ was used to retain variables with marginally significant differences in the models in order to be more conservative and so as to be sure to take into account things that are typically included in studies of health care use, such as age. Differences between VHA users and nonusers on the GLB variables were also analyzed, but in light of our specific interest in these variables, they were all entered into the multivariate equations. Variables that showed differentiation on either lifetime or past-year VHA utilization status, or both, were used in both the lifetime and past-year regression models to maintain a consistent set of independent variables.

Hierarchical logistic regressions were conducted to determine whether self-reported VHA utilization and nonutilization (both lifetime and past year) could be reliably predicted and if so, by which independent variables; the Wald statistic was used to determine significance ($p < .05$). Hierarchical logistic regression was used so that the contributions of the specific aspects of the adapted Andersen model could be examined separately and controlled for sequentially as is typically done when using this model for evaluating factors associated with health care utilization (see Elhai et al., 2008; Fasoli et al., 2010). The blocks of variables were entered in accordance with Andersen's model as follows: demographic and sociocultural factors (i.e., age, gender with female as the reference

group), GLB-adapted health belief factor (concern about GLB-related stigma at VHA), enabling factors (i.e., family income, service connection, employment status, years since left military), clinical need factors (i.e., PTSD diagnostic screen status, SF-8 physical component scale score), and GLB-related negative military experiences (i.e., severity of anxiety about concealing GLB identity, history of GLB investigation or punishment, history of GLB-related interpersonal trauma). Cases with missing data relevant to the models were excluded ($n = 33$).

Results

Sample characteristics are presented in Table 2. Participants' ages ranged from 19 to 83. Nearly one third of the participants was female, and nearly all (94.4%) identified themselves as gay or lesbian, as opposed to bisexual (5.6%).

Rates of VHA Utilization, Reasons for Not Utilizing VHA, and Disclosure of GLB Status to VHA Providers

The rates of utilization for the 16 VHA services queried for both lifetime and during the past year may be found in Table 1. The lifetime rate of self-reported VHA utilization for all participants was 45.8% ($n = 163$), and past-year VHA utilization for all participants was 28.7% ($n = 102$; see Table 2 for details). The proportion of respondents reporting that they do not access specific services they would like to access due to concerns about GLB-related stigmatization are also included in Table 1. Approximately one quarter ($n = 91$; 25.6%) of respondents said that they avoid using at least one VHA service they would like to access because of concerns about stigmatization, with 55 (15.4%) indicating that they avoid two or more types of VHA services for these reasons. The services that were most frequently avoided were individual counseling, general outpatient medical care, and dental care.

Among those who reported never having utilized VHA, nearly three quarters reported that they have other health insurance, and a small proportion cited concerns that VHA staff or patients would not accept their sexuality. Among those who reported having utilized VHA health care, over one third reported that their VHA providers definitely do not know about their sexuality and one third reported that they talk, at least sometimes, with their VHA providers about issues related to their sexuality (see Table 3).

Univariate Associations With VHA Utilization Status

The univariate associations with lifetime and past-year VHA utilization are presented in Table 2. Lifetime VHA utilization was associated with female gender, older age, unemployment, annual family income of less than $25,000, positive service connection, greater number of years since leaving the military, positive PTSD screen, worse physical functioning, and history of at least one

Table 2
*Overall Sample Characteristics (*N *= 356) and Sample Characteristics by VHA Utilization Status*

Sample characteristics	Overall sample ($N = 356$)	Lifetime		Current	
		VHA yes ($n = 162$)	VHA no ($n = 194$)	VHA yes ($n = 102$)	VHA no ($n = 254$)
Demographic factors					
Age	45.4 (13.3)	46.8 (12.5)	44.1 (13.8)*	47.2 (13.4)	44.7 (13.2)
Gender; female	30.3%	34.6%	26.8%*	40.2%	26.4%***
Sociocultural factors					
Ethnicity; non-Hispanic white	87.9%	87.7%	88.1%	86.3%	88.6%
Sexual orientation; lesbian/gay	94.4%	93.2%	95.4%	93.1%	94.9%
Health belief factor					
Concern regarding stigma at VA	25.6%	23.5%	27.3%	31.4%	23.2%*
Enabling factors					
Education; >4-year degree	61.8%	64.2%	59.8%	61.8%	61.8%
Employment; employed	67.1%	58.6%	74.2%****	49.0%	74.4%****
Medicare eligible; 65 or older	8.1%	8.0%	8.2%	10.8%	7.1%
Annual family income; >$25,000	84.6%	79.2%	89.1%**	75.2%	88.4%***
Relationship status; partnered	48.3%	48.8%	47.9%	46.1%	49.2%
Military discharge; honorable/general	96.3%	99.4%	93.6%	99.0%	94.9%
Service connection status; positive	21.9%	40.7%	6.2%****	50.0%	10.6%****
Years since left the military	16.5 (13.2)	17.8 (13.2)	15.5 (13.2)*	17.4 (13.7)	16.2 (13.0)
Size of community; urban setting	74.4%	75.3%	73.7%	70.6%	76.0%
Clinical need (subjective)					
PTSD diagnostic screen; positive	26.0%	32.7%	20.3%***	36.3%	21.8%***
MDD screen; positive	5.8%	9.4%	2.7%	13.7%	2.4%
Problem drinking screen; positive	11.8%	13.0%	10.8%	12.7%	11.4%
Physical Component Scale score	50.5 (9.5)	48.5 (10.1)	52.2 (8.6)****	45.8 (11.1)	52.4 (8.0)****
GLB military experiences					
GLB-related military trauma; yes	46.3%	51.2%	42.8%*	53.9%	43.7%*
GLB military-initiated stressor; yes	52.5%	50.0%	54.6%	51.0%	53.1%
Degree of GLB concealment anxiety	2.6 (0.8)	2.3 (0.9)	2.4 (0.8)	2.2 (0.9)	2.4 (0.8)**

Note. Values are mean with standard deviation in parentheses, except for those labeled as percentage. VHA = Veterans Health Care Administration; PTSD = posttraumatic stress disorder; MDD = depressive disorder.
* $p < .10$. ** $p < .05$. *** $p < .01$. **** $p < .001$.

Table 3
GLB Veterans' Rate of VHA Utilization and Reasons for Not Utilizing VHA

VHA utilization information	*n* (%)
Ever used VHA services	163 (45.8)
Physical health services only	84 (23.6)
Any mental health services	43 (12.1)
ER or other[a] only	36 (10.1)
Used VHA in past 12 months	102 (28.7)
Physical health services only	58 (16.3)
Any mental health services	22 (6.2)
ER or other[a] only	22 (6.2)
Reasons for not utilizing VHA services[b] (n = 187)	
Other insurance coverage	140 (74.9)
Uncomfortable with atmosphere at the VHA	31 (16.6)
Concerned regarding confidentiality	21 (11.2)
Concerned that VHA staff would not accept sexual orientation	22 (11.8)
Concerned that other VHA patients would not accept sexual orientation	12 (6.4)
Other	38 (20.3)
Perceptions of VHA staff's knowledge of respondents' sexuality and willingness to discuss respondents' sexuality (n = 122)[c]	
Definitely does not know	45 (36.9)
Might or probably knows but never talk about it	20 (16.4)
Knows but rarely talk about it	17 (13.9)
Sometimes or openly talk about it	40 (32.8)

Note. GLB = gay, lesbian, and bisexual; VHA = Veterans Health Care Administration; ER = emergency room.
[a] Other includes special evaluations (e.g., agent orange, Gulf War Syndrome), vocational rehabilitation services, social work assistance, and clergy/chaplain services. [b] Multiple responses were allowed. [c] Of the 160 who have received VHA services, 38 did not respond to these questions.

interpersonal trauma during military service related to respondent's GLB status. Past-year VHA utilization was associated with all of the same variables as lifetime utilization except for the following differences: years since leaving the military was not associated with past-year utilization, whereas greater concerns about GLB-related stigma on the part of VHA providers and patients and greater anxiety about GLB-related concealment during military service were positively associated with past-year utilization. Variables that were not associated with either lifetime or past-year VHA utilization included ethnicity, sexual orientation (i.e., lesbian/gay vs. bisexual), educational attainment, Medicare eligibility, relationships status, military discharge status, years since leaving the military, size of community, depression status, and problem drinking status.

Multivariate Predictors of Lifetime VHA Utilization

Hierarchical logistical regression analysis found that lifetime VHA utilization was predicted by positive service connection, positive screen for both PTSD and depression, and history of at least one military interpersonal trauma that was related to respondents' sexual orientation (see Table 4; note that a positive PTSD screen alone did not add significant variance to the model). Odds ratios (ORs) indicate that whether participants were service connected was the main determinant of whether they had ever used VHA services, with those reporting service connection being more than 11 times more likely to have received services (OR lifetime: 11.37). Additionally, those who screened positive for both PTSD and depression were nearly twice as likely to have ever obtained VHA care (OR lifetime: 1.77) and relatedly, those who reported at least one interpersonal military trauma that was perceived to be GLB-related were nearly twice as likely to have ever received VHA care (OR lifetime: 1.82). The Hosmer and Lemesow Test for the final model suggests that there is not a significant lack of fit (χ^2 statistic = 2.3, df = 8, p = .97).

Multivariate Predictors of Past-Year VHA Utilization

Hierarchical logistical regression analysis found that past-year VHA utilization was predicted by female gender, positive service connection, positive screen for both PTSD and depression, lower

Table 4
Logistic Regression Predictors of Lifetime and Past-Year VHA Utilization

Predictors	Lifetime OR (95% CL) (n = 323)	Past year OR (95% CL) (n = 323)
Demographic and sociocultural factors		
Age	1.00 [0.96, 1.03]	1.02 [0.98, 1.06]
Gender; female	1.65 [0.90, 3.02]	2.05 [1.02, 4.13]*
GLB adapted health belief factor		
Don't use at least some VA due to stigma	0.54 [0.28, 1.02]	1.36 [0.68, 2.73]
Enabling factors		
Family income at least $25,000	0.48 [0.21, 1.07	0.51 [0.21, 1.28
Service connected	11.37 [5.42, 23.85]**	10.35 [5.15, 20.80]**
Employed	0.76 [0.40, 1.41]	0.55 [0.27, 1.15]
Years since military discharge	1.02 [0.99, 1.06]	1.00 [0.96, 1.03]
Clinical need factors		
PTSD and MDD screen; positive	1.77 [1.07, 2.92]*	1.78 [1.02, 3.09]*
Physical Component Scale score	0.98 [0.96, 1.01]	0.95 [0.92, 0.99]**
GLB-related military experiences		
Severity of GLB military anxiety	1.06 [0.78, 1.44]	0.90 [0.61, 1.32]
At least 1 GLB military-initiated stressor	0.63 [0.35, 1.12]	0.42 [0.21, 0.87]*
At least 1 GLB military trauma	1.82 [1.02, 3.24]*	2.16 [1.07, 4.36]*

Note. OR = odds ratio; CL = confidence limits; VHA = Veterans Health Care Administration; MDD = depressive disorder.
* $p < .05$. ** $p < .001$.

physical functioning, history of at least one military interpersonal trauma that was related to respondents' sexual orientation, and having no history of stressful experiences initiated by the military to investigate or punish GLB status (see Table 4; note, again, that a positive PTSD screen alone did not add significant variance to the model). Again, the strongest correlate of past-year VHA utilization was service connection status, with those who were positive on this factor being more than 10 times more likely to have received recent VHA care (OR past year: 10.35). In addition, women were twice as likely to have used VHA services in the past year than were men (OR past year: 2.05), those with both PTSD and depression were nearly twice as likely to use VHA (OR past year: 1.78), and those with worse physical health were somewhat more likely to use VHA (OR past year: 0.95). With regard to the GLB variables, those who had at least one stressful experience initiated by the military to investigate or punish GLB status were less than half as likely to have used VHA in the past year (OR past year: 0.42), whereas those with at least one GLB-related interpersonal military trauma were more than two times more likely to have used VHA in the past year (OR past year: 2.16). The Hosmer and Lemesow Test for the final model suggests that there is not a significant lack of fit (χ^2 statistic = 8.2, df = 8, p = .41).

Discussion

The present study is the first to evaluate the rates and correlates of self-reported VHA utilization among GLB veterans. Nearly half (45.8%) of the GLB veterans surveyed reported lifetime VHA utilization, and almost 29% reported VHA utilization in the past year. The rate of past-year VHA utilization seen in our sample is approximately 6.3% higher than the VHA Central Office estimate of the rate of past-year VHA utilization among all veterans in fiscal year 2005 (National Center for Veterans Analysis & Statistics, 2011) and two times higher than the rate reported by Nelson and her colleagues (Nelson et al., 2007). This finding mitigates concerns that GLB veterans may disproportionately not utilize VHA care.

Our findings from the multivariate hierarchical logistical regressions further indicate that lifetime VHA utilization was associated with positive service connection, positive screen for both PTSD and depression, and history of at least one GLB-related interpersonal trauma while in the military. Past-year VHA utilization was associated with positive service connection, female gender, greater clinical need, GLB-related interpersonal trauma, but having no history of stressful experience initiated by the military to investigate or punish GLB status. Anxiety regarding the concealment of one's sexual orientation during military service did not add significantly to the multivariate models nor did concerns about GLB stigma at VHA.

It is noteworthy that positive service connection for a military-related disability, positive screen for both PTSD and depression, and history of military interpersonal trauma that was related to respondents' sexual orientation were all significantly associated with both lifetime and past-year VHA utilization, suggesting that the nature of a trauma adds appreciable variance to the likelihood of utilizing care at VHA for these veterans. Although we originally hypothesized that GLB-related military traumas would be associated with *lower* rates of VHA utilization, data from the civilian sector on the impact of hate crimes against GLB individuals suggests that distress is greater in the aftermath of such traumas than traumas that do not involve hate crimes (Herek, Gillis, & Cogan, 1999; Herek, Gillis, Cogan, & Glunt, 1997), and there is some evidence that GLB-related discrimination is associated with greater mental health care utilization (Burgess et al., 2007). It will be important for future studies to evaluate this finding, but if replicated, it may suggest that GLB veterans with histories of military interpersonal trauma that was related to their sexual orientation are more likely to utilize VHA than their peers without such trauma histories. If this holds true, it will be especially important for VHA providers to be sensitive to this added level of trauma complexity by carefully assessing for it and taking it into account in treatment planning (Kaysen, Lostutter, & Goines, 2005; Martell, Safren, & Prince, 2004).

In contrast, GLB veterans who experienced at least one stressful experience initiated by the military to investigate or punish their GLB status, such as being interrogated regarding sexual orientation, forced to leave the military due to sexual orientation, or isolated from one's unit due to suspected homosexuality, were significantly less likely to have utilized VHA in the past year. It is possible that undergoing GLB-related stressors that were initiated by the military led to a deeper mistrust of related structural entities such as VHA, unlike GLB-related traumas, which were presumably not initiated by the formal military structure. However, this factor did not significantly influence lifetime VHA utilization, and it will be important to see if the relationship with more recent VHA utilization is replicated in other study samples.

Unexpectedly, we found that GLB veterans' concerns about how they would be treated at VHA did not add significantly to the multivariate models regarding lifetime and past-year VHA utilization, although in the univariate analyses greater concern regarding stigma was associated with greater likelihood of utilizing VHA health care in the past year. Again, this was contrary to our hypotheses and should be evaluated in future studies. However, because approximately a quarter of the overall sample reported avoiding at least one type of VHA service due to concerns about stigma toward GLB individuals, our findings indicate this is an area in need of attention by VHA (Clark et al., 2003; Malebranche et al., 2004). The types of services most frequently avoided due to concerns about stigma included individual counseling, general outpatient medical care, and dental care. Because concerns about stigma may influence other outcomes of interest to VHA, including treatment progress, patient relationships with providers, and patient satisfaction with care, it is critical that VHA address discriminatory practices or attitudes on the part of staff or other veterans. It would also be beneficial for VHA to engage in direct outreach to GLB veterans to help dispel concerns about stigma and to foster greater confidence that they will be treated with respect and dignity. This is especially urgent in light of recent findings from the 2005–2010 Massachusetts State BRFSS data set indicating that GLB veterans are two times more likely than their heterosexual peers to be at risk for having seriously considered suicide in the past 12 months (Blosnich, Bossarte, & Silenzio, 2012). Given the substantial increased risk for GLB veterans, these findings suggest, along with our finding that individual counseling may be especially avoided by GLB veterans, that it is critical that VHA remove as many barriers to care as possible, including perceptions that VHA may not be welcoming of GLB veterans.

It is also of concern that nearly 37% of the GLB veterans who have obtained VHA services are certain that their VHA providers do not know about their sexual orientation and that another 43% of GLB veterans indicate that their providers might or definitely know but that sexual orientation-related issues are rarely, if ever, discussed. This finding is consistent with GLB patient–provider relationships in civilian settings, where providers are often uncomfortable addressing issues germane to sexual orientation (Hinchliff, Gott, & Galena, 2005), and GLB patients' perceptions of such provider unease have been found to negatively influence health care utilization rates (Clark et al., 2003; Kinsler et al., 2007; Steele, Tinmouth, & Lu, 2006). In the present study, this finding may be due to provider discomfort or veterans themselves preferring to keep this information private from health care providers (Mayer et al., 2008). Lack of open communication about sexual orientation could compromise the quality of care that GLB veterans receive as well as their overall health; this is therefore another important issue for VHA to address.

Consistent with Joint Commission hospital accreditation guidelines, VHA is in the process of revising its nondiscrimination policies for veteran patients to include sexual orientation (www.jointcommission.org/lgbt/; The Joint Commission, 2012). Along with this important policy step, it is critical that VHA provide thoughtful training to staff regarding GLB as well as transgender veterans that facilitates providers learning how to sensitively assess sexual orientation and whether it is related to any of the veterans' presenting complaints, as well as stresses the importance of creating a nonjudgmental and open atmosphere that promotes disclosure. This may be an especially important next step given our findings that GLB veterans are in fact entering and using VHA, but are unlikely to openly discuss their sexuality with health care provides. Staff training in assessing the types of discriminatory experiences these veterans may have had while in military service as well as prior to and following service and how to document this information in the medical record while taking into account the individual veteran's preferences regarding privacy is also critical.

Although the present study represents an important addition to the literature, it also has a number of limitations. First, these self-report data are cross-sectional, and we therefore cannot assume causality between the factors in the regression models and VHA utilization. Second, we did not include a comparison sample of heterosexual veterans, and therefore we cannot draw firm conclusions about the similarities and differences between our GLB veteran participants and other veterans with regard to their rates and correlates of VHA utilization. Third, we did not ask all participants whether they have health insurance other than VHA. Fourth, although the sample was recruited from community-based venues rather than from VHA facilities, the sample is fairly homogeneous, being composed of mostly male, gay or lesbian (as opposed to bisexual), and white respondents. Indeed, the sample had a greater proportion of non-Hispanic white veterans (nearly 88%) than the overall veteran population during 2005 (81%; http://www.va.gov/vetdata/Veteran_Population.asp). Additionally, the present sample is markedly younger than the overall veteran population was in fiscal year 2005 (present sample mean age: 45.4; overall veteran mean age: 59.2; http://www.va.gov/vetdata/Veteran_Population.asp). However, it is noteworthy that the proportion of female respondents was about 30%, which is markedly higher than the proportion of female veterans overall during 2005 (7.1%; http://www.va.gov/vetdata/Veteran_Population.asp). Thus, our sample is not representative of the overall veteran population with which we are comparing VHA utilization rates. It is possible that the markedly larger proportion of women veterans in the present sample relative to veterans overall is contributing to the relatively high rates of VHA utilization reported by our sample, though this may be offset by the fact that the present sample is, on average, nearly 15 years younger than the average age of veterans at large. The rate of past-year VHA utilization among the men in our sample was 24.6%, which is only slightly greater than the rate for veterans overall. This is in contrast with 38% of the women in our sample reporting having used VHA services in the past year. This finding is similar to gender differences reported in the civilian literature, with women reporting higher medical care service utilization than men (Bertakis, Azari, Helms, Callahan, & Robbins, 2000). Finally, these results are based on a convenience sample rather than a sample of randomly identified participants. Therefore, it may differ from the general population of GLB veterans in additional unknown ways. As it becomes more acceptable to include questions about sexual orientation in demographic assessment instruments used in VHA and veteran studies, it will become possible to obtain more representative samples and to identify whether there are important differences between GLB and heterosexual veterans that need to be taken into account in various clinical settings.

In conclusion, by using official information from VHA as the basis for comparison, we found that GLB veterans appear to access VHA at generally the same or higher rates than the overall veteran population. However, this finding needs to be viewed in light of the relatively large proportion of women in our sample. We also found that even when standard aspects of Andersen's Emerging Health Behavioral Model were accounted for, military interpersonal trauma that was related to respondents' sexual orientation and having no history of stressful experiences initiated by the military to investigate or punish GLB status were associated with use of VHA services. In addition, our findings that a substantial proportion of GLB veterans who utilize VHA do not have open communication with their providers about their sexual orientation and that a sizable minority avoid using at least some VHA services due to concerns about stigmatization suggest that VHA should strive to bring its care of all veterans into alignment with its core mission and values. Although DADT has now been repealed and henceforth GLB military personnel may legally serve openly, many GLB veterans undoubtedly carry painful memories of discrimination and trauma from their military service that may influence their decisions whether to receive their health care from VA, and it will be important that VA be welcoming and ready to meet their needs. Those experiences of discrimination and trauma will also need to be sensitively assessed and taken into account in treatment planning.

References

American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revised (DSM–IV–R)*. Washington, DC: American Psychiatric Association.

Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: Does it matter? *Journal of Health and Social Behavior, 36,* 1–10.

Andersen, R. M. (2008). National health surveys and the behavioral model of health services use. *Medical Care, 46,* 647–653. doi:10.1097/MLR.0b013e31817a835d00005650-200807000-00002[pii]

Austin, E. L., & Irwin, J. A. (2010). Health behaviors and health care utilization of southern lesbians. *Women and Health Issues, 20,* 178–184. doi:S1049-3867(10)00006-X[pii]10.1016/j.whi.2010.01.002

Bertakis, K. D., Azari, R., Helms, L. J., Callahan, E. J., & Robbins, J. A. (2000). Gender differences in the utilization of health care services. [Comparative Study Research Support, U.S. Government, PHS]. *Journal of Family Practice, 49,* 147–152.

Blake, D. D., Weathers, F. W., Nagy, L. M., Kaloupek, D. G., Gusman, F. D., Charney, D. S., & Keane, T. M. (1995). The development of a Clinician-Administered PTSD Scale. *Journal of Trauma Stress, 8,* 75–90.

Blanchard, E. B., Jones-Alexander, J., Buckley, T. C., & Forneris, C. A. (1996). Psychometric properties of the PTSD Checklist (PCL). *Behaviour Research and Therapy, 34,* 669–673. doi:0005-7967(96)00033-2[pii]

Blosnich, J. R., Bossarte, R. M., & Silenzio, V. M. (2012). Suicidal ideation among sexual minority veterans: Results from the 2005–2010 Massachusetts Behavioral Risk Factor Surveillance Survey. *American Journal of Public Health, 102*(Suppl. 1), S44–S47. doi:10.2105/AJPH.2011.300565

Bowen, M. E., & Gonzalez, H. M. (2008). Racial/ethnic differences in the relationship between the use of health care services and functional disability: The health and retirement study (1992–2004). *Gerontologist, 48,* 659–667. doi:48/5/659[pii]

Bowling, K., Firestone, J., & Harris, R. (2005). Analyzing questions that cannot be asked of respondents who cannot respond. *Armed Forces & Society, 31,* 411–437.

Buchmueller, T., & Carpenter, C. S. (2010). Disparities in health insurance coverage, access, and outcomes for individuals in same-sex versus different-sex relationships, 2000–2007. *American Journal of Public Health, 100,* 489–495. doi:AJPH.2009.160804[pii]10.2105/AJPH.2009.160804

Burgess, D., Tran, A., Lee, R., & van Ryn, M. (2007). Effects of perceived discrimination on mental health and mental health services utilization among gay, lesbian, bisexual and transgender persons. *Journal of LGBT Health Research, 3,* 1–14.

Burks, D. J. (2011). Lesbian, gay, and bisexual victimization in the military: An unintended consequence of "Don't Ask, Don't Tell"? *American Psychologist, 66,* 604–613. doi:2011-17695-001[pii]10.1037/a0024609

Clark, M. A., Bonacore, L., Wright, S. J., Armstrong, G., & Rakowski, W. (2003). The cancer screening project for women: Experiences of women who partner with women and women who partner with men. *Women and Health, 38,* 19–33. doi:10.1300/J013v38n02_02

Cochran, B. N., Balsam, K., Flentje, A., Malte, C. A., & Simpson, T.. (in press). Mental health characteristics of sexual minority veterans. *Journal of Homosexuality*.

Datti, P., & Conyers, L. (2010). Application of the behavioral model of service utilization to predicting factors associated with vocational rehabilitation use among a sample of Latino men with HIV/AIDS in New York State. *Journal of Vocational Rehabilitation, 33,* 15–25.

Dean, L., Meyer, I. H., Robinson, K., Sell, R. L., Sember, R., Silenzio, V. M. B., . . . Xavier, J. (2000). Lesbian, gay, bisexual, and transgender health: Findings and concerns. *Journal of the Gay Lesbian Medical Association, 4,* 102–151.

Dhingra, S. S., Zack, M., Strine, T., Pearson, W. S., & Balluz, L. (2010). Determining prevalence and correlates of psychiatric treatment with Andersen's behavioral model of health services use. *Psychiatric Services, 61,* 524–528. doi:61/5/524[pii]10.1176/appi.ps.61.5.524

Dobie, D. J., Kivlahan, D. R., Maynard, C., Bush, K. R., McFall, M., Epler, A. J., & Bradley, K. A. (2002). Screening for post-traumatic stress disorder in female Veteran's Affairs patients: Validation of the PTSD checklist. *General Hospital Psychiatry, 24,* 367–374.

Elhai, J. D., Grubaugh, A. L., Richardson, J. D., Egede, L. E., & Creamer, M. (2008). Outpatient medical and mental healthcare utilization models among military veterans: Results from the 2001 National Survey of Veterans. *Journal of Psychiatric Research, 42,* 858–867. doi:S0022-3956(07)00153-7[pii]10.1016/j.jpsychires.2007.09.006

Fasoli, D. R., Glickman, M. E., & Eisen, S. V. (2010). Predisposing characteristics, enabling resources and need as predictors of utilization and clinical outcomes for veterans receiving mental health services. *Medical Care, 48,* 288–295.

Gates, G. J. (2004, September 28). Gay men and lesbians in the military: Estimates from census 2000. The Urban Institute. Retrieved from http://www.urban.org/UploadedPDF/411069_GayLesbianMilitary.pdf

Grella, C. E., Greenwell, L., Mays, V. M., & Cochran, S. D. (2009). Influence of gender, sexual orientation, and need on treatment utilization for substance use and mental disorders: Findings from the California Quality of Life Survey. *BMC Psychiatry, 9,* 52. doi:1471-244X-9-52[pii]10.1186/1471-244X-9-52

Haskell, S. G., Mattocks, K., Goulet, J. L., Krebs, E. E., Skanderson, M., Leslie, D., . . . Brandt, C. (2011). The burden of illness in the first year home: Do male and female VA users differ in health conditions and healthcare utilization. *Women and Health Issues, 21,* 92–97. doi:S1049-3867(10)00100-3[pii]10.1016/j.whi.2010.08.001

Herek, G. M., Gillis, J. R., & Cogan, J. C. (1999). Psychological sequelae of hate-crime victimization among lesbian, gay, and bisexual adults. *Journal of Consulting and Clinical Psychology, 67,* 945–951.

Herek, G., Gillis, J., Cogan, J., & Glunt, E. (1997). Hate crime victimization among lesbian, gay, and bisexual adults. *Journal of Interpersonal Violence* [serial on-line], *12,* 195–215.

Hinchliff, S., Gott, M., & Galena, E. (2005). 'I daresay I might find it embarrassing': general practitioners' perspectives on discussing sexual health issues with lesbian and gay patients. *Health & Social Care in the Community, 13,* 345–353. doi:HSC566[pii]10.1111/j.1365-2524.2005.00566.x

Kaysen, D., Lostutter, T. W., & Goines, M. A. (2005). Cognitive processing therapy for acute stress disorder resulting from an anti-gay assault. *Cognitive and Behavioral Practice, 12,* 278–289.

Kerker, B. D., Mostashari, F., & Thorpe, L. (2006). Health care access and utilization among women who have sex with women: Sexual behavior and identity. *Journal of Urban Health, 83,* 970–979. doi:10.1007/s11524-006-9096-8

Kinsler, J. J., Wong, M. D., Sayles, J. N., Davis, C., & Cunningham, W. E. (2007). The effect of perceived stigma from a health care provider on access to care among a low-income HIV-positive population. *AIDS Patient Care and STDs, 21,* 584–592. doi:10.1089/apc.2006.0202

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine, 16,* 606–613. doi:jgi01114[pii]

Maguen, S., Schumm, J., Norris, R., Taft, C., Litz, B., King, L., & King, D. (2007). Predictors of mental and physical health service utilization among Vietnam veterans. *Psychological Services, 4,* 168–180.

Malebranche, D. J., Peterson, J. L., Fullilove, R. E., & Stackhouse, R. W. (2004). Race and sexual identity: Perceptions about medical culture and healthcare among Black men who have sex with men. *Journal of the National Medical Association, 96,* 97–107.

Martell, C. R., Safren, S. A., & Prince, S. E. (2004). *Cognitive-behavioral therapies with lesbian, gay, and bisexual clients*. New York, NY: Guilford Press.

Mayer, K. H., Bradford, J. B., Makadon, H. J., Stall, R., Goldhammer, H., & Landers, S. (2008). Sexual and gender minority health: What we know and what needs to be done. *American Journal of Public Health, 98,* 989–995. doi:AJPH.2007.127811[pii]10.2105/AJPH.2007.127811

Moradi, B. (2009). Sexual orientation disclosure, concealment, harassment, and military cohesion: Perceptions of LGBT military veterans. *Military Psychology, 21,* 513–533.

National Center for Veterans Analysis and Statistics. (2011). VA performance & accountability report; 2005 archive: U.S. Department of Veterans Affairs. Available at http://www.va.gov/vetdata/Veteran_Population.asp

Nelson, K. M., Starkebaum, G. A., & Reiber, G. E. (2007). Veterans using and uninsured veterans not using Veterans Affairs (VA) health care. *Public Health Reports, 122,* 93–100.

Ouimette, P., Wolfe, J., Daley, J., & Gima, K. (2003). Use of VA health care services by women veterans: Findings from a national sample. *Women and Health, 38,* 77–91. doi:10.1300/J013v38n02_06

Saunders, J. B., Aasland, O. G., Babor, T. F., de la Fuente, J. R., & Grant, M. (1993). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption–II. *Addiction, 88,* 791–804.

Shilts, R. (1993). *Conduct unbecoming: Lesbians and gays in the U.S. military*. New York, NY: St. Martin's Press.

Steele, L. S., Tinmouth, J. M., & Lu, A. (2006). Regular health care use by lesbians: A path analysis of predictive factors. *Family Practice, 23,* 631–636. doi:cml030[pii]10.1093/fampra/cml030

The Joint Commission. (2012). *Advancing effective communication, cultural competence, and patient- and family-centered care for the lesbian, gay, bisexual, and transgender (LGBT) community: A field guide*. Oak Brook, IL: The Joint Commission.

U.S. Department of Health and Human Services. (2010). *The 2004 HHS poverty guidelines: One version of the [U. S.] federal poverty measure*. Washington, DC: U. S. Department of Health and Human Services. Available at http://aspe.hhs.gov/poverty/04poverty.shtml

Ware, J., Kosinski, M., Dewey, J., & Gandek, B. (2001). How to score and interpret single-item health status measures: A manual for users of the SF-8 Health Survey. Lincoln, RI: QualityMetric Incorporated.

Wikipedia contributors. (2011). Rural area. *Wikipedia: The Free Encyclopedia*. Available at http://en.wikipedia.org/wiki/Rural_area

Received March 22, 2012
Revision received September 21, 2012
Accepted October 2, 2012 ■