

# Cross-sectional Comparison of the Epidemiology of *DSM-5* Generalized Anxiety Disorder Across the Globe

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 Supplemental content

**IMPORTANCE** Generalized anxiety disorder (GAD) is poorly understood compared with other anxiety disorders, and debates persist about the seriousness of this disorder. Few data exist on GAD outside a small number of affluent, industrialized nations. No population-based data exist on GAD as it is currently defined in *DSM-5*.

**OBJECTIVE** To provide the first epidemiologic data on *DSM-5* GAD and explore cross-national differences in its prevalence, course, correlates, and impact.

**DESIGN, SETTING, AND PARTICIPANTS** Data come from the World Health Organization World Mental Health Survey Initiative. Cross-sectional general population surveys were carried out in 26 countries using a consistent research protocol and assessment instrument. A total of 147 261 adults from representative household samples were interviewed face-to-face in the community. The surveys were conducted between 2001 and 2012. Data analysis was performed from July 22, 2015, to December 12, 2016.

**MAIN OUTCOMES AND MEASURES** The Composite International Diagnostic Interview was used to assess GAD along with comorbid disorders, role impairment, and help seeking.

**RESULTS** Respondents were 147 261 adults aged 18 to 99 years. The surveys had a weighted mean response rate of 69.5%. Across surveys, *DSM-5* GAD had a combined lifetime prevalence (SE) of 3.7% (0.1%), 12-month prevalence of 1.8% (0.1%), and 30-day prevalence of 0.8% (0). Prevalence estimates varied widely across countries, with lifetime prevalence highest in high-income countries (5.0% [0.1%]), lower in middle-income countries (2.8% [0.1%]), and lowest in low-income countries (1.6% [0.1%]). Generalized anxiety disorder typically begins in adulthood and persists over time, although onset is later and clinical course is more persistent in lower-income countries. Lifetime comorbidity is high (81.9% [0.7%]), particularly with mood (63.0% [0.9%]) and other anxiety (51.7% [0.9%]) disorders. Severe role impairment is common across life domains (50.6% [1.2%]), particularly in high-income countries. Treatment is sought by approximately half of affected individuals (49.2% [1.2%]), especially those with severe role impairment (59.4% [1.8%]) or comorbid disorders (55.8% [1.4%]) and those living in high-income countries (59.0% [1.3%]).

**CONCLUSIONS AND RELEVANCE** The findings of this study show that *DSM-5* GAD is more prevalent than *DSM-IV* GAD and is associated with substantial role impairment. The disorder is especially common and impairing in high-income countries despite a negative association between GAD and socioeconomic status within countries. These results underscore the public health significance of GAD across the globe while uncovering cross-national differences in prevalence, course, and impairment that require further investigation.

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Understanding of generalized anxiety disorder (GAD) has lagged behind understanding of other anxiety disorders.<sup>1,2</sup> Since its introduction in *DSM-III*,<sup>3</sup> the GAD diagnosis has undergone frequent substantial revision, challenging efforts to accumulate a knowledge base for the disorder. Originally, GAD was considered a “wastebasket diagnosis” presumed to be associated with fairly modest impairment.<sup>4,5</sup> Although GAD has evolved into a well-defined condition characterized by excessive, uncontrollable worry, the assumption that GAD is associated with relatively minimal impairment has persisted in some circles, with the term “worried well” sometimes used to describe affected individuals.<sup>1,6</sup> This assumption may partially account for lower clinical and research attention to GAD than to other emotional disorders.<sup>7,8</sup>

Attention to GAD has been especially limited outside a small number of industrialized, affluent countries in which nearly all research on the disorder has been conducted. There is reason to suspect, however, that GAD may be important not only in affluent countries but also in other parts of the world. In fact, GAD might be more common and impairing in lower-income countries given the greater economic and political instability, insecurity of access to basic necessities, and uncertainty about the future that tend to characterize those countries. In line with this hypothesis, lower socioeconomic status is associated with greater mental illness within countries<sup>9,10</sup>; similar mechanisms could apply across countries as well.

Alternatively, GAD might be less prevalent and impairing in lower-income countries. A GAD diagnosis requires worries to be excessive, and this requirement may be met less often in countries where worry corresponds to realistic everyday concerns. Furthermore, other disorders have been observed to manifest more frequently through somatic than cognitive symptoms in non-Western countries,<sup>11,12</sup> raising the possibility that GAD, which is centrally defined by a cognitive symptom (worry), may be less common in developing than developed countries. Finally, cross-cultural research on other chronic mental disorders suggests that prevalence is often lower and outcomes better in less developed countries, perhaps due to greater provision of support by family and community.<sup>13</sup>

We explored these competing hypotheses using data from the World Mental Health (WMH) Survey Initiative,<sup>14</sup> a coordinated series of general population surveys carried out under the auspices of the World Health Organization (WHO). Two features of the surveys are noteworthy for the present study. First, data were collected in 26 countries of varying income levels. This diversity provided an opportunity to isolate universal characteristics of GAD from characteristics that vary across countries. Second, by lifting the *DSM-IV* hierarchy rule prohibiting the diagnosis of GAD during a mood disorder, the surveys were able to define GAD using *DSM-5* criteria. To our knowledge, these results represent the first community epidemiologic data on *DSM-5* GAD.

## Methods

### Samples and Procedures

Respondents were 147 261 adults, ranging in age from 18 to 99 years, who participated in the WMH surveys. Data from 29 sur-

## Key Points

**Question** What are the patterns and correlates of *DSM-5* generalized anxiety disorder throughout the world?

**Findings** In general population surveys of approximately 150 000 adults in 26 countries, *DSM-5* generalized anxiety disorder has a combined lifetime prevalence of 3.7%, 12-month prevalence of 1.8%, and 30-day prevalence of 0.8%. The disorder is significantly more prevalent and impairing in high-income countries than in low- or middle-income countries.

**Meaning** *DSM-5* generalized anxiety disorder is more prevalent than *DSM-IV* generalized anxiety disorder and is associated with considerable role impairment, especially in high-income countries, underscoring its public health significance.

veys in 26 countries are included in this report (Table 1). The surveys were fielded between 2001 and 2012 and had a weighted mean response rate of 69.5% (eTable 1 in the Supplement). All surveys included nationally or regionally representative samples of the household population. Sampling and weighting methods are detailed elsewhere.<sup>15</sup> To summarize results across surveys, we used World Bank criteria<sup>16</sup> to classify surveys into 3 country-level income groups: (1) low income and lower-middle income, (2) upper-middle income, and (3) high income. We refer to these groups as low, middle, and high income for ease of presentation.

All surveys used the WHO Composite International Diagnostic Interview (CIDI),<sup>17</sup> a validated, fully structured, lay-administered interview. Prior to administration in each country, the CIDI was translated, back-translated, and harmonized using standardized procedures.<sup>18</sup> Consistent training and field quality control procedures were established across countries.<sup>19</sup> Interviews were administered face-to-face in 2 parts. Part 1, which assessed a core set of mental disorders including GAD, was administered to all respondents. Part 2, which assessed additional disorders, was administered to respondents with a part 1 disorder plus a probability subsample of other respondents. Comorbidity analyses were performed using the part 2 sample, which was weighted to adjust for differential probability of selection into part 2. All other analyses used the part 1 sample. A human subjects review board or ethics committee approved the survey protocol in each country (eAppendix in the Supplement), and all respondents gave informed consent; the mode of consent (written vs oral) varied by survey. The presence and type of compensation also varied among surveys.<sup>19</sup>

## Measures

### Generalized Anxiety Disorder

The CIDI was used to assess lifetime, 12-month, and 30-day GAD. In the US survey, lifetime GAD diagnoses based on the CIDI had good concordance<sup>20</sup> with diagnoses based on the clinician-administered Structured Clinical Interview for *DSM-IV* (SCID).<sup>21</sup> A clinical reappraisal study including other WMH surveys did not evaluate GAD in isolation but found good concordance between CIDI and SCID diagnoses of any 12-month anxiety disorder, including GAD.<sup>22</sup> Following the

Table 1. Prevalence of DSM-5 Generalized Anxiety Disorder in the World Mental Health Surveys

Country	Prevalence, No. (%) [SE] <sup>a</sup>				Total Sample, No.
	Lifetime Prevalence	12-mo Prevalence	30-d Prevalence	12-mo Prevalence Among Lifetime Cases	
Low income	596 (1.6) [0.1]	345 (0.9) [0.1]	186 (0.5) [0.1]	345 (59.5) [2.4]	36 498
Colombia	84 (1.9) [0.3]	39 (1.0) [0.2]	17 (0.4) [0.1]	39 (53.8) [7.7]	4426
Iraq	220 (5.0) [0.6]	131 (3.0) [0.4]	82 (2.0) [0.3]	131 (61.3) [4.4]	4332
Nigeria	8 (0.1) [0]	1 (0.0) [0]	0	1 (32.9) [24.0]	6752
Peru	40 (1.1) [0.1]	17 (0.5) [0.1]	2 (0.1) [0]	17 (44.2) [6.7]	3930
PRC Beijing/Shanghai	60 (1.0) [0.1]	36 (0.6) [0.1]	15 (0.3) [0.1]	36 (61.1) [7.1]	5201
PRC Shenzhen	19 (0.2) [0.1]	14 (0.1) [0.1]	0	14 (76.9) [11.3]	7132
Ukraine	165 (3.3) [0.3]	107 (2.1) [0.2]	70 (1.3) [0.1]	107 (63.1) [3.7]	4725
Middle income	875 (2.8) [0.1]	507 (1.6) [0.1]	231 (0.7) [0.1]	507 (56.1) [2.1]	28 927
Brazil	280 (5.1) [0.4]	187 (3.3) [0.3]	100 (1.8) [0.2]	187 (63.4) [3.8]	5037
Bulgaria	125 (2.3) [0.2]	57 (1.2) [0.1]	23 (0.5) [0.1]	57 (49.5) [4.8]	5318
Colombia (Medellin)	127 (3.8) [0.5]	73 (2.1) [0.3]	31 (0.9) [0.2]	73 (56.2) [5.6]	3261
Lebanon	71 (2.3) [0.3]	47 (1.5) [0.3]	22 (0.6) [0.2]	47 (64.5) [7.5]	2857
Mexico	78 (1.1) [0.2]	44 (0.6) [0.1]	19 (0.3) [0.1]	44 (48.8) [7.7]	5782
Romania	27 (1.0) [0.3]	9 (0.2) [0.1]	8 (0.2) [0.1]	9 (24.5) [8.9]	2357
South Africa	167 (3.6) [0.4]	90 (1.9) [0.3]	28 (0.6) [0.1]	90 (53.5) [4.8]	4315
High income	4417 (5.0) [0.1]	2031 (2.3) [0.1]	850 (0.9) [0]	2031 (45.9) [0.9]	81 836
Australia	710 (8.0) [0.5]	312 (3.6) [0.3]	128 (1.5) [0.2]	312 (45.4) [2.7]	8460
Belgium	75 (2.8) [0.5]	27 (0.9) [0.3]	10 (0.3) [0.1]	27 (31.2) [7.1]	2419
France	190 (6.2) [0.5]	61 (2.1) [0.3]	20 (0.6) [0.2]	61 (33.7) [3.7]	2894
Germany	58 (1.5) [0.2]	22 (0.5) [0.1]	6 (0.2) [0.1]	22 (34.8) [7.5]	3555
Israel	216 (4.4) [0.3]	148 (3.1) [0.3]	50 (1.1) [0.2]	148 (70.7) [3.1]	4859
Italy	100 (2.1) [0.3]	28 (0.6) [0.1]	9 (0.2) [0.1]	28 (28.4) [5.2]	4712
Japan	105 (2.6) [0.3]	53 (1.2) [0.2]	8 (0.2) [0.1]	53 (47.6) [5.0]	4129
New Zealand	1084 (7.9) [0.3]	441 (3.1) [0.2]	187 (1.2) [0.1]	441 (38.5) [2.0]	12 790
Northern Ireland	334 (6.4) [0.4]	150 (2.8) [0.3]	82 (1.5) [0.2]	150 (44.2) [3.2]	4340
Poland	90 (0.9) [0.1]	52 (0.5) [0.1]	25 (0.3) [0.1]	52 (58.4) [5.1]	10 081
Portugal	269 (6.1) [0.5]	145 (3.3) [0.3]	45 (1.1) [0.2]	145 (53.0) [3.2]	3849
Spain	131 (1.9) [0.2]	59 (0.8) [0.2]	33 (0.4) [0.1]	59 (43.8) [6.3]	5473
Spain (Murcia)	193 (7.0) [0.9]	111 (4.3) [0.7]	77 (3.0) [0.6]	111 (61.3) [3.3]	2621
The Netherlands	110 (3.6) [0.4]	28 (1.0) [0.2]	13 (0.4) [0.1]	28 (28.2) [5.8]	2372
United States	752 (7.8) [0.3]	394 (4.0) [0.2]	157 (1.6) [0.2]	394 (52.1) [1.8]	9282
All countries	5888 (3.7) [0.1]	2883 (1.8) [0.1]	1267 (0.8) [0]	2883 (48.8) [0.8]	147 261
Comparison between individual countries <sup>b</sup>	85.8	42.7	29.0	6.7	
Comparison between country income groups <sup>c</sup>	311.3	106.5	21.7	20.4	

Abbreviation: PRC, People's Republic of China.

<sup>a</sup> The ratio of numerator to denominator numbers does not equal the reported percentages because the percentages are weighted.

<sup>b</sup>  $\chi^2_{28}$  Test of homogeneity for variation in prevalence estimates across countries; all  $P < .001$ .

<sup>c</sup>  $\chi^2_2$  Test of homogeneity for variation in prevalence estimates across low-, middle-, and high-income countries; all  $P < .001$ .

lead of prior studies that modified the CIDI GAD algorithm to evaluate specific diagnostic changes,<sup>20,23,24</sup> we generated DSM-5 GAD diagnoses by removing the DSM-IV hierarchical exclusion of a GAD diagnosis when symptoms occur exclusively during a mood disorder.<sup>25</sup> Age of onset (AOO) of GAD was assessed using probing methods that have been demonstrated to improve dating accuracy.<sup>26</sup> Persistence of GAD was estimated indirectly by calculating the proportion of respondents with 12-month GAD among those with the lifetime disorder.

#### Impairment

Respondents with 12-month GAD were administered an expanded version of the Sheehan Disability Scale<sup>27</sup> to assess role

impairments caused by the disorder during the worst month in the year before the interview. Respondents rated the extent of interference with home management, work, close relationships, and social life on separate 0-to-10 scales. We grouped ratings into categories of absent (0), mild (1-3), moderate (4-6), and severe (7-10) impairment for analysis. We also assessed the number of days in the past 12 months during which respondents reported being totally unable to work or carry out usual activities because of GAD.

#### Comorbid Disorders

Mental disorders other than GAD were diagnosed using DSM-IV criteria. They included other anxiety disorders (ie, panic disorder, agoraphobia, social phobia, specific phobia, posttrau-

matic stress disorder, and separation anxiety disorder with onset either in childhood or adulthood), mood disorders (ie, major depression and bipolar spectrum disorder<sup>28</sup>), disruptive behavior disorders (ie, oppositional defiant disorder, conduct disorder, intermittent explosive disorder, attention-deficit/hyperactivity disorder, bulimia nervosa, and binge eating disorder), and substance-related disorders (ie, alcohol and drug abuse and dependence).

#### Other Measures

Sociodemographic variables included respondent age, sex, marital status, educational level, household income (stratified into quartiles within country), and employment status at the time of the interview. Treatment seeking was assessed by asking whether respondents received treatment for any mental health or substance-related problem during the past 12 months. Treatment in 4 sectors was probed: specialty mental health, general medical health, human services, and complementary-alternative medicine.

#### Statistical Analysis

Cross-tabulations were used to estimate prevalence, comorbidity, impairment, and treatment. Logistic regression and survival analysis were used to examine sociodemographic correlates. The actuarial method<sup>29</sup> was used to generate AOO survival curves. Design-based SEs were estimated using the Taylor series linearization method<sup>30</sup> implemented in SUDAAN version 11.0<sup>31</sup> to adjust for data weighting and clustering. Statistical significance was evaluated using Wald and McNemar  $\chi^2$  tests. All tests were 2-sided and used a significance threshold of  $P < .05$ . Data analysis was performed from July 22, 2015, to December 12, 2016.

## Results

### Prevalence

Across all surveys, the combined lifetime prevalence of GAD was 3.7%, 12-month prevalence was 1.8%, and 30-day prevalence was 0.8% (Table 1). Lifetime prevalence estimates varied widely across countries, ranging from less than 1% of the populations of Nigeria and Shenzhen, China, to approximately 8% of the populations of Australia, New Zealand, and the United States. Prevalence increased with economic development: lifetime estimates (SE) were lowest in low-income (1.6% [0.1%]), moderate in middle-income (2.8% [0.1%]), and highest in high-income (5.0% [0.1%]) countries.

### Sociodemographic Correlates

Around the world, being female, younger than 60 years, and unmarried (previously married or never married) were associated with GAD (eTable 2 in the Supplement). In addition, GAD was found disproportionately in respondents with lower educational levels, lower household income, and Other employment status (mostly unemployed or disabled). These correlates were relatively modest in magnitude (odds ratio [OR], 1.1; 95% CI, 1.0-1.3 to OR, 1.8; 95% CI, 1.7-2.0) except for the mark-

edly increased odds of GAD among younger cohorts (OR, 3.0; 95% CI, 2.7-3.3 to OR, 6.0; 95% CI, 5.1-7.0). The pattern of correlates was similar across country groups, although GAD was associated less consistently with educational level, household income, and employment status in middle- and low-income countries.

### Onset and Course

Generalized anxiety disorder typically begins in adulthood (eFigure in the Supplement). Onset before puberty was rare in these surveys, with only 5% of cases developing by age 13 years. There was a gradual, steady accumulation of new cases over the lifespan, with 25% of all cases emerging by 25 years, 50% of the cases emerging by 39 years, and 75% of the cases emerging by 53 years. Although the AOO distribution was shifted earlier for high-income countries (median AOO, 36 years) relative to middle- and low-income countries (median AOO, 43 years for both), the distributions were substantively similar across country groups ( $\chi^2_2 = 1.9$ ,  $P = .38$ ).

Consistent with conceptualizations of GAD as a chronic disorder, nearly half of all lifetime cases still had the disorder in the 12 months before the interview (Table 1). Generalized anxiety disorder was more persistent in low-income (59.5%) and middle-income (56.1%) countries than in high-income countries (45.9%). Around the world, persistence was higher for earlier-onset GAD cases, for individuals with lower educational levels and family income, and for those not employed outside the home (ie, Other status, homemaker) (eTable 2 in the Supplement).

### Comorbidity

Most individuals with lifetime (81.9% [0.7%]) and 12-month (70.8% [1.2%]) GAD had 1 or more comorbid DSM-IV/CIDI disorders (Table 2). The odds were highest for lifetime mood and anxiety disorders, lower for disruptive behavior disorders, and lowest for substance-related disorders. The single most common comorbid condition was major depressive disorder, which was found in 52.6% (0.9%) of lifetime cases and 40.9% (1.3%) of 12-month cases of GAD worldwide.

### Role Impairment

Respondents with 12-month GAD reported a mean (SE) of 41.2 days (2.4) out of role due to GAD in the past year. Half (50.6%) of the 12-month cases reported severe functional impairment resulting from GAD (Table 3). The rate of severe impairment was lower yet still substantial (35.3%) among individuals with GAD who had no comorbid disorders (eTable 3 in the Supplement).

The proportion of participants with severe GAD-related impairment was highest in high-income (54.5%), lower in middle-income (42.6%), and lowest in low-income (39.0%) countries. Generalized anxiety disorder was a more disabling disorder in some countries than others, with severe impairment reported by a small minority of persons with GAD in China (17.3% in Shenzhen, 21.8% in Beijing/Shanghai) and Mexico (28.7%) but by a large majority of those with GAD in the Netherlands (80.3%) and Romania (82.3%). Neverthe-

Table 2. Comorbidity of DSM-5 Generalized Anxiety Disorder With DSM-IV Mental Disorders Across Countries<sup>a</sup>

DSM-IV Disorder	Lifetime GAD		12-mo GAD	
	No. (%) [SE] <sup>b</sup>	OR (95% CI) <sup>c</sup>	No. (%) [SE] <sup>d</sup>	OR (95% CI) <sup>e</sup>
Anxiety disorder				
Panic disorder	699 (12.3) [0.7]	9.8 (8.6-11.2)	328 (11.8) [0.9]	15.8 (13.3-18.8)
Agoraphobia	506 (9.4) [0.5]	7.0 (6.1-8.0)	246 (9.0) [0.7]	11.3 (9.3-13.7)
Social phobia	1303 (26.1) [0.9]	9.2 (8.4-10.2)	561 (22.6) [1.2]	12.3 (10.7-14.0)
Specific phobia	1171 (25.6) [0.8]	4.4 (4.0-4.8)	546 (25.2) [1.2]	5.6 (4.9-6.4)
Posttraumatic stress disorder	1208 (21.0) [0.7]	9.2 (8.4-10.2)	415 (14.4) [0.8]	10.8 (9.4-12.4)
Childhood-onset separation anxiety disorder <sup>f</sup>	201 (8.6) [0.7]	4.9 (4.0-6.0)		
Adult-onset separation anxiety disorder	390 (15.5) [0.8]	6.1 (5.3-7.1)	94 (6.9) [0.8]	8.2 (6.2-10.7)
Any anxiety disorder	2929 (51.7) [0.9]	8.0 (7.4-8.7)	1257 (44.0) [1.2]	9.3 (8.5-10.3)
Mood disorder				
Major depressive disorder	3055 (52.6) [0.9]	10.6 (9.7-11.4)	1173 (40.9) [1.3]	16.3 (14.6-18.2)
Bipolar spectrum disorder <sup>g</sup>	544 (11.4) [0.6]	7.6 (6.7-8.7)	267 (10.8) [0.8]	11.5 (9.6-13.8)
Any mood disorder <sup>h</sup>	3657 (63.0) [0.9]	13.4 (12.3-14.4)	1467 (51.1) [1.3]	19.6 (17.6-21.8)
Disruptive behavior disorder				
Oppositional defiant disorder	190 (10.7) [0.9]	4.4 (3.5-5.4)	34 (3.5) [0.7]	8.9 (5.5-14.2)
Conduct disorder	142 (7.8) [0.8]	4.3 (3.4-5.4)	11 (1.0) [0.3]	3.6 (1.8-7.2)
Intermittent explosive disorder	342 (15.0) [1.1]	5.7 (4.7-6.8)	149 (12.1) [1.4]	7.1 (5.5-9.3)
Attention-deficit/hyperactivity disorder	158 (7.5) [0.8]	4.6 (3.7-5.8)	68 (5.8) [0.9]	8.3 (6.0-11.5)
Bulimia nervosa	115 (3.8) [0.4]	5.8 (4.5-7.5)	33 (2.4) [0.5]	9.5 (6.0-15.1)
Binge eating disorder	150 (6.1) [0.6]	4.4 (3.5-5.5)	53 (4.3) [0.8]	6.8 (4.6-10.1)
Any disruptive behavior disorder	566 (10.1) [0.6]	4.0 (3.5-4.4)	122 (8.1) [0.8]	6.2 (5.2-7.4)
Substance-related disorder				
Alcohol abuse	1004 (19.6) [0.8]	2.5 (2.2-2.7)	149 (5.8) [0.6]	2.9 (2.3-2.6)
Alcohol dependence	490 (8.9) [0.5]	4.6 (3.9-5.3)	106 (4.4) [0.6]	6.0 (4.5-8.1)
Drug abuse	459 (10.5) [0.6]	3.9 (3.4-4.5)	71 (3.6) [0.6]	6.9 (4.8-9.8)
Drug dependence	245 (5.3) [0.4]	5.9 (4.8-7.2)	52 (2.5) [0.5]	10.5 (6.8-16.2)
Any substance-related disorder	1141 (22.5) [0.8]	2.7 (2.5-3.0)	221 (9.1) [0.8]	3.9 (3.2-4.7)
Any mental disorder	4627 (81.9) [0.7]	12.3 (11.2-13.6)	1998 (70.8) [1.2]	14.9 (13.2-16.7)

Abbreviations: GAD, generalized anxiety disorder; OR, odds ratio.

<sup>a</sup> The ratio of numerator to denominator numbers does not equal the reported percentages because the percentages are weighted.

<sup>b</sup> Proportion of respondents with lifetime DSM-5 GAD who also qualified for the lifetime DSM-IV disorder in each row.

<sup>c</sup> Based on separate logistic regression models using lifetime GAD to predict each lifetime comorbid disorder; all significant at  $P < .001$ .

<sup>d</sup> Proportion of respondents with 12-month DSM-5 GAD who also qualified for

the 12-month DSM-IV disorder in each row.

<sup>e</sup> Based on separate logistic regression models using 12-month GAD to predict each 12-month comorbid disorder; all significant at  $P < .001$ .

<sup>f</sup> The surveys did not include a 12-month assessment of childhood-onset separation anxiety disorder.

<sup>g</sup> Includes bipolar I disorder, bipolar II disorder, or subthreshold bipolar disorder as defined by Merikangas et al.<sup>28</sup>

<sup>h</sup> Includes major depressive episode and bipolar spectrum disorder.

less, the proportion of severely impaired persons was sizable in most countries (median, 48.6%; interquartile range, 39.4%-56.2%).

### Treatment

Approximately half (49.2%) of respondents with 12-month GAD reported receiving some form of mental health treatment during the previous year (Table 4). Treatment was sought disproportionately by those with comorbid disorders (55.8%) but was also sought by approximately one-third (32.4%) of respondents with GAD alone (eTable 4 in the Supplement). The treatment rate was higher in high-income (59.0%) than in middle-income (29.1%) or low-income (21.7%) countries. However, across countries, the overall pattern was of increasing use of services, particularly specialty mental health services, with increasing impairment due to GAD.

### Discussion

The present findings shed new light on patterns of GAD around the globe. First, we showed that diagnostic changes from DSM-IV to DSM-5 yielded an influx of new GAD cases, as lifetime prevalence estimates reported herein are 37% to 90% higher than published estimates for DSM-IV GAD in the United States.<sup>32,33</sup> In the current WMH surveys, lifetime prevalence is 37% higher and 12-month prevalence is 50% higher for DSM-5 than DSM-IV GAD (Ruscio AM, Hallion LS, Demyttenaere K, Lee S, Lim CCW. Generalized anxiety disorder. In: Scott KM, de Jonge P, Stein DJ, Kessler RC, eds. *The Cross-National Epidemiology of Mental Disorders: Facts and Figures From the World Mental Health Surveys*. Cambridge, England: Cambridge University Press; in press). Although an increase in prevalence was



Table 3. Severity of Role Impairment Associated With 12-Month Generalized Anxiety Disorder by Country Income Level

Country Income	Proportion With Severe Role Impairment, No. (%) [SE] <sup>a,b</sup>					Sample Size, No.
	Home	Work	Relationship	Social	Any <sup>c</sup>	
Low income	79 (23.2) [2.8]	74 (23.7) [3.3]	79 (26.1) [3.4]	67 (24.6) [3.7]	126 (39.0) [3.6]	345
Middle income	120 (25.8) [2.2]	24 (28.7) [3.0]	123 (26.8) [2.2]	128 (28.4) [2.8]	192 (42.6) [3.0]	507
High income	565 (29.4) [1.3]	625 (34.4) [1.4]	628 (33.0) [1.3]	712 (38.1) [1.4]	1049 (54.5) [1.4]	2031
All countries	764 (28.0) [1.1]	816 (32.1) [1.2]	830 (31.1) [1.1]	907 (34.9) [1.2]	1367 (50.6) [1.2]	2883
Comparison between countries <sup>d</sup>	2.5 ( <i>P</i> = .08)	5.4 ( <i>P</i> = .004)	4.1 ( <i>P</i> = .02)	9.6 ( <i>P</i> < .001)	13.0 ( <i>P</i> < .001)	

<sup>a</sup> The ratio of numerator to denominator numbers does not equal the reported percentages because the percentages are weighted.

<sup>b</sup> Sheehan Disability Scale scores for severe impairment range from 7 to 10. Respondents rated the extent of interference with home management, work, close relationships, and social life on separate 0-to-10 scales and were assigned to a severity category based on their highest impairment rating

across the 4 role domains.

<sup>c</sup> Proportion with severe role impairment in at least 1 of the 4 Sheehan Disability Scale role domains.

<sup>d</sup>  $\chi^2$  Test of homogeneity for variation in impairment severity across low-, middle-, and high-income countries.

expected, these estimates reveal that the increase was substantial. The newly identified individuals, who previously were barred from a GAD diagnosis by a concomitant mood disorder, have been shown in outpatient samples to experience a particularly severe form of GAD with a high burden of comorbidity.<sup>34,35</sup> Consistent with this account, we found that more than 80% of people with lifetime GAD experienced another lifetime disorder, most often major depressive disorder. Given the frequent occurrence of GAD during mood episodes and the implications of comorbidity for treatment,<sup>36</sup> these findings underscore the importance of systematic assessment and appropriate management of GAD in patients with mood disorders.

Second, the prevalence of GAD varied widely across countries, with rates generally higher in higher-income countries. This means that the global prevalence of GAD may be considerably lower than the previous best-estimate rates of 6.2% (lifetime) and 2.6% (12-month), which were based exclusively on high-income countries.<sup>37</sup> This finding aligns with the broader pattern of higher rates of psychopathology in wealthier countries<sup>38</sup> that has variously been attributed to methodologic artifacts, differential reporting of mental illness, or differences in risk and protective factors across countries.<sup>39-41</sup> A further possibility specific to GAD is that cognitive symptoms of the disorder may be reported less frequently than somatic symptoms in developing countries,<sup>42,43</sup> implying that clinically significant anxiety in those countries may be missed by the *DSM-5* emphasis on worry. Another possibility is that, when worry is reported, it may focus on a single dominant concern (eg, financial worry)<sup>44</sup> or fail to be judged as excessive owing to genuinely difficult life circumstances.<sup>45</sup> A simple form of this explanation is contradicted by higher rates of GAD in persons of lower socioeconomic status who presumably have the most stress and fewest resources. A more nuanced form is that individual differences in the propensity to worry may be more evident under conditions of relative wealth and stability, such as those found in high-income countries, than under conditions of relative scarcity and instability, where worry may be expected and widespread.

The prevalence of *DSM-5* GAD was concentrated among individuals who were female, younger than 60 years, unmarried, not employed, less educated, and less affluent relative

to national standards. Contrary to most mental disorders,<sup>46</sup> onset of GAD before adulthood was uncommon, occurring in fewer than 25% of the cases. Instead, new cases accrued gradually from puberty through 65 years. These findings are consistent with previous epidemiologic studies in high-income countries<sup>32,47</sup> and suggest that onset or recognition of the disorder is even later in lower-income countries. The relatively shallow AOO distribution seems unlikely to result from retrospective recall biases, as surveys of adolescents have yielded similar findings.<sup>48,49</sup> A more plausible explanation is that GAD may be triggered by stressful life events at any time in the lifespan,<sup>50,51</sup> accounting for the gradual accumulation of cases. Another possibility is that a temperamental predisposition to worry, emerging early in life, does not cause marked distress or impairment until a significant stressor—or chronic stress of the sort associated with the socioeconomic profile characteristic of GAD—overwhelms the individual's capacity to keep worry in check.<sup>52,53</sup> Once GAD begins, it often persists: nearly half of the individuals with lifetime GAD met 12-month criteria for the disorder. However, persistence varied widely, with higher persistence reported in lower-income countries. Taken together, these findings provide mixed support for conventional views of GAD as a chronic condition present since early life.<sup>54-57</sup> Instead, we found that the GAD syndrome usually first emerges in adulthood and that its course, although often unremitting, differs substantially by country.

Contrary to some characterizations of GAD as a disease of the “worried well,”<sup>1,6</sup> GAD was associated with marked disability. Half of the individuals with 12-month GAD reported severe disability in 1 or more life domains resulting from the disorder. Moreover, individuals reported a mean of more than 40 days in the past year when they were completely unable to work or carry out daily activities because of GAD. Finally, GAD was associated with significant help seeking, with approximately half of the individuals with 12-month GAD receiving treatment during the past year. Consistent with conceptions of comorbidity as a severity marker,<sup>58</sup> individuals whose GAD occurred with other disorders reported greater disability due to GAD and greater use of mental health services. However, even in the absence of other disorders, one-third of individuals with GAD reported severe impairment and treatment. These results extend prior findings of general health-related disability

**Table 4. Treatment Seeking Associated With 12-Month Generalized Anxiety Disorder as a Function of Impairment Severity and Country Income Level**

Treatment Sector	Proportion Who Received Mental Health Treatment in the Past 12 mo, No. (%) [SE] <sup>a</sup>			
	All 12-mo GAD Cases	Severity of Role Impairment <sup>b</sup>		
		Mild	Moderate	Severe
<b>Specialty mental health<sup>c</sup></b>				
Low income	14 (3.7) [1.4]			9 (8.4) [3.8]
Middle income	80 (16.5) [2.3]		17 (13.2) [3.9]	40 (22.8) [4.2]
High income	632 (32.3) [1.3]	38 (22.8) [4.7]	128 (23.0) [2.1]	410 (41.8) [2.0]
All countries	726 (26.0) [1.1]	42 (18.1) [3.6]	148 (18.1) [1.6]	459 (35.9) [1.7]
Comparison between countries <sup>d</sup>	72.1 ( <i>P</i> < .001)		30.5 ( <i>P</i> < .001)	23.4 ( <i>P</i> < .001)
<b>General medical<sup>e</sup></b>				
Low income	40 (11.4) [2.2]		13 (11.5) [3.3]	20 (16.0) [4.4]
Middle income	79 (14.7) [2.0]	11 (21.2) [7.0]	17 (10.5) [2.7]	30 (15.9) [3.6]
High income	847 (41.0) [1.4]	64 (36.7) [5.0]	189 (33.4) [2.4]	496 (46.7) [1.9]
All countries	966 (32.8) [1.1]	79 (30.3) [3.9]	219 (26.2) [1.8]	546 (39.4) [1.7]
Comparison between countries <sup>d</sup>	76.8 ( <i>P</i> < .001)	6.4 ( <i>P</i> < .001)	21.9 ( <i>P</i> < .001)	35.2 ( <i>P</i> < .001)
<b>Human services<sup>f</sup></b>				
Low income	17 (6.4) [2.2]		6 (10.1) [5.6]	8 (4.2) [1.2]
Middle income	19 (3.8) [1.0]			13 (6.9) [2.4]
High income	152 (7.6) [0.8]	8 (4.4) [1.6]	30 (4.9) [1.1]	100 (9.8) [1.2]
All countries	188 (6.8) [0.6]	12 (4.7) [1.5]	37 (4.9) [1.1]	121 (8.9) [1.0]
Comparison between countries <sup>d</sup>	4.7 ( <i>P</i> = .01)		8.8 ( <i>P</i> < .001)	4.3 ( <i>P</i> = .01)
<b>Complementary-alternative medicine<sup>g</sup></b>				
Low income	8 (2.4) [0.9]			
Middle income	21 (4.0) [1.5]			12 (7.3) [3.5]
High income	164 (8.2) [0.8]	7 (3.4) [1.4]	37 (6.7) [1.3]	111 (11.6) [1.3]
All countries	193 (6.8) [0.6]	11 (3.6) [1.2]	43 (5.1) [0.9]	126 (10.0) [1.1]
Comparison between countries <sup>d</sup>	12.0 ( <i>P</i> < .001)			9.9 ( <i>P</i> < .001)
<b>Any treatment<sup>h</sup></b>				
Low income	71 (21.7) [3.3]	7 (15.9) [5.6]	23 (23.4) [6.4]	35 (27.4) [5.7]
Middle income	156 (29.1) [2.8]	15 (30.0) [7.6]	35 (24.5) [4.8]	70 (35.9) [4.9]
High income	1205 (59.0) [1.3]	91 (51.8) [4.9]	275 (48.7) [2.5]	705 (67.8) [1.9]
All countries	1432 (49.2) [1.2]	113 (43.3) [4.0]	333 (40.7) [2.2]	810 (59.4) [1.8]
Comparison between countries <sup>d</sup>	73.6 ( <i>P</i> < .001)	7.2 ( <i>P</i> < .001)	12.6 ( <i>P</i> < .001)	28.7 ( <i>P</i> < .001)

Abbreviation: GAD, generalized anxiety disorder.

<sup>a</sup> Empty cells indicate fewer than 5 cases. The ratio of numerator to denominator numbers does not equal the reported percentages because the percentages are weighted.

<sup>b</sup> Based on GAD-related impairment rated on the Sheehan Disability Scale. Sheehan Disability Scale scores were categorized as 1 to 3 (mild), 4 to 6 (moderate), and 7 to 10 (severe). Respondents rated the extent of interference with home management, work, close relationships, and social life on separate 0-to-10 scales and were assigned to a severity category based on their highest impairment rating across the 4 role domains.

<sup>c</sup> Includes psychiatrist, psychologist, or other mental health professional; social worker or counselor in a mental health specialty setting; use of a mental health helpline; or overnight admission for a mental health, drug, or alcohol problem,

with a presumption of daily contact with a psychiatrist.

<sup>d</sup>  $\chi^2$  Test of homogeneity for variation in treatment estimates across low-, middle-, and high-income countries. The test was performed when more than 1 stable cell ( $\geq 5$  cases) was available for comparison.

<sup>e</sup> Includes general practitioner, other medical physician, nurse, occupational therapist, or other health care professional not previously mentioned.

<sup>f</sup> Includes religious or spiritual advisor, or social worker or counselor in any setting other than a specialty mental health setting.

<sup>g</sup> Includes any other type of healer, such as herbalist or homeopath; participation in an internet support group; or participation in a self-help group.

<sup>h</sup> Respondents who sought any form of treatment listed above.

ity and diminished quality of life in GAD<sup>59-61</sup> by quantifying the impairment resulting from GAD in each life domain, showing that impairment is substantial in developing as well as developed countries, and describing the association between impairment and treatment seeking across countries.

Although GAD was impairing in all of the countries included in the present study, it was most impairing in high-

income countries. This finding is particularly striking when contrasted against the greater frequency and persistence of GAD in individuals with lower socioeconomic status relative to national standards. The inverse associations with income at the individual vs national levels have been documented for many mental disorders and could reflect the influence of risk factors that vary with economic development.<sup>62</sup> For ex-

ample, greater industrialization and urbanization in higher-income countries may result in fewer community supports (eg, extended family and religious community) to buffer the impact of stressful events or assist with role functioning. In addition, there may be greater demands on individuals in higher-income countries to achieve independence, occupational success, and social status in a competitive environment, increasing uncertainty and perceived pressure to meet high expectations.<sup>63</sup>

### Limitations

Our large general population sample offered unprecedented statistical power and the opportunity to study GAD in parts of the world in which, to our knowledge, no previous data were available. Nevertheless, the study was limited in several respects. Assessment was performed with fully structured interviews administered by lay interviewers. Clinical reappraisal studies have shown good concordance with the SCID but indicate that CIDI-based prevalence estimates tend to be conservative.<sup>22</sup> Lifetime symptoms and disorder onset were reported retrospectively. Our measure of persistence could not distinguish chronic from recurrent cases and

missed cases that resolved before the preceding 12 months. Finally, although the results varied systematically by country income strata, large differences in prevalence within strata suggest an influence of methodologic variation (eg, sample frames and/or response rates) or substantive factors (eg, sociocultural variables) not accounted for in our analyses.

### Conclusions

Using data from 26 countries, we showed that DSM-5 GAD is a common disorder associated with considerable comorbidity and functional impairment. The disorder typically begins in adulthood, although its onset is later and its course is more persistent in less developed countries. Although GAD is found in similar subgroups within the countries examined, it is more prevalent and impairing in high-income than in low- or middle-income countries. Probing the mechanisms underlying these cross-national differences will advance understanding of GAD and inform debates regarding its validity and global relevance.

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