Gender differences in Generalized Anxiety Disorder: Results from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC)

Oriana Vesga-López, M.D.[a], **Franklin Schneier, M.D.**[a], **Samuel Wang, B.S.**[a], **Richard Heimberg, Ph.D.**[b], **Shang-Min Liu, M.S.**[a], **Deborah S. Hasin, Ph.D.**[a], and **Carlos Blanco, M.D., Ph.D.**[a]

[a]Department of Psychiatry, New York State Psychiatric Institute, College of Physicians and Surgeons of Columbia University, New York, NY

[b]Department of Psychology, Temple University, Philadelphia, PA

Abstract

Objective—To assess gender differences in the epidemiology, comorbidity and treatment-seeking patterns of DSM-IV Generalized Anxiety Disorder (GAD) in the United States.

Method—Data were derived from the 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), a large cross-sectional survey of a representative sample (N=43,093) of the U.S. population.

Results—The lifetime and twelve-month male:female prevalence ratios of DSM-IV GAD were 1:1.9 and 1:2.2, respectively. Men with GAD had significantly higher rates of comorbid alcohol and drug use disorders, nicotine dependence, and antisocial personality disorder. Women with GAD had significantly higher rates of comorbid mood disorders (except bipolar disorder) and anxiety disorders (except social anxiety disorder). Men with GAD reported greater use of alcohol and non-prescription medications to help relieve GAD symptoms. GAD in women was associated with higher family history of depression. Disability associated with GAD was greater in women than in men. Rates of treatment-seeking for DSM-IV GAD were low for both genders, but particularly low among men.

Conclusion—There are significant gender differences in the prevalence, comorbidity pattern, sociodemographic and clinical correlates, course, and treatment-seeking rates of persons with DSM-IV GAD. Increased recognition and treatment of GAD, particularly among men, could lead to a substantial reductions in the societal and personal burden and improve the quality of life of those afflicted with this disorder.

INTRODUCTION

In anticipation of the publication of the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-V), the American Psychiatric Association has called attention to the need to examine gender similarities and differences in the anxiety disorders.[1] Generalized anxiety disorder (GAD) is a highly prevalent,[2–4] chronic,[5–9] disabling condition,[2, 10, 11] often associated with other psychiatric disorders,[2, 12] and with significant personal, societal and economic burden.[13–15]

Research in other anxiety disorders, including panic disorder, obsessive-compulsive disorder[16] (OCD) and social anxiety disorder,[17] has documented gender differences in prevalence, patterns of comorbidity, and rates of treatment-seeking. From the clinical point of view, gender-specific demographic characteristics, comorbidity, symptom presentation, and severity can help alert clinicians about the different presentations of the disorder, influence selection of target behaviors and the sequence of interventions, and address gender-specific issues related to the delivery of mental health services. From the epidemiological point of view, a better understanding of gender differences in GAD is also important because features of GAD that are invariant across genders are likely to be more central to the disorder. Gender differences in the phenomenology of GAD may be the result of core etiological mechanisms (e.g., genetic factors) that are expressed differently due environmental, cultural, sex-role orientation, or biological differences. Alternatively, they may be due to the presence of specific etiological factors (e.g., hormones) with differential influence across genders. Therefore, examination of gender differences in GAD may provide clues regarding similarities and differences in its etiology between men and women.

Data from epidemiological studies indicate that women have two to three times higher lifetime risk for GAD than men;[1, 18] however, none of these studies has directly examined differences in the epidemiology of GAD by gender. Research in GAD has documented gender differences in clinical presentation, course, comorbidity, and pharmacologic treatment response.[6, 7, 19–21] These data, derived from clinical samples, suggest that women with GAD have an earlier age of onset,[6, 7, 20] report more somatic symptoms,[20] tend to have lower rates of remission and relapse,[6, 22] and exhibit higher rates of psychiatric comorbidity,[20] and poorer response to antidepressant treatment[21] than men with GAD. Overall, female gender has been associated with having worse outcome of GAD.[23] Those studies, however, were limited by their small sample sizes,[20, 21] failure to use DSM-IV criteria,[6, 7] and reliance on treatment-seeking samples.[20, 21]

Because much current knowledge about GAD is derived from clinical samples, it may not generalize to individuals with GAD in the community. Furthermore, these studies did not examine gender differences in risk factors, pattern of psychiatric and physical comorbidity, symptoms, disability, and treatment-seeking behaviors among persons with GAD.

In view of the limitations of prior research, we sought to assess for the first time data on gender differences in GAD in a nationally representative sample in the United States from the National Institute on Alcohol Abuse and Alcoholism's (NIAAA) 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC).[24] The specific goals

of this study were: (1) to provide information on national prevalence estimates and sociodemographic characteristics of DSM-IV GAD stratified by gender; (2) to compare men and women with DSM-IV GAD with respect to rates of other psychopathology; and, (3) to investigate gender differences in the clinical presentation, course, associated disability, and treatment-seeking patterns of persons with DSM-IV GAD.

METHOD

NESARC Sample

The 2001–2002 NESARC surveyed a representative sample of the United States population.[24] The target population was individuals age 18 years and older in the civilian noninstitutional population residing in households and group living quarters. The survey included residents of the continental United States, District of Columbia, Alaska and Hawaii. Face-to-face personal interviews were conducted with 43,093 respondents. The survey response rate was 81%. Blacks, Hispanics, and young adults (ages 18–24) were oversampled. The research protocol, including informed consent procedures, received full ethical review and approval from the U.S. Census Bureau and the U.S. Office of Management and Budget.

Interviewer Training

Interviews were conducted by approximately 1,800 professional interviewers from the US Census Bureau. On average, the interviewers had 5 years of experience working on census and other health-related national surveys. Training was standardized under the direction of the NIAAA. All interviewers completed in-person training at one of the US Census Bureau's regional offices.

Assessment

Sociodemographic Measures—Sociodemographic measures included age, race-ethnicity, nativity, marital status, urbanicity, and region of the country. Socioeconomic measures included education, personal and family income measured as categorical variables, and type of health insurance.

DSM-IV Diagnostic Interview—The diagnostic interview was the NIAAA Alcohol Use Disorder and Associated Disability Interview Schedule - DSM-IV version (AUDADIS-IV).[25] This diagnostic interview, designed for lay interviewers, was developed to advance measurement of substance use and mental disorders in large-scale surveys. The test-test reliability and validity of AUDADIS-IV measures of DSM-IV disorders have been reported elsewhere.[26, 27]

DSM-IV GAD—DSM-IV GAD was diagnosed when excessive anxiety and worry about a number of events or activities were present more days than not for at least 6 months, accompanied by difficulty controlling the worry and at least three of the six DSM-IV GAD somatic symptoms. Lifetime GAD was defined as having at least one episode of GAD over the life course. Respondents with an episode of GAD in the year preceding the interview were classified as having 12-month GAD. To be consistent with previous analyses of GAD

in the NESARC, [2] we included all cases of GAD regardless of temporal overlap with mood disorders. Diagnoses of GAD also required that the DSM-IV clinical significance criterion be met, that is, symptoms of the disorder must have caused clinically significant distress or impairment.

Other Psychiatric Disorders—Like GAD, other anxiety (panic disorder with and without agoraphobia, social anxiety disorder, and specific phobia) and mood (major depressive disorder [MDD], dysthymia, bipolar I, bipolar II) diagnoses in this report are DSM-IV primary diagnoses. Consistent with the way DSM-IV defines primary disorders, AUDADIS-IV "primary" diagnoses include mental disorders that are not due to the direct psychological effect of a substance (e.g. drug or medication) or a general medical condition. Primary does not imply that one disorder was more prominent, more distressing or had an earlier onset than a comorbid psychiatric disorder. All mood and other anxiety disorders satisfied the DSM-IV clinical significance criterion and MDD diagnoses also ruled out bereavement.

Consistent with DSM-IV, AUDADIS-IV diagnoses of alcohol abuse required a respondent to meet at least one of the four criteria defined for abuse in the 12-month period preceding the interview or previouslyand not meet criteria for dependence. Alcohol dependence diagnoses required at least three of the seven DSM-IV criteria for dependence during the past year or prior. For prior diagnoses of alcohol dependence, at least three criteria must have occurred within a 1-year period. Drug use disorder and nicotine dependence diagnoses used the same algorithms.

AUDADIS-IV assessments of DSM-IV personality disorders (PDs) have been described in detail previously.[25] These include avoidant, dependent, obsessive-compulsive, paranoid, schizoid, histrionic and antisocial personality disorders. DSM-IV PD diagnoses require evaluating long-term patterns of functioning. AUDADIS-IV PD diagnoses were made accordingly. Respondents needed to endorse the required number of DSM-IV symptom items for the specific PD, with at least one symptom causing distress or social/occupational dysfunction.

Other Measures—Age of onset, number of episodes, duration of only or longest (if applicable) episode, and use of alcohol and/or drugs to help relieve symptoms of GAD were assessed among respondents with lifetime GAD. To examine the total number of lifetime episodes, respondents were asked how many separate times lasting at least 6 months they experienced the symptoms constituting the criteria for GAD. Respondents were additionally told that these periods had to be separated by at least 2 months without any GAD symptom to be considered separate.

Consistent with previous research,[28] this study included variables that addressed the etiological complexity of internalizing disorders and are known risk factors for anxiety. The risk constructs specified were as follows: (1) predisposing genetic influences, here operationalized as family history of depression; (2) exposure to an adverse family environment, here operationalized as parental absence or separation from a biological parent before age 18; (3) parental loss due to death before age 18; (4) early-onset anxiety, here

operationalized as onset of any anxiety disorder before age 18; and (5) conduct disorder, here operationalized as childhood conduct problems. We also examined two adult risk measures that have featured prominently in the literature on anxiety[29, 30]: (1) stressful life events, here measured with 12 items from the Social Readjustment Rating Scale (e.g, fired from a job, forced to move)[31] and (2) history of trauma and victimization in the past 12 months, here assessed by self-report of having personally been the victim of a crime or attempted crime, such as: being beat up, mugged or attacked by a stranger or someone the person knew, being hit, threatened, or forced to have sex.

To examine the association between GAD and physical health status by gender, additional questions queried: (1) the presence of cardiovascular, gastrointestinal and rheumatoid medical disorders in the last 12 months, ascertained by asking the respondent if a doctor or another health professional had made the diagnosis of any of the aforementioned disorders, and (2) overall health status, assessed by self-report (e.g. in general, would you say your health is excellent, very good, fair or poor?). Twelve-month disability was assessed using the Social Functioning, Role Emotional Functioning, and Mental Health scores of the Short Form-12v2, a reliable and valid measure of impairment often used in population surveys.[32]

Finally, treatment seeking-rates and age at first treatment were ascertained among respondents with lifetime GAD. Respondents with pure lifetime GAD and GAD comorbid with other anxiety, mood and substance use disorders were classified as receiving treatment for their disorder if they ever: (1) visited a counselor, therapist, physician, or psychologist; (2) were a patient in a hospital for at least one night; (3) visited an emergency room; or (4) were prescribed psychotropic medication for a mental disorder.

Statistical Analysis

Weighted percentages and means were computed to derive prevalences, sociodemographic correlates and clinical characteristics of respondents with DSM-IV GAD. Logistic regression analyses yielded odds ratios (ORs), indicating measures of association between: (1) 12-month and lifetime GAD and sociodemographic correlates; (2) 12-month and lifetime GAD and other disorders, adjusted for sociodemographic characteristics; (3) lifetime GAD and other clinical correlates; and (4) lifetime GAD and mental health service utilization. Standard errors for all analyses were estimated using SUDAAN,[33] a software package that adjusts for design characteristics of the survey.

To examine potential mediators of gender differences in disability associated with GAD, we further reanalyzed our data controlling for use of alcohol or drugs to relieve symptoms of GAD. To examine of gender differences in treatment-seeking, we conducted additional analyses controlling for psychiatric comorbidity, severity of GAD, and level of disability. All additional analyses are available upon request.

RESULTS

Prevalence and Sociodemographic Correlates

The lifetime prevalence rates of DSM-IV GAD were 2.8% for men and 5.3% for women, whereas the 12-month rates of GAD were 1.2% for men, and 2.7% for women.

Demographic characteristics of DSM-IV GAD stratified by gender are shown in Table 1. Among respondents with lifetime GAD and the subgroup with 12-month GAD, men were significantly less likely to be black, widowed, or older than age 65, and more likely than women with lifetime and 12-month GAD to fall within the higher personal income categories. Among respondents with 12-month GAD, men were significantly more likely than women to be US-born, and men with lifetime GAD were significantly more likely to have an annual family income between $35,000–69,000 and less likely to be from the South than women with lifetime GAD.

Comorbidity

Men with 12-month and lifetime GAD were significantly more likely than women to have any substance use disorder, any alcohol use disorder, drug dependence, and antisocial personality disorder, and less likely to have specific phobia. In addition, men with lifetime GAD were more likely to have nicotine dependence and drug abuse and significantly less likely to have panic disorder and any mood disorder, except bipolar disorder, than women with lifetime GAD (Table 2).

Course and Clinical Presentation

Mean age at onset of GAD was 32 in men and women. Men with lifetime GAD did not differ significantly from women with lifetime GAD in mean number of episodes or median duration of their longest episode (Table 3).

The clinical presentation of DSM-IV GAD differed significantly by gender. Among individuals with lifetime GAD, men reported use of alcohol, medication, and drugs significantly more often than women to help relieve GAD symptoms, and men were also more likely to report arguments or friction with relatives or friends as a result of the excessive worry. Women were significantly more likely to endorse a higher total number of criteria and more frequently reported being easily fatigued, irritable, and having muscle tension. Women also reported more autonomic, cardiovascular, respiratory and gastrointestinal symptoms than men.

Other Clinical and Health Correlates

Table 4 presents other clinical and physical health correlates, as well as associated measures of disability among respondents with lifetime GAD. Women were significantly more likely than men to report first-degree family history of depression and early onset anxiety. Moreover, lifetime GAD in women was significantly associated with lower mental health scores on the SF-12v2. There were no other significant differences.

Treatment Seeking

Mean ages at first treatment contact were 34.3 for men and 34.8 for women and were not significantly different. Overall, rates of treatment-seeking were very low and differed significantly by gender. Men were significantly less likely than women to seek any lifetime treatment, any outpatient treatment, or to use medication for GAD. Men with GAD and comorbid substance use disorders were more likely than women with GAD and comorbid substance use disorders to seek treatment for substance use disorder. Women with GAD and

comorbid anxiety and mood disorders were more likely than men with these comorbid disorders, to seek treatment for their comorbid disorders (Table 5).

Additional Analyses (available upon request)

To test whether gender differences in disability associated with GAD were mediated by differences in the presence of psychiatric comorbidity, we reanalyzed our disability data controlling for comorbid Axis I psychiatric disorders, which were significantly different between genders. Gender differences in social and emotional functioning, became non-significant after adjusting for mood and anxiety disorders that differed in prevalence between men and women (i.e., MDD, dysthymia, and panic disorder). Additional adjustments for substance use disorders, and use of alcohol or drugs to help relieve symptoms of GAD did not result in any further changes in gender differences in disability associated with GAD.

To examine potential mediators of differences in treatment-seeking between men and women with GAD, we conducted analyses adjusting for the presence or absence of psychiatric comorbidity and severity of the disorder, operationalized as total number of criteria, and level of disability. Adjusting for comorbidity did not lead to changes in differences in rates of any lifetime treatment-seeking between men and women with GAD. Similarly, controlling for symptom severity and level of disability failed to reduce differences in treatment-seeking rates across genders.

DISCUSSION

This is the largest epidemiological study to date to collect data from a nationally representative sample of the general population on gender differences in DSM-IV GAD. Consistent with previous community surveys, the prevalence of GAD was significantly higher in women than in men. We emphasize three major results: (1) associations of GAD with other psychiatric disorders differed by gender, with men presenting with higher rates of substance use disorders, and women with higher rates of mood and other anxiety disorders; (2) men with GAD reported higher rates of use of alcohol and non-prescribed medications to help relieve symptoms of GAD, whereas women reported a higher number of criteria and related physical symptoms (i.e. autonomic, cardiovascular, respiratory, and gastrointestinal) and greater disability; and (3) treatment rates were low for both genders, but particularly among men.

Consistent with previous epidemiological [1] and clinical studies [6, 7] we found that that the prevalence of DSM-IV GAD was higher in women than men. Three complementary reasons, genetic factors, hormonal influences, and vulnerability to environmental stressors, are likely to contribute to this differential prevalence. First, twin studies indicate that the *proportion* of variance in risk for GAD explained by genetic factors is similar across genders.[34–36] In conjunction with the overall higher prevalence of GAD (i.e., absolute risk) in women than men found in this and previous studies, the results from twin studies suggest that the *absolute* contribution of genetic factors to the risk for GAD is larger in women than in men. The higher frequency of individual and family history of depression (a disorder with close genetic links to GAD) among women than men with GAD documented in the present

study are also consistent with a larger *absolute* contribution of genetic factors to GAD in women. Second, other biological mechanisms such as abnormalities in the regulation of the hypothalamic-pituitary adrenal axis and the sympatho-adrenomedullar system, as well as female reproductive hormone cycle events, appear to have a significant influence on risk for, onset, and course of anxiety disorders throughout a woman's life and probably contribute to the differential risk of GAD across genders.[37, 38] Third, previous studies have shown that women are more likely to suffer childhood sexual and physical abuse than men and might be more vulnerable to the development of psychopathology following these traumatic experiences.[39, 40] Thus, the greater rates of these environmental factors in women might also contribute to a higher prevalence of GAD in women than in men. Overall, available data suggest that, although their prevalence and impact seem to be greater for women than men, the environmental risk factors for GAD are qualitatively similar across genders, providing some indirect indication of the validity of this disorder.

Consistent with studies of epidemiological samples,[12] mood disorders and other anxiety disorders co-occurred more frequently in women than in men with lifetime GAD. Our study extends previous findings by documenting that men with lifetime and 12-month GAD were more likely than women to have comorbid substance use disorders and antisocial personality disorder. The prevalence of Axis I and II disorders differed among men and women with GAD. However, the patterns and strengths of associations were similar to those in the general population.[41] This indicates that all gender-specific risk factors for GAD exert their effect through gender-specific increases in the prevalence of GAD, but their effect does not carry over to other psychiatric disorders. As a result, the presence of GAD does not amplify or buffer gender effects on the structure of psychiatric disorders in the community.[35] As the process of formulating DSM-V progresses, it will important to continue to examine the robustness of such structure to gender effects (and the effects of other covariates, such as ethnicity) in other psychiatric disorders.

Contrasting with earlier clinical data[6, 7, 20, 22] showing gender differences in the course of GAD, the NESARC found that men and women do not differ in age at onset, duration of longest episode or total number of GAD episodes during their lifetime. [22, 23, 42] Also in contrast with previous surveys[43] and clinical studies[6, 7, 44] suggesting that GAD episodes commonly persist for a decade or longer, we found GAD is better characterized by an intermittent course with several episodes (3.4 on average) of less than one year duration each. GAD may have a more continuous course among patients in primary care settings[22] or specialized psychiatric care[6] than in individuals with GAD in the community, who may have on average lower levels of severity and rates of comorbidity. Some differences across studies may also be attributable to different operationalizations of remission.

The NESARC found that women tended to endorse a higher number of criteria, to endorse some criteria preferentially, and to be more disabled than men. Men endorsed fewer of the the current diagnostic symptoms of GAD, and they more frequently reported having arguments or friction with family, friends or people at work, and use of alcohol or drugs to help relieve symptoms of GAD. Women with GAD more frequently reported being easily fatigued and experiencing muscle tension, irritability, and somatic symptoms, such as autonomic, respiratory and gastrointestinal disturbances. Two factors may partially account

for this differential pattern across genders: (1) diagnostic criteria are equally valid for men and women, but differences in symptom frequency arise from gender-specific patterns in the reporting of symptoms; or 2) current diagnostic criteria do not adequately embody the symptoms of men with GAD.

Data from previous studies suggest that increased symptom reporting in women is a generic phenomenon, rather than one restricted to certain symptoms, and is independent of psychiatric comorbidity.[45, 46] However, no consistent gender-specific recall patterns have been reported that could lead to an artefactual female preponderance in the reporting of psychiatric symptoms. Differences in the number and type of criteria endorsed may also partly derive from patterns of socialization and gender role orientation.[47] Girls and boys are socialized to develop gender-specific behaviors, traits, and skills. The expression of fear and anxiety may be more socially acceptable in women than men, which may lead to the endorsement of more criteria and more associated physical symptoms in women.[47, 48] Whereas these cultural factors encourage less stoicism and greater expressiveness among women, externalizing behaviors may be more acceptable in men, explaining the higher rates of self-medication symptoms and the reporting of more frequent arguments with relatives and friends. [49]

An alternative explanation for the differential symptom pattern across genders may be that the current diagnostic criteria do not adequately characterize the symptoms of men with GAD. Our data indicate that men with GAD tend to have higher rates of substance use disorders and endorse more frequently arguments with family and friends, as well as use of substances to relieve their anxiety, all of which are externalizing behaviors. It is possible that other externalizing behavior, which have been described in some depressed individuals, [50, 51] such as reacting with anger to stress or minor annoyances, becoming easily angry or enraged with other people, being verbally abusive, and feeling out of control, may sometimes represent symptoms of anxiety in men. Field trials for DSM-V that include a broader array of symptoms may help determine whether those additional symptoms better capture the symptoms experienced by men. Item response theory analyses could help determine whether men and women with GAD have differential probabilities of endorsing particular symptoms, and their influence on prevalence estimates. Subsequently, factor analytic studies could help determine whether the latent structure of GAD is the same for men and women. These analyses would provide additional validation for DSM-IV GAD or suggest the need for modifications in DSM-V.

We also found that, despite their higher comorbidity with substance use disorders, men with GAD exhibited less mental health disability than women. Gender differences in disability and impairment related to GAD may be partially explained by mediating factors that help decrease its severity in men, or in turn contribute to greater severity in women. In this study, men with GAD were observed to have greater rates of use of alcohol or drugs to help relieve symptoms of anxiety. It is possible that self-medication could have been successful in reducing the otherwise greater disability associated with GAD, resulting in significant difference across genders. However, reanalyses of our disability data, first controlling for use of alcohol or drugs to help relieve symptoms of GAD, and then for comorbid substance use disorders, failed to find any significant changes in the observed differential pattern of

disability across genders. Because individuals with mood disorders, particularly MDD are more disabled than those with pure GAD, [10, 52, 53] we examined whether the greater disability in women with GAD could be explained by the significantly higher rate of comorbid mood disorders. Confirming previous studies, our results suggest that greater rates of comorbid mood disorders in women with GAD partially account for the greater impairment observed in this group. It is also possible that the SF-12 mental health score may assesses areas (e.g. social, emotional, and mental functioning) more highly valued by women than men, and whose impairment represents a more significant loss for women.[54]

The NESARC indicated a lack of treatment for individuals with GAD. At the time of interview, fewer than half of the individuals with GAD had sought treatment and, among those, the mean time to treatment-seeking was about two years, consistent with data from previous studies.[55, 56] Consistent with findings in the general population [56–58] and clinical samples of individuals with anxiety disorders,[59, 60] men were half as likely as women to make any mental health contact for the treatment of GAD and comorbid disorders. Several explanations could account for these differences. First, there may be gender-based reporting biases. However, previous studies have found that women are about twice as likely as men to make an outpatient mental health visit whether in self-reported[58, 61] or record-based [62] investigations. Second, previous studies have found that specific psychiatric disorders, and mental health-related disability are all strong independent and additive predictors of mental health services use in the United States.[19, 58, 63] Therefore, gender differences in treatment-seeking rates could be due to differential comorbidity in men and women. However, our reanalyses of treatment-seeking data adjusting for comorbidity failed to find any significant changes in the differences in rates of lifetime treatment-seeking. Alternatively, differences in treatment-seeking could be due to variations in level of need across genders, as measured by the number of criteria endorsed or level of disability. However, reexamination of our treatment data controlling for symptom severity and level of disability also failed to find any reduction in differences in treatment-seeking rates across genders.

Finally, attitudinal differences could lead to differences in treatment-seeking.[63–65] The NESARC did not assess attitudes towards treatment of anxiety disorders. However, unpublished data from the NESARC suggest that men are more likely than women to report blood-injection-injury fears (all additional analyses available upon request). To the extent that some men may associate these situations with health care or may generalize those attitudes towards other aspects of treatment, those fears may contribute to delays in treatment-seeking. Some men may also see their symptoms and treatment-seeking as a form of weakness, which may further contribute to lower treatment rates. The overall higher contact of women with the health care system related to their reproductive health[66] may also positively model women's treatment-seeking attitudes and behavior, and those attitudes may extend to mental health care. At issue is the question of whether the remaining gender difference in use represents an unmet need for care for men and/or inappropriate use for women. Although the magnitude of the difference is not large, the absolute number of individuals affected is large, given the distribution of men and women in the population. From the perspective of allocating resources relative to need, these questions merit further study in different settings and for different providers.

Our study has the limitations common to most large-scale surveys. First, because the NESARC sample only included civilian households and group quarters populations 18 years and older, information was unavailable on adolescents or individuals in prison. Second, the cross-sectional design does not permit elucidation of the impact of the risk of chronicity and disability in GAD conferred by gender and comorbid conditions. Similarly, this cross-sectional design limits the examination of the close relation between GAD and MDD. More prospective longitudinal research about cumulative and sequential comorbidity has been called for to fill the void of developmental information in the DSM-IV.

Despite these limitations, the NESARC constitutes the largest nationally representative survey to date to examine information on gender differences in individuals with GAD. Our study indicates that women have a higher lifetime risk than men of developing GAD, have greater associated disability, have distinct symptomatic and comorbidity patterns, and are more likely to seek treatment. Overall, our findings suggest that men might tend to express their anxiety more often than women through externalizing behaviors. Additional items assessing externalizing behaviors could be considered to better characterize symptoms of GAD in men, and validated using psychometric techniques as well as the criteria proposed by Robbins and Guze.[67] GAD may represent a continuum of symptoms whose distribution varies by gender and has been incompletely evaluated to date. In turn, a new characterization of GAD may lead to a reconsideration of its place in the broader spectrum of psychopathology, which could possibly differ for men and women. Finally, health care initiatives geared towards increasing recognition and treatment of individuals with GAD, particularly among men, could lead to a substantial reductions in the societal and personal burden of GAD and improve the quality of life of those afflicted with this disorder.

Acknowledgments

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Table 1

Prevalence and sociodemographic characteristics of 12-month and lifetime DSM-IV Generalized Anxiety Disorder by gender.

| | 12-Month GAD (n=894) | | | | | | | | Lifetime GAD (n=1,757) | | | | | | | |
| | Male (n=232) | | | Female (n=662) | | | OR | 95%CI | | Male (n=502) | | | Female (n=1,255) | | | OR | 95%CI | |
	%	95%CI		%	95%CI		OR	95%CI		%	95%CI		%	95%CI		OR	95%CI	
Race/Ethnicity																		
White	78.5	71.4	84.3	74.0	69.0	78.5	1.0	1.0	1.0	81.0	76.2	85.0	78.0	74.2	81.3	1.0	1.0	1.0
Black	5.8	3.5	9.4	11.9	9.2	15.3	0.5	0.3	0.8	4.9	3.3	7.1	9.7	7.9	11.8	0.5	0.3	0.8
Asian & Native American	5.5	2.9	10.3	4.9	3.0	7.9	1.1	0.5	2.5	6.5	4.3	9.9	4.6	3.2	6.6	1.4	0.8	2.4
Hispanic	10.1	5.9	16.9	9.1	6.4	12.9	1.0	0.5	2.1	7.6	4.9	11.6	7.7	5.7	10.5	1.0	0.6	1.6
US Born																		
Yes	96.1	92.9	97.9	90.1	86.2	93.0	2.7	1.3	5.4	93.4	89.9	95.7	91.5	88.6	93.7	1.3	0.8	2.2
No	3.9	2.1	7.1	9.9	7.0	13.8	1.0	1.0	1.0	6.6	4.3	10.1	8.5	6.3	11.4	1.0	1.0	1.0
Age																		
18–29	26.4	20.3	33.7	19.8	16.4	23.6	1.0	1.0	1.0	17.8	13.6	23.0	16.3	14.0	18.9	1.0	1.0	1.0
30–44	36.5	29.2	44.5	38.5	34.0	43.3	0.7	0.4	1.1	33.5	28.3	39.1	34.4	31.3	37.7	0.9	0.6	1.3
45–64	32.6	26.3	39.8	32.2	27.9	36.9	0.8	0.5	1.2	41.8	36.2	47.6	37.6	34.4	40.9	1.0	0.7	1.5
65+	4.3	2.5	7.7	9.5	7.3	12.3	0.4	0.2	0.7	6.9	4.8	9.8	11.7	10.0	13.8	0.5	0.3	0.9
Education																		
< High School	21.6	14.9	30.5	15.4	12.4	18.9	1.7	1.0	3.0	15.5	11.7	20.2	13.3	11.1	15.7	1.2	0.8	1.8
High School	34.6	27.4	42.7	31.9	27.4	36.7	1.3	0.9	2.0	28.5	23.7	33.7	31.3	28.0	34.7	0.9	0.7	1.2
College	43.6	35.8	51.9	52.8	48.0	57.6	1.0	1.0	1.0	56.1	50.5	61.5	55.5	51.6	59.3	1.0	1.0	1.0
Individual																		
$0–$19999	45.2	37.3	53.4	66.3	61.6	70.7	1.0	1.0	1.0	35.9	30.6	41.6	60.3	56.6	63.8	1.0	1.0	1.0
$20000–$34999	24.4	17.9	32.4	18.7	15.1	23.0	1.9	1.2	3.2	22.8	18.7	27.5	20.5	18.0	23.3	1.9	1.3	2.6
$35000–$69999	23.3	17.6	30.4	12.5	9.7	15.9	2.8	1.7	4.4	30.5	25.7	35.7	15.9	13.4	18.9	3.2	2.3	4.5
$70000+	6.9	3.9	12.1	2.5	1.3	4.8	4.1	1.6	10.7	10.8	7.9	14.7	3.3	2.2	4.8	5.6	3.2	9.5
Family Income																		
$0–$19999	29.7	22.6	38.0	34.6	30.4	39.0	1.0	1.0	1.0	22.4	18.0	27.3	30.0	27.0	33.2	1.0	1.0	1.0
$20000–$34999	21.8	15.7	29.6	21.7	18.0	26.0	1.2	0.7	2.0	20.0	15.9	24.9	19.9	17.5	22.6	1.4	0.9	2.0

	12-Month GAD (n=894)									Lifetime GAD (n=1,757)								
	Male (n=232)			Female (n=662)			OR	95%CI		Male (n=502)			Female (n=1,255)			OR	95%CI	
	%	95%CI		%	95%CI					%	95%CI		%	95%CI				
$35000–$69999	34.8	26.9	43.8	27.2	23.1	31.6	1.5	0.9	2.4	33.4	31.0	42.2	29.8	26.8	33.0	1.6	1.2	2.3
$70000+	13.5	9.2	19.4	16.6	13.1	20.7	1.0	0.5	1.7	21.2	17.1	26.1	20.3	16.8	24.3	1.4	0.9	2.2
Marital Status																		
Married	57.2	49.0	65.2	49.2	44.6	53.9	1.0	1.0	1.0	60.8	55.6	65.7	52.1	48.7	55.4	1.0	1.0	1.0
Widowed	18.0	13.4	23.7	31.9	28.0	35.9	0.5	0.3	0.8	19.2	15.9	23.1	33.0	30.3	35.9	0.5	0.4	0.7
Never Married	24.7	18.2	32.7	18.9	15.7	22.6	1.1	0.7	1.8	20.0	16.0	24.8	14.9	12.7	17.4	1.2	0.8	1.6
Urbanicity																		
Urban	72.7	63.3	80.5	79.3	73.8	83.8	1.0	1.0	1.0	75.4	68.7	81.0	79.7	75.4	83.4	1.0	1.0	1.0
Rural	27.3	19.5	36.7	20.8	16.2	26.2	1.4	0.9	2.3	24.6	19.0	31.3	20.3	16.6	24.6	1.3	0.9	1.8
Region																		
Northeast	16.4	10.9	23.8	17.0	11.4	24.7	0.7	0.4	1.3	15.7	10.8	22.2	17.2	11.6	24.7	0.7	0.5	1.1
Midwest	28.8	20.3	39.0	26.9	20.9	33.8	0.8	0.5	1.4	29.1	21.9	37.5	27.5	21.6	34.3	0.8	0.6	1.2
South	27.9	20.1	37.3	36.1	29.2	43.6	0.6	0.3	1.0	26.8	20.5	34.2	33.5	27.6	40.0	0.6	0.4	0.9
West	27.0	18.1	38.3	20.1	13.8	28.3	1.0	1.0	1.0	28.5	20.6	37.9	21.8	16.0	29.1	1.0	1.0	1.0
Insurance																		
Public	20.7	13.8	29.9	20.0	16.7	23.7	1.1	0.7	2.0	14.8	11.2	19.5	18.2	15.7	20.9	0.8	0.6	1.2
Private	54.6	46.2	62.8	60.4	55.7	64.9	1.0	1.0	1.0	63.7	58.4	68.8	64.2	60.6	67.7	1.0	1.0	1.0
No Insurance	24.7	17.9	33.0	19.7	16.1	23.8	1.4	0.9	2.2	21.4	17.2	26.4	17.6	14.9	20.7	1.2	0.9	1.7

Table 2

Lifetime and Twelve-month prevalence and adjusted risk of DSM-IV Generalized Anxiety Disorder and other psychiatric disorders by gender.

	12-Month GAD (n=894)						Lifetime GAD (n=1,757)					
	Male (n=232)		Female (n=662)		OR		Male (n=502)		Female (n=1,255)		OR	
	%	(CI)	%	(CI)		(CI)	%	(CI)	%	(CI)		(CI)
Any Psychiatric Disorder[a]	89.8	82.1 94.5	89.7	86.4 92.3	1.0	0.5 2.1	96.1	93.1 97.8	94.4	92.7 95.6	1.5	0.8 2.8
Any Axis I Disorder	80.6	72.9 86.5	83.3	79.6 86.5	0.8	0.5 1.4	93.9	90.4 96.2	92.1	90.3 93.6	1.3	0.8 2.3
Any Substance Use Disorder	30.8	23.9 38.6	14.2	11.3 17.8	2.7	1.7 4.1	74.2	69.3 78.5	51.3	47.9 54.7	2.7	2.1 3.6
Alcohol Use Disorder	24.5	18.1 32.2	10.8	8.2 14.2	2.7	1.7 4.3	65.4	59.9 70.5	36.1	32.8 39.6	3.3	2.6 4.4
Alcohol Abuse	8.3	4.7 14.0	2.7	1.5 4.8	3.3	1.4 7.9	25.4	21.4 29.9	15.9	13.7 18.4	1.8	1.4 2.4
Alcohol Dependence	16.2	11.0 23.4	8.2	5.8 11.3	2.2	1.2 4.0	40.0	34.7 45.5	20.2	17.7 23.0	2.6	2.0 3.5
Any Drug Use Disorder	13.9	8.6 21.6	5.6	3.9 8.1	2.7	1.4 5.2	33.6	28.2 39.6	17.8	15.5 20.4	2.3	1.8 3.1
Drug Abuse	5.9	3.3 10.4	3.2	2.0 5.3	1.9	0.8 4.3	17.9	14.3 22.2	9.0	7.2 11.2	2.2	1.5 3.2
Drug Dependence	10.2	5.5 18.1	3.2	2.0 5.0	3.4	1.6 7.4	15.7	11.4 21.4	8.8	7.0 11.0	1.9	1.3 2.9
Nicotine Dependence	35.1	27.9 43.1	31.7	27.4 36.3	1.2	0.8 1.7	41.7	35.9 47.8	33.4	30.0 37.0	1.4	1.1 1.9
Any Mood Disorder	45.3	37.8 53.1	53.2	48.5 57.9	0.7	0.5 1.1	66.6	60.9 71.8	75.4	72.9 77.8	0.7	0.5 0.9
Major Depressive Disorder	31.2	24.4 38.9	36.7	32.0 41.6	0.8	0.5 1.2	40.9	35.7 46.4	51.3	48.0 54.6	0.7	0.5 0.9
Bipolar 1	10.7	6.7 16.5	11.9	9.1 15.4	0.9	0.5 1.6	19.0	14.9 23.8	16.7	14.4 19.4	1.2	0.8 1.6
Bipolar II	0.4	0.1 1.8	1.8	1.0 3.5	0.2	0.1 1.0	4.7	2.8 7.7	5.2	3.9 6.9	0.9	0.5 1.5
Dysthymia	13.6	9.2 19.7	15.6	12.4 19.5	0.9	0.5 1.5	14.6	11.3 18.6	21.3	18.5 24.3	0.6	0.5 0.9
Any Anxiety Disorder	42.8	35.2 50.8	55.9	50.7 61.0	0.6	0.4 0.6	50.2	44.6 55.8	61.2	57.8 64.5	0.6	0.5 0.8
Panic Disorder	20.3	15.3 26.6	24.6	20.6 29.0	0.8	0.5 1.2	23.7	19.6 28.3	31.5	28.4 34.8	0.7	0.5 0.9
Social Phobia	18.4	13.5 24.6	25.2	20.9 29.9	0.7	0.4 1.0	27.4	23.2 32.1	28.2	24.9 31.8	1.0	0.7 1.3
Specific Phobia	26.7	20.0 34.7	37.0	32.6 41.6	0.6	0.4 1.0	27.9	23.1 33.3	39.6	36.3 43.1	0.6	0.4 0.8
Conduct Disorder	1.9	0.7 5.4	0.7	0.3 1.7	2.9	0.7 12.3	2.3	1.2 4.1	1.2	0.6 2.5	1.8	0.7 4.7
Pathological Gambling	0.1	0.0 0.4	1.1	0.3 3.5	0.1	0.0 0.5	1.2	0.6 2.2	1.1	0.6 2.3	1.1	0.4 2.8
Psychotic Disorder	3.6	1.9 6.5	3.0	1.8 5.0	1.2	0.5 2.8	2.0	1.1 3.4	1.5	0.8 2.5	1.4	0.6 3.1
Any Personality Disorder	64.9	56.9 72.2	58.8	54.2 63.3	1.3	0.9 1.9	56.1	49.9 62.0	50.4	47.0 53.8	1.0	0.6 1.6
Avoidant	25.5	18.0 34.7	20.5	16.5 25.1	1.3	0.8 2.2	19.0	13.9 25.3	16.2	13.6 19.2	0.8	0.5 1.9

	12-Month GAD (n=894)									Lifetime GAD (n=1,757)								
	Male (n=232)			Female (n=662)			OR			Male (n=502)			Female (n=1,255)			OR		
	%	(CI)		%	(CI)			(CI)		%	(CI)		%	(CI)			(CI)	
Dependent	5.9	2.2	14.7	6.7	4.5	9.6	0.9	0.3	2.7	3.9	1.5	9.8	4.8	3.5	6.6	0.8	0.3	2.3
Obsessive-Compulsive	37.9	30.1	46.4	31.7	27.2	36.6	1.3	0.9	2.0	31.6	26.8	36.8	28.0	24.8	31.5	1.2	0.9	1.5
Paranoid	29.9	22.7	38.3	30.7	26.1	35.7	1.0	0.6	1.5	23.4	19.1	28.3	25.2	22.3	28.4	0.9	0.7	1.2
Schizoid	19.2	12.4	28.4	19.0	15.6	22.9	1.0	0.6	1.8	16.3	12.5	21.1	15.4	13.0	18.2	1.1	0.7	1.6
Histrionic	13.1	7.9	20.9	9.0	6.7	12.1	1.5	0.8	2.8	10.0	6.6	14.8	7.7	6.2	9.6	1.3	0.8	2.2
Antisocial	24.4	17.5	33.0	9.1	6.8	12.1	3.2	1.9	5.6	19.1	15.0	24.1	7.2	5.8	9.0	3.0	2.1	4.4

[a] Axis II disorders are lifetime diagnoses

Table 3

Prevalence of DSM-IV Generalized Anxiety Disorder symptoms and course among individuals with lifetime GAD by gender.

| | Lifetime GAD (n=1,757) | | | | | |
| | Male (n=502) | | Female (n=1,255) | | T-test | |
	Mean	95%CI	Mean	95%CI	T-score	p-value
Age at onset (mean)	32.1	30.5 33.7	32.9	31.9 34.0	−0.96	0.3423
Number of episodes mean	3.4	2.3 4.5	3.4	2.8 4.0	−0.07	0.9436
Total Number of Criteria (mean)	4.6	4.5 4.8	5.1	5.0 5.2	−6.19	<0.0001
Duration of longest episode, months (median)	11.5	11.9 11.9	11.7	11.9 11.9		
	%	95%CI	%	95%CI	OR	95%CI
Use of alcohol to help relieve symptoms	25.5	21.2 30.4	15.9	13.5 18.6	1.8	1.3 2.4
Self-medication to help relieve symptoms	10.7	7.8 14.5	5.4	4.1 7.2	2.1	1.3 3.2
Criteria						
Restlessness or feeling keyed up or on edge	91.6	88.4 94.1	92.8	90.7 94.4	0.8	0.5 1.3
Being easily fatigued	74.8	70.1 78.9	86.3	83.9 88.4	0.4	0.3 0.6
Difficulty concentrating or mind going blank	89.3	85.6 92.1	92.7	90.7 94.3	0.6	0.4 1.0
Irritability	81.4	76.3 85.6	86.9	84.3 89.1	0.6	0.4 0.9
Muscle tension	49.0	43.7 54.2	69.4	65.9 72.6	0.4	0.3 0.5
Sleep disturbance	79.1	73.8 83.6	80.1	77.2 82.8	0.9	0.6 1.3
Symptoms						
Associated Autonomic symptoms	63.9	58.4 69.1	72.0	68.6 75.1	0.7	0.5 0.9
Associated cardiovascular symptoms	39.8	34.3 45.5	47.9	44.3 51.4	0.7	0.5 1.0
Associated Respiratory Symptoms	36.5	31.6 41.7	46.0	42.5 49.5	0.7	0.5 0.9
Associated gastrointestinal symptoms	44.0	38.3 49.8	60.7	57.2 64.1	0.5	0.4 0.7
Urinary symptoms	27.5	22.5 33.1	31.7	28.5 35.0	0.8	0.6 1.1
Arguments or friction with relatives or friends	66.2	60.0 71.9	58.7	55.5 61.7	1.4	1.0 1.8
Difficulty or inability to complete daily tasks	78.0	73.1 82.3	75.5	72.5 78.2	1.2	0.9 1.6
Restrict usual activities	57.2	51.5 62.7	54.3	50.8 57.7	1.1	0.9 1.5

Table 4

Other clinical and physical health correlates and disability of DSM-IV Generalized Anxiety Disorder among individuals with lifetime GAD by gender.

	Lifetime GAD (n=1,757)				OR	
	Male (n=502)		Female (n=1,255)			95%CI
	%	95%CI	%	95%CI		
Correlates						
Vulnerable family environment^d	29.3	24.4 – 34.7	33.7	30.1 – 37.5	0.8	0.6 – 1.1
Parental Loss before age 18	12.2	8.8 – 16.6	10.1	8.4 – 12.1	1.2	0.8 – 1.9
Family history of depression	63.3	58.0 – 68.4	72.3	69.2 – 75.1	0.7	0.5 – 0.9
Early onset anxiety^e	57.4	52.2 – 62.5	66.2	62.8 – 69.4	0.7	0.5 – 0.9
Conduct Disorder	2.3	1.2 – 4.1	1.2	0.6 – 2.5	1.8	0.7 – 4.7
Number of stressful life events in the last 12 months	2.7 ^a	2.5 – 2.9	2.7 ^a	2.5 – 2.9	–0.05 ^b	0.9613 ^c
History of trauma or victimization	0.1 ^a	0.05 – 0.2	0.1 ^a	0.1 – 0.2	–0.88 ^b	0.3829 ^c
12-month Medical Conditions						
Cardiovascular Disease	43.4	37.9 – 49.2	42.7	39.1 – 46.5	1.0	0.8 – 1.3
Gastrointestinal Disease	21.5	17.6 – 25.9	21.6	19.1 – 24.3	0.9	0.7 – 1.3
Arthritis	31.1	26.4 – 36.2	37.7	34.1 – 41.4	0.7	0.6 – 0.9
Lifetime Overall Health						
Physical Health good to excellent	64.3	58.3 – 69.9	58.8	54.8 – 62.7	1.3	0.9 – 1.7
Physical health poor	35.7	30.1 – 41.7	41.2	37.3 – 45.1	1.0	1.0 – 1.0
	Mean	95%CI	Mean	95%CI	T-score	p-value
Physical Component Summary Score^f	48.6	47.2 – 50.0	47.3	46.4 – 48.2	1.6	0.1022
Mental Component Summary Score^f	44.7	43.5 – 45.9	41.8	40.9 – 42.7	3.7	0.0004
Social Functioning Scale Score^f	45.5	44.2 – 46.8	43.6	42.6 – 44.6	2.3	0.0266
Role of Emotional Functioning Scale Score^f	44.7	43.1 – 46.3	42.4	41.5 – 43.3	2.5	0.0153
Mental Health Scale Score^f	44.7	43.5 – 45.9	41.3	40.4 – 42.2	4.3	0.0001

^a Mean.

^b T-test: T- score.

[c] p-value.

[d] History of separation from a biological parent.

[e] Onset of any anxiety disorder before age 18.

[f] Short Form-12, version 2 (SF-12-v2).

Table 5

Treatment seeking among respondents with pure lifetime Generalized Anxiety Disorder and comorbid DSM-IV Axis I disorders by gender.

	Male (n=502)		Female (n=1,255)		Lifetime GAD (n=1,757)				
	%	95%CI	%	95%CI	OR	95%CI	Adjusted OR[a]	95%CI	
Any Lifetime Treatment	40.3	35.0 – 45.9	52.8	49.7 – 55.9	0.6	0.5 – 0.8	0.6	0.5 – 0.8	
Lifetime Outpatient treatment seeking	32.0	27.1 – 37.4	44.2	41.1 – 47.4	0.6	0.5 – 0.8	0.6	0.4 – 0.7	
Lifetime Emergency Room/Hospital	5.7	3.7 – 8.8	7.2	5.5 – 9.4	0.8	0.4 – 1.4	0.9	0.5 – 1.6	
Lifetime use of medication	28.9	23.9 – 34.6	39.6	36.1 – 43.2	0.6	0.5 – 0.8	0.6	0.5 – 0.8	
Treatment seeking in the past 12 months	20.9	16.7 – 25.8	26.2	23.3 – 29.3	0.7	0.5 – 1.0	0.8	0.6 – 1.0	
Any lifetime treatment for Comorbid Mood Disorders	65.9	59.9 – 71.5	78.0	74.6 – 81.1	0.5	0.4 – 0.7	0.5	0.4 – 0.8	
Any lifetime treatment for Comorbid Anxiety Disorder[b]	57.6	49.7 – 65.1	70.5	66.5 – 74.2	0.6	0.4 – 0.8	0.5	0.4 – 0.7	
Any lifetime treatment for Comorbid Substance Use Disorder[c]	26.7	21.4 – 32.7	22.4	18.3 – 27.2	1.3	0.8 – 1.8	1.6	1.0 – 2.5	

	Mean	95%CI	Mean	95%CI	T-test		Multiple regression	
					T-score	p-value	Wald-F	p-value
Age when first sought treatment	34.3	31.9 – 36.6	34.8	33.6 – 36.0	−0.41	0.6	0.36	0.5481
Time to Treatment Seeking (years)[d]	1.8	1.08 – 2.5	2.5	1.9 – 3.1	−1.49	0.1	1.83	0.1813

[a] Odds ratios adjusted for race, age, individual income, family income, marital status, region, and insurance.

[b] Anxiety Disorders include panic disorder, social anxiety disorder, and specific phobia.

[c] Substance Use Disorders include alcohol use disorders and drug use disorders.

[d] Among those who sought treatment